

Dynamic DNS Web Usability for a Target Market



A Major Qualifying Project
submitted to the Faculty
of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the
Degree of Bachelor of Science
by

Kristen Garza, MIS
Brandon Grace, MIS
William Grudzinski, Jr., MIS
John F. Wyatt Jr., MIS

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Sponsored by:
Dyn Inc.,

Approved by:
Professor Soussan Djamasbi, Advisor

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Abstract

This project examined the usability of the DynDNS website and specifically investigated the process of signing up for services. To achieve the company's goal of attracting new users, particularly those who are not experts in networking, the MQP team examined ways to make Dyn's services easier to access, utilize and understand. These examinations were carried out through three laboratory experiments, including an eye tracking study. Through the analysis of the results of these experiments the MQP team provided recommendations to improve the usability of DynDNS' current website as well as recommendations to improve the processes of signing up for services.

Executive Summary

With the rise of internet use around the world, it is becoming more important for internet users to be able to access their files from any location. DynDNS (Dyn) offers services that allow users to do so using technology such as mail/port forwarding, and dynamic IP management. Dyn's current user base is composed of highly savvy users in regards to the internet and networking.

Dyn is currently interested in expanding their market share to users that are less network savvy than their current user base. One option that is likely to increase the use of Dyn's services by this new user base is by improving the user experience on the site (Djamasbi et al. 2010 a). This project will provide recommendations to improve the user experience of users accessing Dyn's site. Because Human Computer Interaction literature suggests that user experience is a strong predictor of willingness to use a website (Djamasbi et al. 2010 a) the MQP team's suggestions for improving user experience of the site are likely to help Dyn achieve its goal; i.e., increase its market share.

The MQP team examined Dyn's history and practices along with their competitors', and made initial suggestions for the development of a silo site that made it easier for users to sign up for Dyn's services. The team then conducted several studies to make further recommendations for both the new silo site and Dyn's current website. First, an online experiment helped to show that Dyn is likely to attract more new users if it incorporates the search terms that these users utilize to find Dyn's services online. Next, the use of cognitive walkthroughs followed by in-depth interviews allowed the MQP team to understand what users think when they interact with both the current Dyn website and the silo site. Finally, eye-tracking data showing what points users focused on and in what order they visited different elements on the website, helped to determine how Dyn can improve the effective communication of the provided information on its website. These studies as well as their implications, limitations, and avenues for future research are discussed in this document.

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Letter of Acknowledgment



Dyn Inc.
1230 Elm St., Fifth Floor
Manchester, NH 03101

Cory von Wallenstein
Vice President, Product Management
Phone: 508-340-0958
Email: cvw@dyn.com

March 14, 2011

Dr. Soussan Djasasbi
Assistant Professor of MIS
School of Business
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609-2280

Dear Dr. Djasasbi:

The purpose of this letter is to summarize my evaluation of the Major Qualifying Project (MQP) conducted by Kristen Garza, Brandon Grace, William Grudzinski, John Wyatt with the Dyn Inc. team. The basic goal of the project was to evaluate the usability and market reach of the eCommerce site DynDNS.com, identify actionable obstacles to wide-scale adoption and appeal of the site, and conduct a study using a silo web site¹ to assess the performance of the identified improvements.

We at Dyn Inc. are extremely pleased and grateful to have worked with this team, and with the results of the project. With an ambitious scope and a tight timeline, the team immediately hit the ground running, generating a continuous stream of valuable research and analysis for the teams at Dyn Inc. to work with.

In many ways, the output of this MQP (particularly the research into the silo site, the search engine marketing keywords, usability assessments and recommendations) will guide the future development of DynDNS.com through 2011 and beyond. We simply would not be positioned for the future success of this site without the insight and usability guidance of the MQP team.

Sincerely,

A handwritten signature in black ink, appearing to read 'Cory von Wallenstein', written over a horizontal line.

Cory von Wallenstein

¹ <http://www.dyndns.com/mqp2010/>

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1. Introduction

The internet has become a universal mode of communication, from personal communication to e-commerce. A study earlier this year showed that 77.3% of Americans have internet access in their homes (Internet World Stats, 2010). More available internet connectivity allows users to have greater accessibility to their internet-connected devices at home. Users might need to access family photos off a home computer or remotely help grandparents troubleshoot their computer.

Every computer that is online has an Internet Protocol (IP) address. An IP address is a number with four octets. This number serves as the locator for each computer on the internet, and without them computers would not be able to talk to each other. When a user types in `www.google.com` in their web browser, the browser translates that address or domain name into an IP address by querying a DNS server. In this case, the IP would be `173.194.35.104`.

A simple comparison of these addresses is street addresses for houses. If you want to visit your friend's home across town, you need to know their street address. However, if that address keeps changing, then how will you know how to get to their house? The same thing goes for accessing a website or your own computer at home. If the IP address of the computer you are trying to reach keeps changing, then how will you know how to reach it? Most consumer broadband connections are assigned a dynamic IP by the Internet Service Provider. Subscribing to a dynamic IP management service such as DynDNS will keep the DNS record pointing to the correct and current IP.

DynDNS offers services such as mail and port forwarding, and dynamic IP management. Currently, DynDNS is a major contender for dynamic IP services. DynDNS is successfully reaching their current target market; however, that pool is currently saturated. Looking to the future, Dyn Inc. is researching ways to attract new customers, particularly those who are not experts in networking, in

order to increase their total market share and increase their profits. One way to attract these new clients is by providing a better user experience (Djamasbi et al. 2010 b).

The goal of this project was to develop and test a set of recommendations for improving the user experience of the company's website. The goal was achieved by proposing website designs and letting Dyn Inc. develop a site based on those recommendations. Before the group began to develop recommendations for a silo site, we researched industry competitors, evaluated their sites, and examined how new customers could access DynDNS's services more effectively. In this way, we were able to develop our recommendations for the DynDNS website.

This paper will begin by exploring the industry background, and will provide an overview of DynDNS and the current status of its website. After this background, the paper will explain the research and development of recommendations for a silo site, as well as the design of the site that Dyn Inc. developed. The paper will then conclude by describing the research methods used in gathering data about the usability of the new site versus the old site, analysis of the results, and recommendations for future research.

Dyn's goal is to increase their market share by tapping into users that are less network savvy than Dyn's traditional user base. Based on the studies outlined later in this project, the MQP team was able to make recommendations to improve the user experience of those accessing Dyn's site. The implementation of these recommendations is likely to increase the number of Dyn users, therefore allowing DynDNS to accomplish their goal.

2. Background Information

In order to make concrete conclusions about the overall usability of DynDNS's website, one must first examine the role of the company in providing internet services. This section examines the industry that DynDNS currently occupies and notes industry trends such as simplifying the signup

process for internet services. In addition, Dyn Inc.'s history, current services, and competitors are investigated. The chapter concludes with research questions and goals of the project.

2.1. Industry

Dyn Inc. is a network services provider that offers email services, domain registration, and a dynamic DNS service capable of pointing to a consumer's current IP address. This DNS service can be used in conjunction with other software to allow a user to share files, provide remote support, share the desktop screen, or host a website. This section will explain the role of DNS in facilitating access to a consumer's computer and explore the future of the technology.

2.1.1. Overview

E-commerce has grown tremendously over the past 15 years, and it is now the norm for small and medium sized businesses to have a website that details the products offered and provides relevant information. Consumers expect these websites to offer zero downtime, high performance, and consistent responses. However, many systems and subsystems of the underlying web infrastructure are either misunderstood or simply unknown to the end user. Internet service companies respond to consumer demands by offering solutions that they can understand.

Internet service companies can either create new proprietary technology or market existing technology more effectively to users. The software platforms that run web servers and email servers are free and widely available. The Apache HTTP Server is open-source and supports many operating systems. Although there is documentation for new users, this might not be something that the everyday web user is capable of completing. One way to effectively market a service is to understand the user's perspective. Let us examine the niche of the consumer audience that needs to remotely access files on a work computer from their home. This can be approached by analyzing the situation and determining which specific internet services should be used. In this situation, this could involve using a traditional

server/client model that implements FTP (File Transfer Protocol). The user's end goal is to remotely access files; he/she isn't concerned with the technical details behind the technology. Internet service companies are bundling individual products and marketing packages as the solution to the problem.

The Domain Name System technology has been used since the 1980s, but its ease of use for the typical population hasn't improved. Users can't be expected to manually update DNS records to point toward their new IP (Internet Protocol) address each time their ISP (Internet Service Provider) changes it. The firms of the internet services industry are essentially selling interfaces to technology. There is an industry-wide trend toward making these software interfaces simpler and more intuitive. As consumers purchase more network capable devices, they expect all of these computers to seamlessly connect and share with one another, even cross-platform. Technologies, such as embedded code in routers, are a good example of taking steps to improve the user's experience. Dyn Inc. has developed relationships with router manufacturers to include the dynamic DNS update client in the router settings. By using a DynDNS.com certified router, the user can expect that the technology will simply "just work." The simplicity of the software interface is paramount to achieving market penetration. Apple's iPad tablet was an enormous success because it achieved new growth in unsaturated markets. According to market research firm Inside Digital Media, Inc., this was largely due to the removal of obstacles that users faced with notebooks. Improvements in the user interface simplified the user experience and made the product seem easier to use. It was marketed as being the best way to experience the web and multimedia, rather than being functionally compared to a traditional notebook computer.

2.1.2.Future

The future of the industry is considerably more dependent on marketing the various uses of the technology than on improving the underlying technology. One of the few near-future technical improvements is the widespread adoption of DNSSEC (Domain Name Security Extensions). On July 20,

2010, three leading registrars in the industry, Go Daddy, DynDNS.com, and NamesBeyond began supporting new measures designed to resolve security flaws. The consequences of an attack designed to alter DNS records to redirect unsuspecting website visitors to an entirely different (but similar) website could be devastating. These internet companies fulfill a crucial infrastructural support role that allows their clients' web services to be accessed from anywhere in the world. It's important for industry leaders to maintain strong relationships with clients and to identify issues and respond appropriately.

The Domain Name System technology can be implemented to achieve far more than redirecting traffic to a new address. More and more companies are realizing the importance of managed DNS for their websites. Technologies such as load balancing and Content Delivery Networks are behind the scenes of major websites, ensuring that redundancy is in place and maximum uptime can be achieved. Flexible traffic management tools can automatically direct traffic to a web user's closest datacenter. This technology has strategic applications that extend far beyond its use to translate a domain name into an IP address.

2.2. DynDNS

'Uptime is the Bottom Line' is the phrase that Dynamic Network Services proclaims when describing the reliability of its infrastructure. Dynamic Network Services, Inc. is a network services company which provides critical internet infrastructure and domain name services to make the internet faster and more reliable for individuals, enterprises, and large networks. With a range of innovative solutions, from domain name and email services on DynDNS.com, to load balancing, traffic management and top level domain (TLD) services with the Dynect Platform, Dyn Inc. remains committed to world-class customer service and engineering excellence (<http://www.dyndns.com>, 2011).

2.2.1.History

The company was founded in 1998 as a free service. That service, then operating as DynDNS.org, was a dynamic DNS service for a home user to host a website on their home computer or remote access back to their PC. Over time, as the user base grew and became more demanding, Dyn Inc. turned to a donation-based service in an effort to stay ahead of competition and add complimentary services. Later, Dyn Inc. transitioned to a recurring revenue software-as-a-service (SaaS) model with a suite of IT services aimed at the home/small business market.

Fast-forward to 2005 and the story of maturation continues. Dyn, Inc. initiated a customer audit and mining exercise of the over two million active DynDNS.com users at the time. From this, the company realized that many high profile corporations were using its consumer-grade service. This revelation, coupled with the simple fact that the premium externally managed DNS industry lacked options, encouraged Dyn Inc. to unveil a new brand, the Dynect Platform. Dynect was introduced to the outsourced DNS market in the fall of 2007. In April 2010, Dyn Inc. acquired EveryDNS and at the end of August bought EditDNS. With this, the DNS market decreased to only a few players.

In the present, Dyn Inc. offers premium services on two “rock solid” DNS platforms for both consumers/home/SMB users (DynDNS) and enterprise/corporation businesses (Dynect). As our project’s scope will only include DynDNS, the next section is an outline of the services Dyn Inc. offers.

2.2.2.Services

Table 1 is a summary of Dyn’s services. Our project will mainly focus and promote the DynDNS free service under the DNS and Domain Services section.

Table 1: Dynamic DNS Service Offerings

Service Category	Service Name	Service Description
DNS and Domain Services	Dyn DNS	Service to track your dynamic IP address.
	Dyn DNS Pro	Get more from your Dynamic DNS service with the Dynamic DNS Pro.
	DynDNS Custom	Dynamic and static DNS management tool for your own domain.
	Dynect SMB	Affordable multi-zone anycast managed DNS on an enterprise class network.
	Domain Registration	Register new domains or transfer existing ones.
	Secondary DNS	Add reliability to your own nameservers.
Email Services	MailHop Relay	Mail server redundancy, spam and virus handling, different port.
	Mailhop BackUp MX	Accept mail for your domain and have it forwarded.
	Mailhop Forward	Outgoing, secure SMTP server for on the go or all the time.
Performances and Security Services	Internet Guide	A better, faster, and safer internet with our free recursive DNS service
	Web Hop	URL forwarding for Dynamic DNS, Custom DNS, or your own hosts.
	Secret Registration	Keep your private domain contact information out of WHOIS.
	SSL Certificates	Get security for web transactions with an SSL certificate for your host.
	Premier Support	Get 24×7×365 technical assistance with one-hour response time.

2.2.3. Clientele/Users

Dyn Inc.'s clients utilizing these services span over 200 countries, 4 million consumers, and 500 enterprises. Some of the more well-known clients include Twitter, CNBC, Warner Brother, Ty, Eastern Mountain Sports, and the Harley Davidson Company. Geographically, the Dyn Inc. network reaches out to locations like Tokyo, Hong Kong, Singapore, Frankfurt, Amsterdam, London, and many US locations. Some future planned locations include Sydney, Cape Town, Mumbai, Paris, Brazil, and other various US cities.

2.2.4. Awards

Some of the recent awards Dyn Inc. has acquired are listed in Table 2.

Table 2: Awards Received by Dyn Inc.

Award
In December 2007, DynDNS was rated the number one small business to work for in NH by Business New Hampshire magazine (“News from Dyn Inc.”)
In December 2008, DynDNS was rated as the number two best business to work for in NH by Business New Hampshire magazine. (“News from Dyn Inc.”)
In December 2009, DynDNS was rated as the number two Best Small Company to work for in NH by Business New Hampshire magazine. (“News from Dyn Inc.”)

2.2.5.Competitors

According to the Internet Corporation for Assigned Names and Numbers (ICANN) there are hundreds of accredited domain name registrars for many Top Level Domains. Each of these registrars is a source of competition for Dyn Inc., but they have different business models for generating revenue. Go Daddy and Network Solutions have considerable market share for domain name registrations. Go Daddy offers domain name registrations, web hosting, virtualized and dedicated servers, email, SSL (Secure Sockets Layer), and tools for small businesses to quickly get started by using a template. Go Daddy is the market leader in terms of number of domains registered, with approximately 200 million domain names. A dynamic DNS service isn't offered to users for free because they could avoid the web hosting fees and simply host the required services on a broadband internet connection at home. Similarly, Network Solutions is geared toward offering web hosting and e-commerce solutions for small businesses. In contrast, Dyn Inc. offers email services and SSL, but focuses on DNS and domain services. Cory Von Wallenstein, VP of Product Management at Dyn, says that the DNS market is approximately 15-20 million users worldwide, and Dyn occupies approximately half of that. Dyn Direct competitors for free dynamic DNS have a considerably smaller market share (in the range of 1/10 of Dyn's revenue) and include no-IP (<http://www.no-ip.com>), FreeDNS (<http://freedns.afraid.org>), TZO (<http://www.tzo.com>), and DNS Exit (<http://www.dnsexit.com>). Dyn Inc. is the recognized leader in the DNS market and continues to improve its services and act as an industry improvement advocate.

A customer can use free Dynamic DNS in addition to a service platform on his computer in order to access files at home, share pictures with family and friends, or create a personal blog. Dyn Inc. offers solutions that allow home users to use the Dynamic DNS Free service in combination with another program in order to accomplish this goal. The Dynamic DNS is application agnostic, meaning that it is behind the scenes, resolving the domain name to the home consumer's IP address. Personal web hosting can be achieved by using Dynamic DNS and XAMPP, blogging with Dynamic DNS and Wordpress, and a VPN with Dynamic DNS and a VNC server/client. Other standalone software solutions that aim to provide remote access services will be examined and compared later in this report.

Within the last decade, remote access products have come remarkably far. Users can access their desktops with optional file management, remote sound, and printer options using a web browser. The key to marketing these solutions is emphasizing the role of internet services and how they can be used to improve internet accessibility.

2.2.6.Future

Dyn Inc. is committed to maintaining strong relationships with its existing customer base and to advocating for innovation. The company acknowledges that its customers have contributed to the remarkably consistent growth. The DNS market is effectively saturated for technical users, and Dyn Inc. is branching out through public relations initiatives to convey how its services can be used. The "Blog & News" section of the Dyn Inc. website contains postings of marketing campaigns, monthly newsletters, and discussions of the services offered as they relate to the industry. The "DNS is Sexy" campaign was established in order to make people more aware of the importance of DNS technology. The points are expressed in a way that many people will be able to understand, even with a lack of technical knowledge. The phrase, "Which is easier, remembering 128.121.146.100 or twitter.com?" ("DNS is

Sexy", 2010) demonstrates the role of DNS to novice web users. In order to market toward a new target audience, the user should grasp what the technology does and how it is used to gain value.

One way of communicating the benefits provided by a product is to look at case studies and customer testimonials. The CEO of Dyn Inc., Jeremy Hitchcock, is encouraging customers to participate in a new marketing campaign that will examine the success of innovative customers. "Taking it to the Streets" will look at 4-6 customers in New York City and publish an article on the website about each one, detailing what makes it successful. This should establish the important role of internet services to e-commerce platforms and provide a more personable connotation to DNS technology. Dyn Inc. is also gaining more attention through the social networking platforms Twitter and Facebook. Word-of-mouth is extremely effective through these mediums because of the number of users and the ability for people to associate with (or follow) groups. Approximately 2,000 Twitter users are following the DynDNS feed (<http://twitter.com/dyndns>). It is expected that many of these users are loyal customers who will praise the company's services to friends and coworkers. The long-term growth of Dyn Inc. will require informing a broader audience of how the technology can help them, while simultaneously keeping the loyalty of its current user base.

3. Research Questions/Goals of the Project

The main goal of Dyn Inc. is to achieve a net growth of users. The company is particularly interested in expanding its market to include those new users who are not experts in network technologies. To help Dyn Inc. achieve this goal, the project team focused on two sub-goals.

The first goal was to make Dyn Inc.'s services easier to access, utilize and understand with a silo website. The MQP team made it easier for users to find out what each service does, where to sign up, and how the services will solve their problems. This silo streamlined the signup process and adds a valuable introduction to the services offered by Dyn Inc. in regards to remote desktop access. The MQP

team proposed several designs for the creation of a silo website. Then, based on the recommendations, Dyn Inc. picked one and developed a silo site for implementation. After this site was completed, the group conducted several studies to examine the usability of the process of the site and compared users' intention to use Dyn Inc.'s services based on the changes to the site.

The second sub-goal our research achieved was to increase Dyn Inc.'s reach to different markets, specifically the non-network savvy population who have specific tasks like setting up a remote desktop connection and file sharing. The project team appealed to the typical users that might not understand how Dyn Inc. can solve their problems. We approached this goal by conducting studies on typical users' Goggle search patterns for remote desktop needs.

Through our research, we proposed to investigate the research questions shown in Table 3.

Table 3: Project Research Questions

Research Questions
How do technical sites similar to DynDNS (indirect competitors) convey the message of their services to the target market?
How can we reach the non-network savvy potential users who have a business need such as remote access, but may not know that DynDNS can address their need?
How can Dyn Inc. direct customers to individual services faster?
How can Dyn Inc. encourage paid services?

By examining these questions and evaluating the solution, we have made recommendations which will help Dyn achieve their main goal of attracting new users to Dyn Inc. services.

3.1. Website Usability

Usability “refers to how well users can learn and use a product to achieve their goals and how satisfied they are with that process” (Usability Basics, 2010). One approach to improve usability of a

website is to use a technique called User-Centered Design which focuses on the user experience from the beginning, rather than trying to work it into an already completed project. Making a website user-friendly is very important in today's online marketplace, since there are often other service providers that users can go to as an alternative. It is imperative that businesses design the most usable websites so that they may attract users and continue to bring them back.

3.2. Company Website

DynDNS is an internet-based service provider, catering to the needs of highly technical individuals. To this end, they have been extremely successful. However, typical users looking to solve everyday problems, such as remote computer access or hosting a personal website may not even be aware that DynDNS provides services that offer ideal solutions. Upon visiting the DynDNS website for the first time, users are confronted with very technical language and may be intimidated if they do not understand it. These "typical" users who may not be the most technically savvy occupy a large market that DynDNS has yet to reach. They encounter the same problems and have the same needs as the technologically savvy, however, they may not be sure how to discover and utilize DynDNS's services.

A common problem that everyday computer users face is the need to access files, programs, or printers on a home computer while on the road or at the office. It seems as though in the age of technology this would be a relatively simple task. However, Internet Service Providers (ISPs) often assign dynamic IP addresses to residential customers, making remote access very difficult without a third-party service. An IP address is essentially a unique number that identifies a particular device that is connected to the internet. A device may be a computer, mobile phone, or even a game system. There are two ways to manage IP addresses: by assigning static IP addresses, or by assigning dynamic IP addresses. Most ISPs will assign dynamic IP addresses, meaning the number may change at any time. These addresses are assigned using Dynamic Host Configuration Protocol (DHCP) which is a service that will assign an

available IP address to a device from a pool of available addresses. Static IP addresses never change. Obviously, this seems like it would be the preferred method. However, due to the large number of devices connecting to the internet and the limited number of IP addresses available the sole use of static IP address would be unfeasible (What is an IP Address, 2010). To obtain a static IP address, one typically has to purchase a business line from an ISP and this can be quite expensive. Every time a computer is assigned a new IP address by the ISP, the user would no longer be able to access the machine remotely without first going back home to discover the new address.

Utilizing a few of the core services offered by DynDNS, a user can easily set up a computer that can be accessed remotely using a third party software application, despite receiving new IP addresses occasionally. This can be achieved by using DynDNS Free, DynDNS Pro, or DynDNS Custom. The differences between the three services can be summarized as: DynDNS Free offers two free hostnames on available domains with a monthly expiration if inactive, DynDNS Pro offers 30 hostnames on premium domains without any monthly expiration limitation, and DynDNS Custom offers the same features as DynDNS Pro except with a custom domain name to be purchased by the user. Utilizing any of these services, a user would be able to assign an easy to remember hostname to the machine, and the DynDNS update utility would constantly link that name with the potentially changing IP address.

An important untapped business opportunity for the DynDNS website is that a non-network savvy user may not even realize that Dyn Inc. is capable of solving such an issue as remote access for them, since the prominent wording deals primarily with setting up DNS services and dynamic IP addresses. This technical text coupled with a user's general lack of understanding may cause them to exit the website and begin seeking out easier to understand alternatives, such as the competitors' services, detailed in the next section.

3.2.1. Google Analytics Review¹

Google Analytics is a web-based service that website operators can subscribe to which measures various aspects of their website and activity on it. Analytics offers tools to capture and analyze information about visitors, traffic sources, and even website content. These powerful metrics were quite beneficial in examining the overall accessibility of the DynDNS website, especially since Dyn Inc. has been collecting data for several years now.

One of the most interesting metrics examined is the source of overall traffic to the DynDNS website. For the time period September 6, 2010 through October 6, 2010, 54.42% of all traffic to the DynDNS website was direct, meaning a user typed “www.dyndns.com” into his or her web browser. This suggests that the majority of visitors to DynDNS already know about their services. The next segment of visitors is the group of users who are directed to DynDNS via web search engines. This group accounts for 20.98% of overall traffic. The problem with this is the top search queries that brought users to DynDNS were: “dyndns,” “dyndns.org,” “ddns,” and “dynamic dns” proving that this group also already knew of Dyn Inc.’s services and may simply not know the exact link to their page. If a user were to search on Google for something such as “how to remotely access my computer,” DynDNS would not be hit on the first few pages, if at all.

DynDNS’s current website is far too technical for the typical user if they are able to reach the page at all. More likely, however, these users will not even reach the Dyn Inc. website because only technical searches seem to return DynDNS as a result. Common queries that detail an everyday problem return some of DynDNS’s indirect competitors instead.

¹ Data included in this section is from the DynDNS Google Analytics account, which is not publicly available. For more information, see: <http://analytics.google.com>.

3.3.Competitor Analysis

DynDNS has little direct competition for its dynamic DNS service, which allows users to convert their dynamically assigned IP addresses into a static hostname that consistently updates to point to the right IP. This makes their home computers, servers, or other networkable devices always available from remote locations.

DynDNS does have several indirect competitors that offer services that can perform particular tasks, although they are not marketed as such stand-alone products. A major focus of analysis was companies that offer services that allow a user to remotely access his or her computer from anywhere in the world. The three leaders in this particular industry are GoToMyPC, LogMeIn, and RemotePC. All three services were analyzed for overall usability, including the signup process, the installation process, and the process of actually accessing a computer remotely. A full study of these competitors is provided in Appendix 12.1.

The three solutions examined offer cross-platform functionality and were tested on both Windows and Mac computers. The exception is RemotePC, which only allows for one host to be registered under the trial agreement, without the ability to change it. Therefore, once it was registered on the Windows test machine, it could not be changed to the Mac machine. The Windows test machine was a Dell e6400 Latitude notebook running Windows 7 x64 and the Mac test machine is a PowerBook G4 running Mac OS X 10.5 Leopard. These two machines were networked using a Netgear gigabit switch (GS108) receiving data from a Motorola SurfBoard (SBG900) on a residential Charter Communications internet line. The machine that accessed the two test machines remotely was another Dell e6400, running Windows Vista x86. This machine connected to the internet wirelessly using an enterprise network at Worcester Polytechnic Institute, unless otherwise noted.

For more information and the detailed trials that were performed on each of the three services, please refer to Appendix 12.1 in this document.

3.3.1.GoToMyPC

GoToMyPC is a solution that “enables fast, easy and secure remote access to a Mac or PC from any Web browser” (Remote Access, 2010). It is a software solution offered by Citrix Online, which is a division of Citrix Systems Inc. According to Citrix’s website, Citrix Online is an extremely fast-growing division of the company, gaining over 17,000 new customers each month (About Us, 2010). This high number of new users illustrates the obvious demand of both consumer and business markets for such services.

3.3.2.LogMeIn

LogMeIn is a solution that enables users to remotely access their computers, with many additional services. “Users worldwide rely on LogMeIn solutions for remote control, file sharing, systems management, data backup, business collaboration and on-demand customer support of PCs, servers, Macintosh computers, smartphones and other connected devices” (About LogMeIn, 2010). LogMeIn understands the high demand for such services, and therefore offers its basic remote desktop software free of charge to anyone looking to simply access a computer while away from their home. The more sophisticated services, such as remote control via a mobile device, carry additional subscription fees.

3.3.3.RemotePC

RemotePC is a single service offered by Pro Softnet Corporation, which offers several other web-based products for remote productivity. “RemotePC’s mission is to provide secure, easy and fast remote access solutions for a consumer base that spans across segments - from individuals to small and medium businesses” (Corporate Information, 2010). Utilizing this solution, users are able to increase their productivity by accessing necessary information and systems while away from their home or office.

3.3.4. Summary

GoToMyPC was a feature-rich solution to remote computing with an easy to use interface. A user can log into the web portal from any browser, and easily select which computer to connect to. The GoToMyPC solution does exactly what it advertises; it enables a user to easily connect to a remote computer. It does not offer many additional features, such as those offered by LogMeIn (including computer statistics).

LogMeIn was the clear leader with regard to the available technology and overall ease of use. Once the machines were configured, the process of connecting to a remote computer was seamless. The other two services offered a similar web portal to access machines; however, there are a few features that set LogMeIn apart. First, once a remote session is terminated, the user is not left on an authentication or setup page, as is the case with the other services. Instead, the user is redirected to a list of all available machines, so that another remote session may be initiated or the web session may be exited. Another benefit to this service is the easy access to statistics about the remote computer. On the left-hand side of the remote screen, there is a panel of tools and utilities available to display things such as power and computer management, processor and memory statistics, and diagnostic information. These features are very useful when using a remote computer, giving the user easy access to vital information. Unfortunately, these features are currently only available when accessing a Windows computer.

RemotePC was definitely the least user-friendly and most unproductive solution out of the three tested. The software is not properly signed, so a user must agree to install unsigned software during the installation process when alerted by Windows Security. The service also failed to connect to the remote computer during the first two attempts, without offering any support or help. On the third attempt, the machine was finally able to be accessed. Upon closing the remote session, the user is left on the page

detailing the launch process, instead of being brought back to the index of computers available. Another major flaw was the inability to change or modify the existing computer registration under the free trial, which is the reason the group was unable to perform analysis on using RemotePC to access a Mac computer.

4. User Experience: Research on Usability

To prepare to address Dynamic DNS's need for improving the usability of their website, this chapter first explores what the term "user experience" means. Then, it investigates web search behaviour in existing literature, which will help our team in our own analysis of DynDNS's site. Finally, this chapter outlines best practices for methods we have utilized in our research.

4.1. User Experience

The field of user experience was established to cover the holistic perspective of how a person feels about using a system. The focus is on pleasure and value rather than on performance. The exact definition, framework, and elements of user experience are still evolving but a few definitions have been suggested (ISO 9241-210).

ISO 9241-210 defines user experience as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service", so, user experience is subjective and focuses on the use (ISO 9241-210). User experience includes all the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after use. The notes also list the three factors that influence user experience: system, user, and the context of use.

Note three of the standard hints that usability addresses aspects of user experience, e.g. "usability criteria can be used to assess aspects of user experience". ISO 9241 part 11 states that

“Usability (of an application) refers to the effectiveness, efficiency, and satisfaction with which specified users can achieve specified goals in particular environments” (ISO 9241-Part 11). Unfortunately, neither standard goes further in clarifying the relation between user experience and usability, but there is clear overlap between these concepts.

According to Effie Law’s studies, user experience focuses on interaction between a person and something that has a user interface (Figure 1, see below).

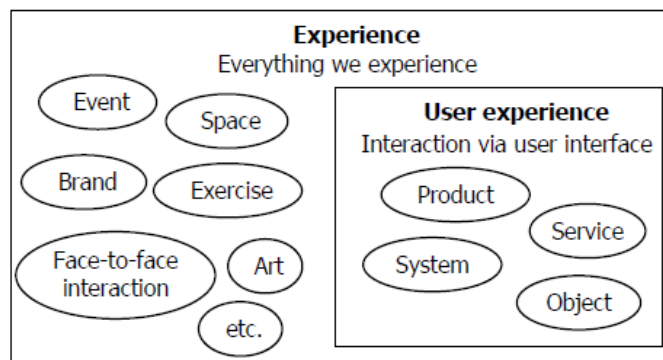


Figure 1: User Experience (UX) in relation to other experiences that we can study, (Law, 2009)

One activity in a user-centered approach to software usability testing involves the evaluation of the product software by end-users. We have used many of these tests in our methodology for our project. However, the testing methods used in this approach vary. Some usability professionals use subjective ratings, while others use objective measures, and still others use a combination (Kissell, 1995).

4.1.1. Objective Usability

Objective measures of usability traditionally generate more reliable data than subjective measures. However, objective measures are typically derived from performance measures, and as a result, are more expensive on resources than subjective measures (such as user surveys, questionnaires,

and interviews). Consequently, commercial practice frequently prefers subjective assessment rather than objective evaluation (Kissell, 1995).

Objective data is 'external to the mind' and concern facts and the precise measurement of things or concepts that actually exist (Hodgson, 2010). For example, when asking a user, "Do you own a computer?" one will receive a factual concrete answer of either yes or no. Opinion does not play a part in the answer you receive – they either have a computer or they do not.

4.1.2. Subjective Usability

On the other hand, subjective data results from an individual's personal opinion or judgment and not from some external measure (Hodgson, 2010). For example, when asking a user, "What is your general opinion on the prices of computers?" one may receive an answer like "I think they are overpriced for what they offer." This is an example of an opinion and is not necessarily true. Research shows, however, that subjective experience of a website tends to have a significant impact on users' willingness to use the website (Loiacono et al., 2002).

Another example of a subjective usability metric is the System Usability Scale (SUS) shown in Table 4. It asks users to rate the following statements on a scale of 1 (strongly disagree) to 5 (strongly agree).

Table 4: System Usability Scale (SUS) Statements, (Brooke, 1996)

Statement
I think I would like to use this system frequently.
I found this system unnecessarily complex.
I thought the system was easy to use.
I think I would need the support of a technical person to be able to use this system.
I found various functions in this system were well integrated.
I thought there was too much inconsistency in this system.
I would imagine that most people would learn to use this system very quickly.
I found the system very cumbersome to use.
I felt very confident using the system.
I needed to learn a lot of things before I could get going with this system.

As you can see, these questions are targeting the user’s experience with the system and how they *feel* about it.

4.1.3. Visual Aesthetics vs. Functionality

Web pages are made up of a complex combination of perceptual elements: “static and animated media, text and image; in different sizes, different colors, font styles, groupings and spatial layouts” (Faraday, 2000). These aspects of a website all affect the user experience and, therefore, many professionals have offered standards to follow to create visually appealing systems and websites. Interestingly though, while many of these principles, rationales, and guidelines describe how to design a usable and visually appealing website, the emphasis is clearly on the functional and the usability aspects of the design rather than on aesthetics (Lavie & Tractinsky, 2004). For example, J.M. Spool assesses websites and draws guidelines based on usability as the sole criterion (Spool, J.M., 1999). Further, when Wayne Neale, Ph.D. and Cindy McCombe, from Kodak, teamed up to develop their publication “*Designing usable and visually appealing web sites,*” the emphasis is clearly on the functional and the usability aspects of the design rather than on aesthetics (Neale & McCombe, 1997).

Noam Tractinsky and Talia Lavie note this under-emphasized factor of usability in their paper, *“Assessing dimensions of perceived visual aesthetics of web sites”*. They further conduct a study that focuses on what they explain to be the two main types of aesthetics. These figures are displayed in Figure 2 (below).

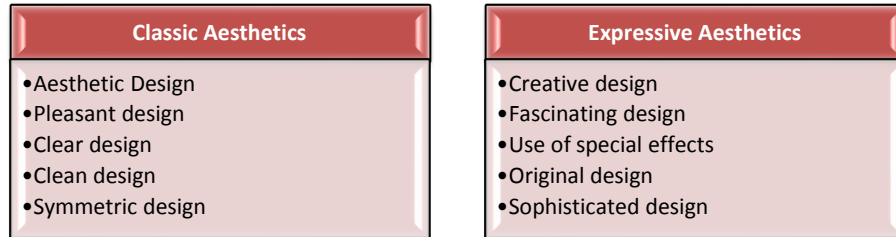


Figure 2: Aesthetic Factors, (Tractinsky & Lavie, 2004)

In addition to aesthetics, they test on usability and user experience in the areas of the functional sense, pleasurable interaction and service quality (Tractinsky & Lavie, 2004).

Bruce "Tog" Tognazzini's also has a set of principles that are highly respected which are known as TOG's First Principles of Interaction Design (Tognazzini, 2010). They are summarized in Table 5.

Table 5: TOG's First Principles of Interaction Design, (Tognazzini, 2010)

Principle	Summary
Anticipation	Applications should attempt to anticipate the user's wants and needs.
Autonomy	Use status mechanisms to keep users aware and informed and keep status information up to date and within easy view
Color Blindness	Any time you use color to convey information in the interface, you should also use clear, secondary cues to convey the information to those who won't be experiencing any color coding today.
Consistency	Make objects consistent with their behavior. Make objects that act different, look different, and are consistent with user expectations
Defaults	Defaults should be easy to "blow away", and be intelligent and responsive
Efficiency of User	Look at the user's productivity, not the computer's. Keep the user occupied.
Explorable interfaces	Give users well-marked roads and landmarks. Make Actions reversible. Always allow a way out.
Fitt's Law	The time to acquire a target is a function of the distance to - and size of - the target.
Human Interface Objects	Human-interface objects are not necessarily the same as objects found in object-oriented systems.
Latency reduction	Wherever possible, use multi-threading to push latency into the background.
Learnability	Pay attention to learning curve.

As you can see, many of these principles have to do with aesthetics, but some focus on functionality.

Other guidelines are more functionality driven. Jakob Nielsen and Rolf Molich developed the following usability 'heuristics' in 1990 (Nielsen, J., & Molich, R., 1990). Only one pertains to aesthetics and the rest have to do with functionality. See Table 6 for a breakdown of these heuristics.

Table 6: Nielson and Molch Usability Heuristics, (Nielsen, J., & Molich, R., 1990)

Heuristic	Summary
Visibility of System Status	The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
Match between System and the Real World	The system should speak the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
User Control and Freedom	Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
Consistency and Standards	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.
Error Prevention	Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
Recognition Rather than Recall	Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
Flexibility and Efficiency of Use	Accelerators unseen by the novice user may often speed up the interaction for the expert user so that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
Aesthetic and Minimalist Design	Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
Help Users Recognize, Diagnose, and Recover from Errors	Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
Help and Documentation	Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

4.1.4.Trust

Trust is an integral part of cooperative behavior between people and the electronic systems they use. While browsing a website, the user must be able to trust that the website will follow through with its obligations and deliver the services it promises. Previous research has examined simple emotions, such as good-bad and positive-negative. This line of research expands upon studies that assess the attractiveness of faces (Olson & Marshuetz, 2005) and web sites (Lindgaard et al., 2006) "to examine whether trust is assessed rapidly in the preconscious mind in response to yet unknown visual elements" (Albert et al., 2009). This research expands, suggesting that users are more likely to use a service on a website, if and when they trust that site to provide quality services. Therefore, if Dyn can maintain a heightened feeling of trust in regards to their website, they are likely to gain more customers.

It is generally accepted that there are two types of trust: cognitive and emotional. "Cognitive trust requires rational reasons why this object merits trust while emotional trust is motivated by strong positive feelings" (Albert et al., 2009). Economists have examined how incentives can be used to reduce the uncertainty that is inherently associated with forming new relationships. Dependability, predictability, and reliability are the cornerstones of creating trust. The initial trust phase is limited to conscious factors, such as "Communication, opportunism, product brand quality, and web site attractiveness" (Albert et al., 2009). Previous studies have looked at the influence of the conscious assessment of these factors, but this study examines trust at the preconscious level. "This is achieved by briefly presenting visual stimuli in the form of popular financial and health-related web site home pages and examining the consistency of responses between participants' trust assessments across multiple exposures" (Albert et al., 2009).

In the first experiment, participants were shown 50 screenshots of web site home pages. These web sites are of the top 25 health care and top 25 financial services companies in the Fortune 1000. The participants were shown the image for only 50ms, which required them to use their "gut feeling". The data "suggest that trust is processed at a pre-attentive level" (Albert et al., 2009). The second experiment used the same methods, but involved 11 graduate students. This allowed the researchers to have a more transparent and involved study. Overall, the results of this experiment were comparable to the first experiment.

When shown the same screenshots in different random orders, individuals were shown to process trust on a pre-attentive level. This study suggests that trust is an important consideration in web site design. "Designers should be keenly aware of how visual primitives such as color, closure, and size interact to influence trust assessments on a pre-attentive level. Simply focusing on content to relay the notion of trust may not be enough" (Albert et al., 2009). Creating a working relationship with the user based on trust is paramount to bringing new visitors to the website and building a rapport.

4.1.5. User Centered Design

To design with user experience in mind refers to a method of design called "User-Centered Design" (UCD). It is defined by the Usability Professionals Association as, "an approach to design that grounds the process in information about the people who will use the product. UCD processes focus on users through the planning, design and development of a product" (*What is user-centered design: About usability, 2010*).

The term 'User-Centered Design' originated in Donald Norman's research laboratory at the University of California San Diego (UCSD) in the 1980s and became widely used after the publication of *User-Centered System Design: New Perspectives on Human-Computer Interaction* (Norman, D. A., & Draper, S. W., 1986). Norman built further on the UCD concept in his seminal book *The Psychology Of*

Everyday Things (POET) (Norman, D.A., 1988). In *POET* he recognizes the needs and the interests of the user and focuses on the usability of the design. He breaks his suggestions down into four simple methods of UCD shown in Table 7 (Norman, D.A., 1988).

Table 7: User Centered Design Methods, (Norman, 1988)

Methods of User-Centered System Design
Make it easy to determine what actions are possible at any moment.
Make things visible, including the conceptual model of the system, the alternative actions, and the results of actions.
Make it easy to evaluate the current state of the system.
Follow natural mappings between intentions and the required actions; between actions and the resulting effect; and between the information that is visible and the interpretation of the system state.

The international standard for this process is outlined in ISO 13407: Human Centered design process. The 4 main steps for this process are outlined in Table 8 per the ISO 13407 document (ISO 13407).

Table 8: Human Centered Design Process, (ISO 13407)

Step	Summary
Specify the context of use	Identify the people who will use the product, what they will use it for, and under what conditions they will use it.
Specify requirements	Identify any business requirements or user goals that must be met for the product to be successful.
Create design solutions	This part of the process may be done in stages, building from a rough concept to a complete design.
Evaluate designs	The most important part of this process is that evaluation - ideally through usability testing with actual users - is as integral as quality testing is to good software development.

4.2. Web Search Behavior

Each web search is initiated to display a large number of keyword-related websites that will provide diverse information needs. Researchers have examined the common behaviors that individuals

use and classified their goals into one of three categories (Rose, 2004). A navigational query contains a certain website that the search engine should return. For example, searching for "macbook pro apple store" accurately returns the link to purchase a MacBook Pro model notebook computer. Second, an informational query seeks background information about a certain topic. A search query for "dynamic dns providers" will provide a list of business websites that offer the service. Third, resource goals involve the interaction with the website's service, the entertainment value of the web page, or downloading a file for offline use. Developing a website design that accommodates all three categories can reach a broader target audience.

Researchers at the University of Freiburg, Germany, conducted an expert study in order to analyze how online searching experts used information systems to find information. They compared the results of the experts' search tasks to the search queries of the German search engine Fireball (<http://www.fireball.de>). One significant difference between expert users and non-expert users is the number of words used, "The average length of a query in Fireball is only 1.66 words, while the experts used an average of 3.64 words, twice as many" (Hölscher, 2000). Also, the experts acknowledged that content-specific knowledge is often needed in order to create effective search queries. After receiving the search results, "Experts were significantly more likely to choose a target document for closer inspection than Web novices (35% vs. 25%)" (Hölscher, 2000). Web novices tend to go back to the search results and alter the keywords used in the search query. This indicates that users without content-specific knowledge are less able to find solutions to their goals in terms that they can understand. It is important for a company's website to have a high page ranking in the search engines. Tailoring a website to new users relies on easy-to-read product descriptions getting the message across through multiple streams. Some users who aren't technologically savvy might find that a process-oriented website design is easier to relate to than purchasing and combining multiple individual services. On the other hand, the experts might need to inspect the detailed specifications more

thoroughly. In general, the website should market services via use-case scenarios because this is how users will approach the problem themselves.

4.3. Measures

A few different measures will be employed in our investigations. They are: a self-reporting measure called the System Usability Scale, the method of cognitive walkthroughs, and finally, eye tracking. These measures are described more below.

4.3.1. System Usability Scale (SUS)

The System Usability Scale's (SUS) approach to system usability is that "Usability is not a quality that exists in any real or absolute sense" (Brooke, 1996). This does not mean that usability isn't a measurable source, rather that when measuring usability, the appropriateness for the given purpose should also be examined. SUS is a ten question industry standard survey to assess this appropriateness. The questions are laid out in a Likert scale, which ask the survey taker to agree or disagree with a statement on a scale of one to five. The theory behind this is that a survey taker will give more honest thought into agreeing or disagreeing with a statement, as the statements point to extreme expressions (Brooke, 1996). See Appendix 12.2 for an example of the System Usability Scale.

Using SUS in research requires that the participants have had a chance to evaluate the system, and have not entered into discussion about it. The participants should mark their first response to the questions, and all questions should be answered. If a participant cannot decide on an answer, they should be instructed to mark the middle of the scale.

SUS scores range for 0-100, with 100 being the best score in terms of usability. For each question, the score will range from 0-4. However, there are two ways to grade the questions. For questions 1, 3, 5, 7 and 9, the score is the scale position minus one. So if the ranking for question 3 were

5, then the score would be 4. However, questions 2, 4, 6, and 8 are scored as 5 minus the scale position. For example, if question 6 were marked as 3, then the score would be 2. To obtain the final SUS score, sum up all the individual question scores, and multiply the result by 2.5 (Brooke, 1996). The scores were a useful metric for objectively assessing the usability of multiple versions of the website.

4.3.2. Cognitive Walkthroughs

Cognitive walkthroughs stem from the theory that users do not want to read an instruction manual when learning a new system. Rather, they would prefer to learn how to use a system based on which task within the system they need to perform, thus ensuring that the benefits of learning a process in the system outweigh the cost of learning (Wharton, Rieman, Lewis, & Polson, 1994). While cognitive walkthroughs are often used as a form of expert usability evaluation, this project used a less technical subject group to reflect the users that are the target audience of the silo (Jordan, 1998).

This form of testing is a simple way to determine if a system makes sense to a user. To conduct a cognitive walkthrough experiment, a user is selected to complete a specific goal using a system they have not had prior experience with. The subject, or user, is given a set of tasks to complete using the system. These tasks are chosen to best represent the overall functionality of the system. While completing the tasks, the user verbally narrates their thoughts on the system's layout and how they are trying to complete the goal. They would also verbally note any and all expectations of what the system should be doing at that time and any shortcomings that they interpret the system as having. The purpose of a cognitive walkthrough is to compare the sequence of actions necessary for a user to complete a process, as opposed to the actions that a user expects (Wharton et al., 1994).

4.3.3. Eye Tracking

While the study of eye movement pre-dates computers, its application to Human-Computer Interaction is becoming increasingly important in the study of system usability (Jacob, 2003).

Technology advances have transformed this method of data gathering from tests that required participants to have objects inserted into their eyes, to the non-invasive methods used today. The current technique to track eye movement is to have the participant sit in front of a camera that beams an infrared light into the participant's eyes. This light is reflected in their eyes, and then the camera can pick up that reflection and send it to a unit which processes the data (Jacob, 2003). See Figure 4 (below) for an example of a subject using a computer equipped with an eye tracking device.



Figure 3: Subject using eye tracking, ("Eye Tracking Ad Image", 2011)

The most common way for visualizing eye tracking data is a heat map. Heat maps display how long a user is focused on a point on the screen, displaying colors overlaid onto an image of the screen to denote the time that a user spent looking at a specific point on the screen. While this map is useful in depicting which items on a page gain a subject's attention, the map does not note in which order the subject viewed those items, nor does it show if a subject viewed a point on more than one occasion. See Figure 5 for an example of a heat map.

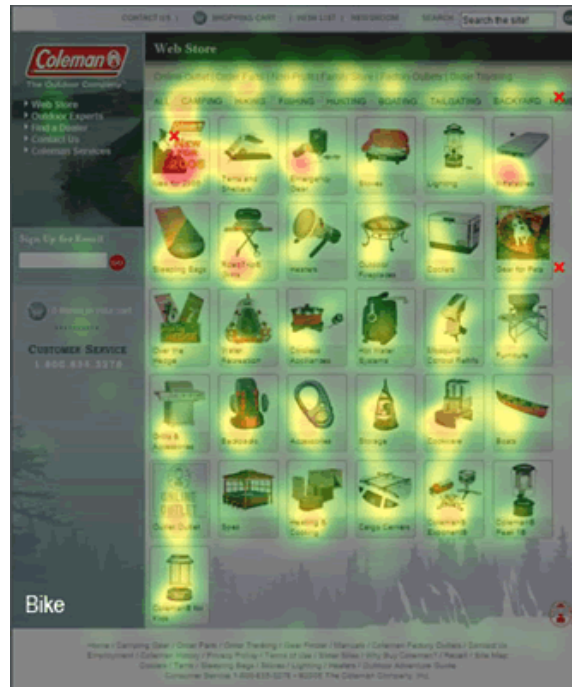


Figure 4: Heat Map of User Searching for an Item (Schresta et al., 2007)

5. Methodology

Marketing to a broader target audience requires insight into the identified user groups' thought processes and behavior. We employed three methods that have aided us in improving the website usability for new and current users. First, several surveys to collect demographic information about the participants and their technical aptitude were conducted. This data was collected along with the subjects' search terms and the general strategy that was used to complete the task. Second, extensive examination of competitor's websites (found in Appendix 12.1) and common usability trends (found in Section 3.1, Website Usability) were used to design a prototype silo for the DynDNS website that takes into consideration the behavior of web users and search engines and improves upon the current website. Next, in a controlled setting, usability testing using the current website and the proposed silo website was performed. Finally, a third study involving eye-tracking was used to determine the main

points on the pages that users focus on, and deduce areas that confused the users based on their eye movements through the page.

5.1. Study I: Google Search Ranking

To get a better feel for Dyn's current customer base, the project team looked into key word search data that the company collected from September 6, 2010 through October 6, 2010 using Google Analytics. The analysis of this data showed that the top ten keywords users search for before being directed to DynDNS range from "dyndns" to "dynamic dns". While a typical internet search stems from a question such as "How can I connect to my home PC from work?" these G.A. results show users focusing on technical terms in their searches. This suggests that these users are already aware of a solution to their problem. Thus Study I, described below, can help DynDNS to readdress how search engines, such as Google.com, point novice users to Dyn's site.

5.1.1.Objective

Dyn Inc. is looking at how to expand their market share by targeting users who may search for a less technical set of terms. Users enter search terms based on their knowledge of the subject they are searching. If, for example, a user knows that they are looking for a dynamic DNS service, they will search for that. However, if a user is looking for a service that Dyn Inc. offers, but doesn't know the technical name for that service, then what do they search for? Because Dyn Inc. wants to harness the potential of the technologically inexperienced, the following surveys were conducted in order to better understand how these users search.

5.1.2.Participants

Conducting and distributing these surveys largely relied on the student body at Worcester Polytechnic Institute (WPI). An email containing the URL for the Google Search Survey was distributed to various communities, including the WPI Helpdesk student employees and WPI Gordon Library student

employees. In total 98 college undergraduate students participated in this survey. The gender and age of the participants was not collected.

5.1.3.Design

The group first conducted several surveys with college-aged people about what keywords they would use to solve problems that can be solved by DynDNS. The survey collected data regarding the subjects' technical abilities and their familiarity with remote access technology. The survey continued by asking questions that expose the methods used to find a solution for the users' needs. By asking how potential users think about approaching a problem, we were able to find out if they start off by talking to friends, conducting their own research, or by asking an expert. See Appendix 12.3 for the complete list of questions asked in these surveys.

The information gathered in these surveys gave us an idea of where these potential users are getting the keywords that they search for, and whether they understand their meaning, therefore allowing us to target the site's keywords and page ranking to fit the subjects' key search terms. By adjusting the search terms that bring up DynDNS on Google and other search engines, DynDNS will be able to reach more users and increase their market share.

5.1.4.Procedure

Before each survey started, the subjects were briefed on how we stored data in order to gain their trust and encourage honest answers from them. Because the subjects may alter their responses thinking that it will fit with the group's research better, the subjects were debriefed as to the purpose of the survey and the questions on it after the survey was completed.

5.1.5.Results

After the data was collected from the survey, all of the information was aggregated and inputted into charts.

This chart represents the responses of the participants' technical aptitude. Available answers were: Expert, Advanced, and Novice. 15% of respondents identified themselves as Novice, while 28% said they were Experts. The majority (57%) of users indicated they were 'Advanced' users. See Figure 6 (below) for more information.

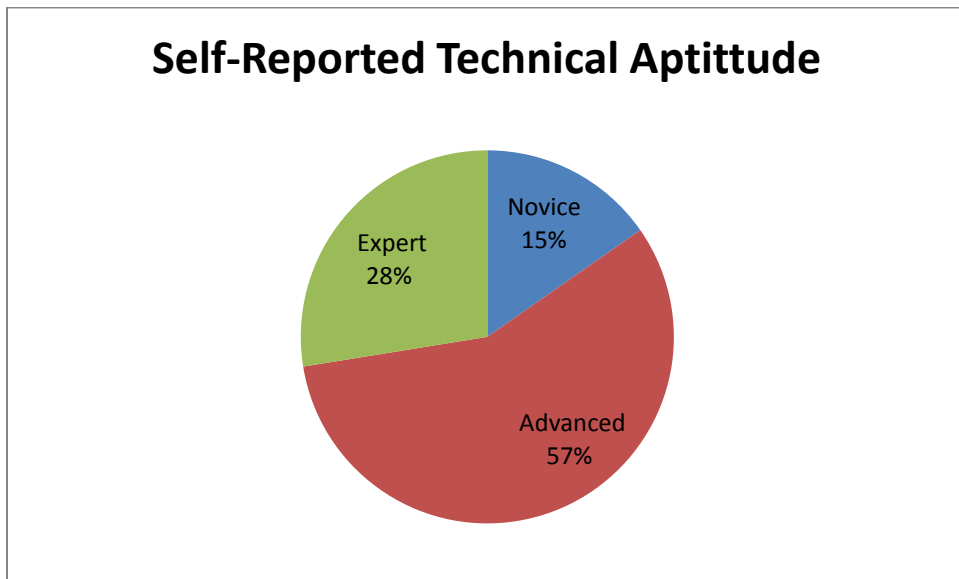


Figure 5: Google Search Survey: Self-Reported Technical Aptitude

Participants were then asked how many hours per week they spent online. The range varied from less than one hour to over five hours per week. Only 1% of respondents reported spending less than one hour per week online, while 27% said they spend between one and three hours per week. Responses for both 'between three and five hours' and for over 'five hours per week' were tied at 36%. This information is displayed in Figure 7.

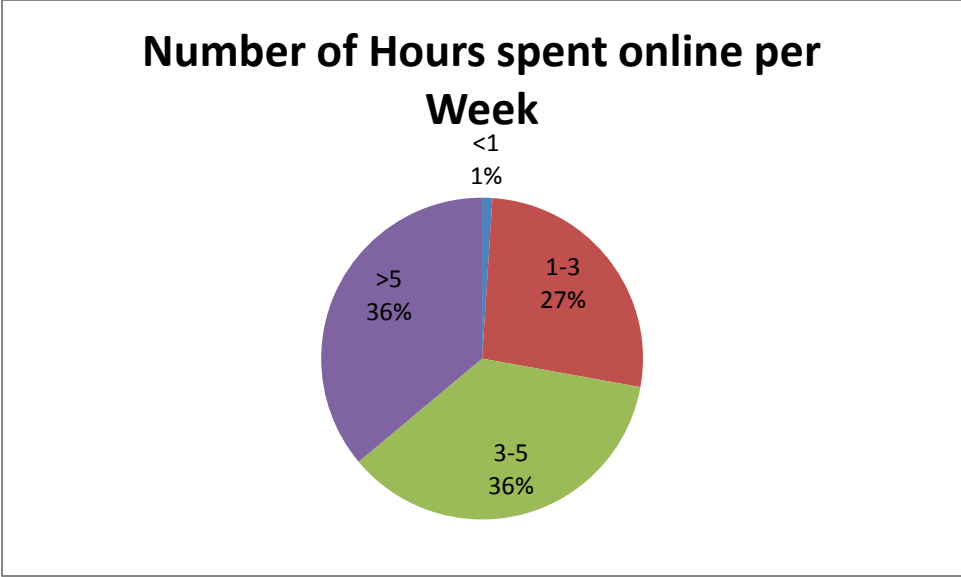


Figure 6: Google Search Survey: Hours Spent Online

Participants were then asked whether or not they accessed their home PC from remote locations. This question was responded with a "yes" or "no" answer. Only 24% of participants responded with "yes". While the majority (76%) said that they do not. These answers can be seen in Figure 8.

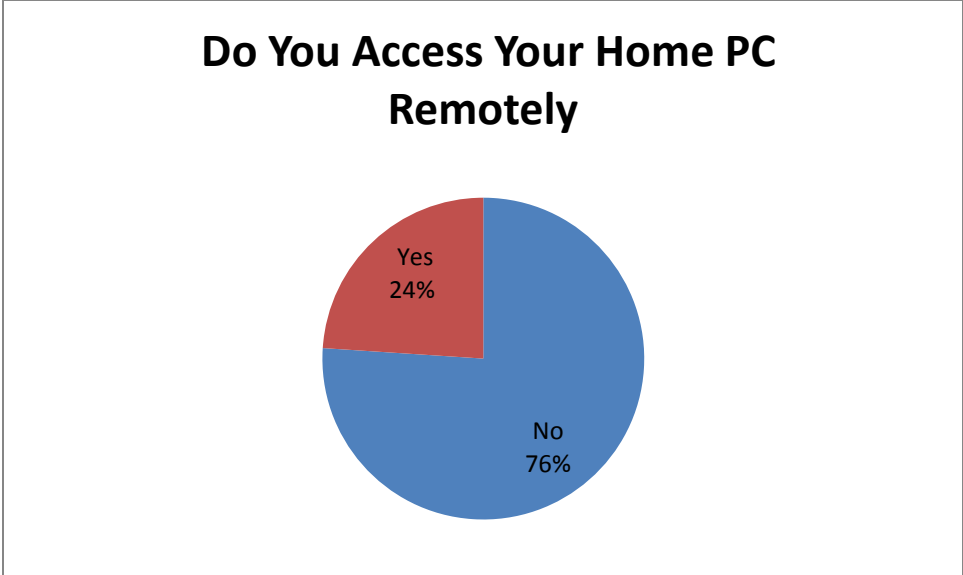


Figure 7: Google Search Survey: Access Home PC Remotely?

For the 24% of participants that reported they remotely accessed their home PC, only 3% said that they used DynDNS to fulfill these needs. Competitors used were VNC (11%), Other (Logmein, MacView, etc. at 36%). The majority (50%) of users reported using Microsoft’s Remote Desktop Protocol (RDP). See Figure 9 for the compiled graph.

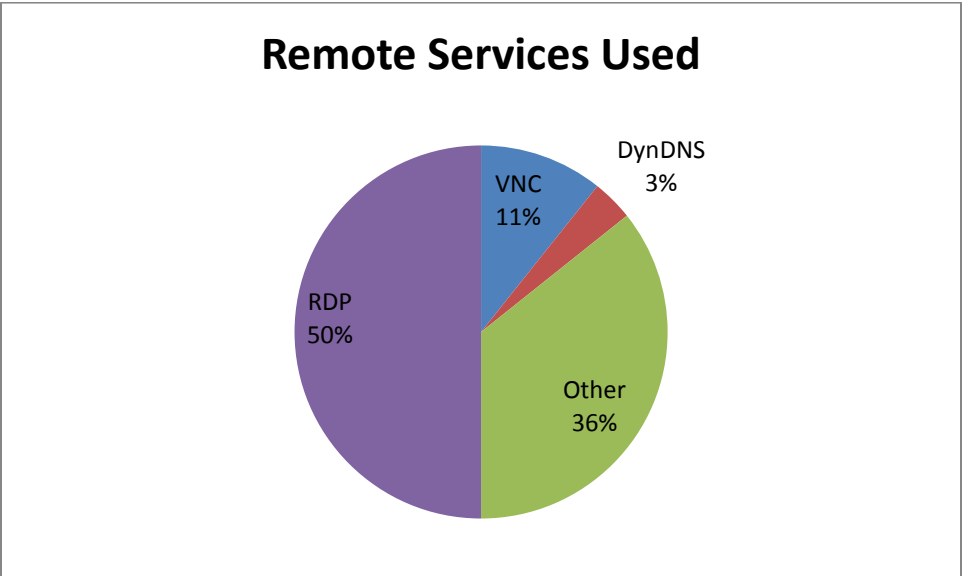


Figure 8: Google Search Survey: Remote Services Used

Participants were then given a situation where they had to search for a way to access their home PC from another location. This was an open response question, and was not required to complete the survey. Responses were divided into four categories; General Terms, Remote Desktop Keywords, Competitor Services, and No Terms Given (question skipped). 10% of participants searched for Competitor Services, 23% did not respond to the question, and 26% used General Terms. The majority (41%) used Remote Desktop Keywords. This information can be viewed in Figure 10.

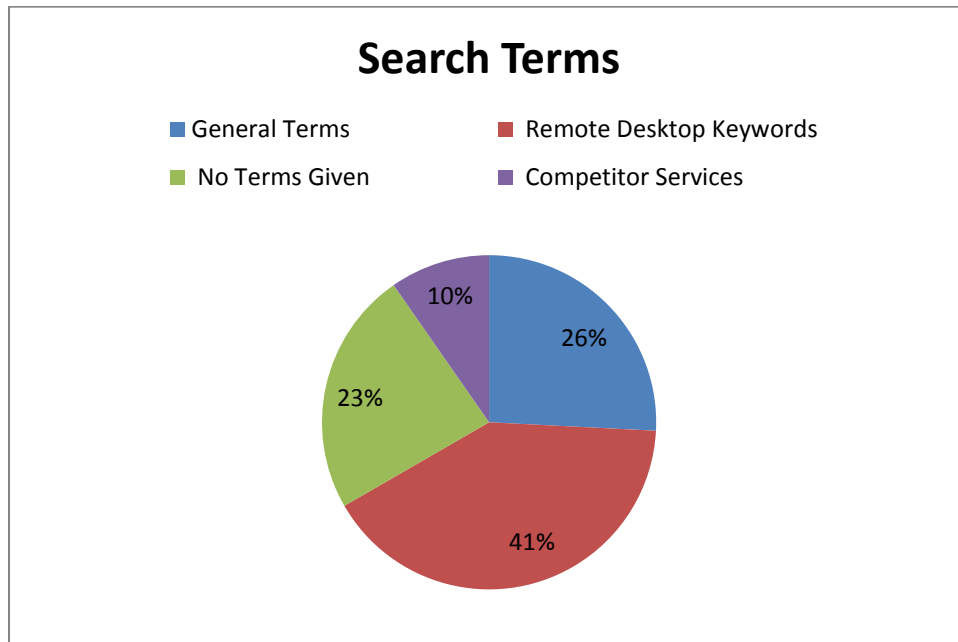


Figure 9: Google Search Survey: Search Terms Used

Participants were then asked about how they found out about new technologies. Available options were: Web Search, Friends/Family, Co-Workers, Social Networking, Magazines/Articles, Television, Advertisements, Online Media, or Other. Participants were asked to mark any and all that applied to them. 12% said Other, 26% marked Advertisements, 39% reported Online Media, 40% said Television and Magazines / Articles, Social Networking was reported by 43%, Co-Workers were marked by 54%, Web Search was reported by 77% of participants, and the most common response was Friends /Family which 78% of participants marked. These responses can be seen in Figure 11.

How do you learn about new technologies? (Check all that apply)

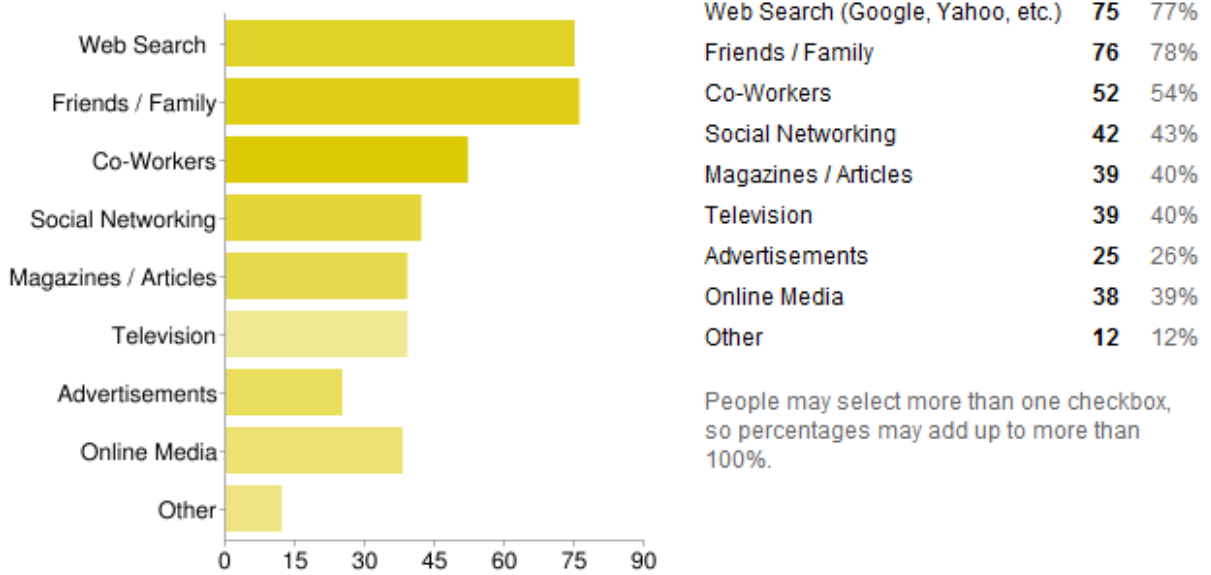


Figure 10: Google Search Survey: How Users Learn About Technology

Next, participants were asked if they had heard of DynDNS before this survey. Answers were given in a "yes" or "no" format. 74% of participants responded "no", while only 26% said "yes". See Figure 12 (below). Finally, participants that responded "yes", were asked where they heard about DynDNS from. Available options were: Web Search, Friends /Family, Co-Workers, Social Networking, Magazines / Articles, Television, Advertisements, Online Media, or Other. Advertisements and Social Networking were marked as 4%, Online Media at 11%, Other at 19%, 22% from Co-workers, 33% from Web Search, and the most common source was Friends/Family with 41%. This information is visualized in Figure 13.

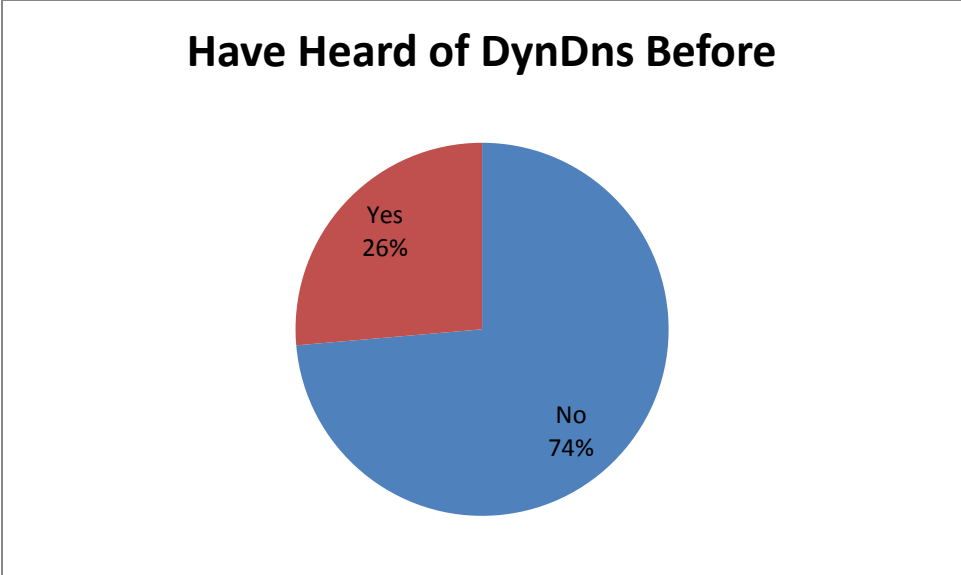


Figure 11: Google Search Survey: Heard of DynDns Before

If yes, how did you first discover DynDNS's service?

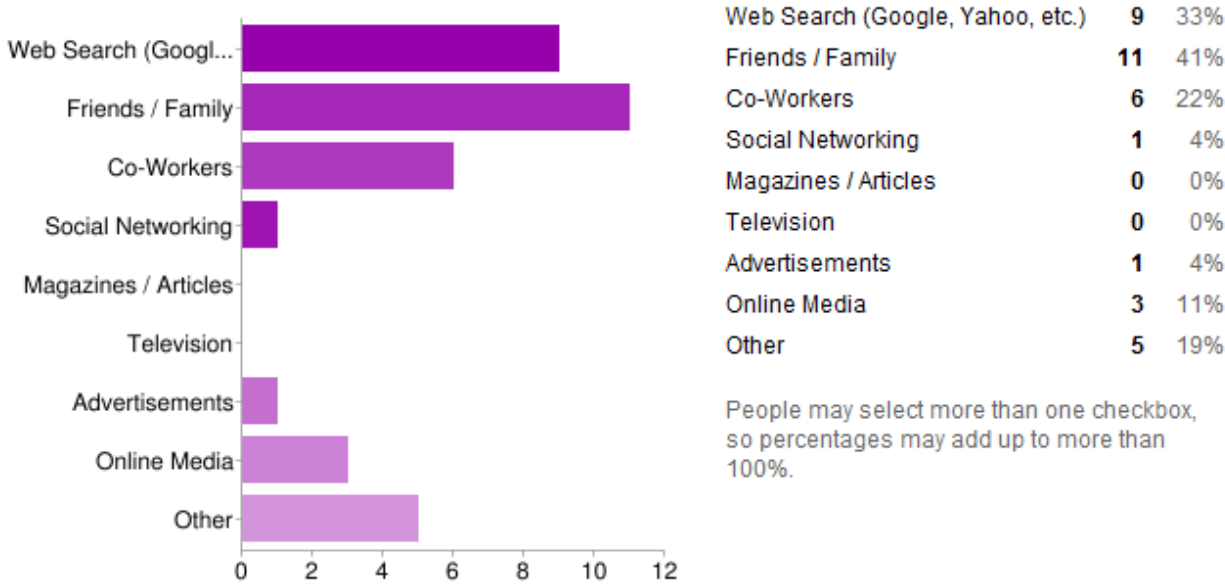


Figure 12: Google Search Survey: How Did You Hear About DynDNS

5.1.1.Discussion

It is important to note that this survey was conducted with students from a technical school, and that 57% of respondents identified themselves as advanced users. This does not mean that they are network savvy, rather that they have general technical aptitude. Therefore, it is likely that these respondents are actually part of the demographic that Dyn is hoping to gain in their user base. In addition, 74% of respondents had never heard of Dyn before. This suggests that the available market for non-network savvy users could be of significant interest to Dyn.

Only 26% of respondents said that they use remote desktop services. This, however, could be because the other 74% have not been adequately informed about what remote services can provide for them and therefore, they have no desire to pursue such an investment.

Despite the large amount of 'Advanced User' entries, the responses users gave to the rest of the questions typically landed on the more novice side of the spectrum. When asked which search terms users would use to find remote services, 41% were specifically about remote desktop connects, and another 26% were more general statements such as, "access home PC from work". This totals to 67% of responses actually being about remote search terms. An additional 10% of users searched for competitors' names, such as VNC, Windows RDP, and LogMeIn.

It is also interesting to compare the differences between how users typically hear about technology and how those that have heard about DynDNS did so. Most users heard about DynDNS through word-of-mouth from friends and family and web searches. These results were strikingly similar to how they have heard about DynDNS, however, Dyn did lack in the Magazine/Articles response. This may mean that Dyn could gain more users by conducting a marketing campaign aimed at these venues.

5.2. Study II: Silo Implementation and Testing

Content siloing can increase the search engine optimization and overall ease of use of a commercial website. As search engines have become more frequently used by consumers, the algorithms behind the scenes of web searches have been improved to increase the relevancy of search results. As a result, more users are visiting individual, specific pages as opposed to visiting the website homepage and manually navigating the website directories. The results of the Google Search Ranking provided us with the terminology that users most often use when searching for services that Dyn Inc. offers.

The scope of this project focused primarily on increasing the reach of DynDNS on the industry by attracting more new customers to the website to take advantage of the services offered. Therefore, the silo website recommendations cater most to potential users, but also incorporated features of the existing site that have impressed current customers. The primary method used to achieve this was to use high-level language in describing the services on the first landing page. The more common, easier to understand language will appeal to new customers, while the technical details current users have come to expect are still available to satisfy their needs. The silo site guides the user through an easy-to-use, step-by-step process of understanding the targeted services Dyn Inc. offers, specifically remote desktop, signing up for an account and then setting up their computer to use the free service. On the existing company website, users must navigate through a complex process to complete these tasks in different areas of the website. The silo has all of these steps in one place for convenience and simplicity. After the silo was implemented, the project team conducted an experiment on the usability of the silo and also the existing website so that further improvements could be made to both.

5.2.1. Objective

The group used the experiment and its results to gauge the successfulness of the developed prototype. This was done by examining user reactions, which were obtained through the System Usability Scale analysis and the subsequent interview sessions. The SUS score was calculated for both the silo site and the website and compared to the industry accepted standard of 65, indicating a suitably usable website. Aggregating the interview answers helped us explore the following root questions, as seen below in Table 9.

Table 9: Root Questions for Study

What is the general perception for this company and products?

Would users like/use the service? When and why?

Did the user find the silo site easy or complex? And where are the areas of improvement?

Did the user find the website tasks of signing up for and account and the free service easy or complex? And where are the areas of improvement?

With insight in regards to these questions, we were able to suggest to DynDNS how both the silo site and the existing website can be modified in order to reach a broader target market.

We were able to determine the effectiveness of different strategies in increasing the signup rates and to identify seemingly difficult steps of the participant's process. This data was compiled and analyzed, then presented back to DynDNS with an ultimate recommendation to improve the overall website usability. With these recommendations in place, DynDNS is more likely to reach the typical potential users who have a need, but may not know how Dyn can address that need, direct customers to individual services faster and more efficiently, and encourage paid services after a user signs up for the free service.

5.2.2. Prototype Development

Our group proposed multiple solutions to improve the usability of the website and increase website traffic and conversion rates. Research suggests that the quantity of clicks required to purchase a product is of the utmost importance. This is one aspect of the current website that we believed could be improved. Using Dyn's Google Analytics account, we discovered that about 21% of website traffic for www.dyndns.com is a referral from a search engine. Of the 10 most frequent keywords used to get to the website, none of them are phrased in a way that is process oriented or representative of a new website visitor. The silo site design focuses on the interaction with these new visitors in the crucial first web pages. Our proposed changes focused on making the signup process more user-friendly, resulting in an increase in the number of signups and overall customers.

The objective was to focus on the process of the proposed silo website. The quantity of clicks and amount of user input required for the signup process were deemed especially important. Efforts were made to reduce the number of steps to as few as possible, and to simplify the process into a step-by-step wizard. For the typical user who is coming to the website with the idea of remote access in mind, he or she would be able to progress in a linear manner through the steps needed to sign up for and utilize Dyn's services. The results of the Google search survey provided insight into the key terms used by users to find these services. This allowed the MQP team to suggest a design that the typical user could interact with to achieve his or her goal of using remote access.

The silo website was designed to emulate and streamline both the signup process and the addition of a new hostname to the user's account. This was achieved through re-engineering the processes and removing any unnecessary options and technical terms. A user who visits the DynDNS silo with the expectation of getting started with remote access will face a predictable linear pathway to utilizing the service. He or she will begin by creating an account with DynDNS, and then configure the free dynamic DNS service. The silo wizard aims to guide a user with a specific end goal, the use of

remote access software, through these steps in a logical manner. The "Add New Hostname" page as seen below in Figure 14 was reduced to a single text input box. Step four of the silo wizard, as seen below in Figure 15, merely asks the user to choose a name for his/her computer. Because this silo is catered exclusively to new users interested in remote access, the "Service type" and "Mail routing" options are no longer relevant and therefore were removed to reduce the user's confusion. The user's external IP address is detected by the system and used internally to map the hostname to this IP.

Add New Hostname [↑ Host Services](#)

You don't currently have a [Dynamic DNS Pro service](#) in your account.

To get the full benefits of Dynamic DNS, including premium subscriber domains and other features, [add Dynamic DNS Pro to your shopping cart](#) 🛒 (or try it with \$1.99 [monthly subscription](#)).

Hostname: . **dyndns-free.com**

Wildcard: create "*.host.dyndns-yourdomain.com" alias (for example to use same settings for www.host.dyndns-yourdomain.com)
only for DynDNS Pro users

Service Type: Host with IP address
 WebHop Redirect (URL forwarding service)
 Offline Hostname

IP Address:
[Your current location's IP address is 71.88.100.93](#)
TTL value is 60 seconds. [Edit TTL...](#)

Mail Routing: I have mail server with another name and would like to add MX hostname...

What do you want to use this host for?
Select services and devices you would like to use with this hostname.

Work From Home Office or VPN:

Hosting and Design For Web Sites and Blogs:

Remote Access For Devices:

Figure 13: Existing Company Website Screenshot: Add New Hostname Form

The screenshot shows a web interface for a five-step process. The progress bar at the top indicates that the user is currently on Step 4. The main heading is "Choose a name for your computer." Below this heading, there is a text input field that is currently empty, followed by a dropdown menu that has "dyndns-free.com" selected. At the bottom of the form, there are two yellow buttons: "Prev" on the left and "Next" on the right.

Figure 14: Silo Screenshot: Step 4 - Re-engineered "Add New Hostname" Step

The recommendations for the silo sites were presented first to our faculty advisor to determine the degree of improvement made to the overall signup process. Once approved, these were then presented to the development and management teams at Dyn Inc. to examine the feasibility and overall potential business benefits. Once a particular prototype was chosen to pursue, the development team agreed to develop the working silo site within a two week time frame. The completed live page was hosted by Dyn Inc. and made available to the group in order to conduct trials. As of December 15, 2010, the URL of the silo website is: <http://www.dyndns.com/mgp2010/>. Please refer to Appendix 12.4 for screenshots of the website that was used for the study.

5.2.3. Participants

Twenty-three trials were conducted on the campus of Worcester Polytechnic Institute using undergraduate students as participants. Our project group attended a class session to give a brief overview of the study and distribute flyers (see Appendix 12.5 for the flyer). The students were told that they could participate in the experiment in order to receive extra credit points in the class. The study group contained twenty-three college students from the class.

5.2.4.Design

On the day of the study, the students came to the designated meeting room at their reserved time. The experiment took place in three offices on the WPI campus. The rooms were set up with a desk and a laptop computer. The laptop, combined with screen-capturing software, was used to record both the screen and audio of the interactions of the subject, the interviewer, and the websites. Further, the various papers necessary for the experiment were distributed to each room before the participants arrived. One project team member remained in each of the three rooms and the last project team member was available for any last minute items that needed to be completed outside of the testing rooms.

Each testing session was allotted a maximum of 20 minutes for testing and was pre-assigned to be either a silo exposure or a website exposure test. The treatment we administered was the web URL to the DynDNS web page. One group received and used the current website for testing. The second group visited the silo wizard page that is hosted by Dyn Inc.

5.2.5.Procedure

After welcoming a participant to the study, a project team member began the recording software and read the directions for the respective study (silo or website). Both study groups were given the same scenario and asked to complete similar tasks of learning about the services, making an account, and signing up for the services. Please see Appendix 12.6 for the exact script.

Once the tasks were completed by the user, the project team member read the respective SUS questions out loud (detailed in section 5.2.6) and collected the answers from the participant using a Likert scale of 1 to 5. After the SUS was administered, the participant engaged in a brief interview. For specific interview questions for silo exposure and website exposure please refer to the script in Appendix 12.6.

5.2.6. Measurements

After finishing the assigned tasks on the given website, the participants completed a System Usability Scale questionnaire that used a Likert scale to assess the usability of the web page. Further, because the questions on the SUS are specific to a “system,” our project team modified the questions for the experiments. Detailed in Table 10 are the questions which were given to the user. These questions were modified slightly from the SUS found in Appendix 12.2 so as to accommodate the different tasks in each study.²

Table 10: Modified System Usability Scale (SUS) Used in the Study

1	I think that the services offered by this company would be useful to me.
2	I found the process unnecessarily complex.
3	I thought the signup process was easy to use.
4	I think that I would need the support of a technical person to be able to set up these services with this process.
5	I found the various functions in this process were all well integrated.
6	I found that there was too much inconsistency in this process.
7	I would imagine that most people would learn to use this process very quickly.
8	I found the process very cumbersome to use.
9	I felt very confident during the process.
10	I needed to learn a lot of things before I could get going with this process.

After the survey was administered, the user also answered some other open-ended interview questions about the process. These questions were modified to pertain to the relevant website (either

² In the experiment script, found in Appendix 12.6, the specific variations of the SUS can be found. There is separate wording for the users exposed to the silo site and users exposed to the current website.

the silo or the current website). They can be found below, in Table 11, and the complete study script can be found in Appendix 12.6.³

Table 11: Interview Questions for Participants

1	Before this experiment, were you familiar with DynDNS? If Yes, ask how familiar they are with the company, what services they used, how they liked the services they used
2	How easy/difficult was it to learn about what the service that this company provides does for you? Please explain.
3	Do you think that the service that this company provides for remotely accessing your files might be useful to you? Why/Why not?
4	Where would you use this service primarily? <ul style="list-style-type: none"> i. At home between computers on the same network ii. From home accessing a work computer iii. From school accessing a home computer iv. From work accessing a home computer v. On the go accessing a home computer
5	In the course of a week, how often would you use this service? <ul style="list-style-type: none"> i. Multiple times a day ii. Multiple times a week iii. Once a day iv. Once a week v. Never
6	ABOUT THE SET-UP WIZARD – Which of the following would have improved your experience? <ul style="list-style-type: none"> i. Images ii. Video tutorials iii. Text references for difficult terms iv. More instructions v. Less instructions vi. Icon of the product vii. Product overview
7	Would you consider signing up for the free service that this company offers? Why/why not?
8	Do you think the terminology and explanations used in the sign up process were clear and helpful?
9	Would you trust that this company would give you good reliable services?
10	In your opinion, what was the hardest part of the process?
11	Do you think it was aesthetically pleasing? Why/why not?
12	As we mentioned before, this is a beta test and we plan on polishing the interface. We would appreciate feedback on how you would like to see the final product.
13	Was there anything else that you liked or did not like?

³ *Please note that question 12 was only asked to users that were exposed to the silo site.

5.2.7.Results

Each of the lab experiments was recorded and stored electronically. This disc with audio and video can be acquired by contacting our advisor, Professor Soussan Djamasbi (djamasbi@wpi.edu).

In addition to full length experiments, the MQP team compiled a flash video that was distributed to the company sponsors as well as the project faculty advisor. This video shows highlights of some of the problems found throughout the experiments. A screenshot of the menu of the video is shown below in Figure 16.



Figure 15: Screen Shot of Lab Experiment Videos

If interested in obtaining or viewing a copy of the above video, once again please contact Professor Soussan Djamasbi (djamasbi@wpi.edu).

5.2.7.1. Cognitive Walkthrough

The cognitive walkthrough provided an examination of each of the websites from the perspective of a new user who is unfamiliar with Dyn Inc. and its services. For both the silo website and current website, participants were instructed to learn about and describe in their words what they believe Dyn Inc. offers as a service, to create a new account, and to utilize their service by registering a free hostname. The purpose of the cognitive walkthrough was to expose usability issues in the processes of each website, and to identify elements of the web pages that could be improved upon to establish visual appeal and trust.

The first task for each group of participants involved browsing the homepage, or landing page, to determine the services that are offered by Dyn Inc. The DynDNS.com homepage (<http://www.dyndns.com>), as seen below in Figure 17, created mixed emotions and confusion in several of the participants. For the purposes of the experiment, the participants were refrained from clicking hyperlinks and viewing subpages.



Figure 16: Existing Company Website Screenshot: DynDNS.com Homepage

As the participants described their thoughts for the cognitive walkthrough, it was evident that they were unsure about what specific services the company offers. The participant "wpi-2" commented "From their homepage, it seems as though I have to sign up for something. I would probably have no idea what they actually do without someone explaining it. The website looks good; very easy to navigate. I don't see what they actually do on here." The participant "wpi-7" also had difficulty, "Not clear yet what they can provide for me. You can host my own website for free. Access my webcam from anywhere. They allow me to host my website, and I can connect to any workstation." Other users

mentioned that the services appeared to target home users and small to medium-sized businesses, but weren't able to succinctly say what the service aims to accomplish.

The responses to the second interview question, "How easy/difficult was it to learn about what the service that this company provides does for you?" confirmed that it was difficult for the participants to extract useful information from the homepage. The user "wpi-4" responded "I'd say on the homepage, it doesn't really talk about what the service is. Not in detail. You'd need background knowledge of what you're trying to do here, which I don't really have". Another user, "wpi-8" claimed that he didn't know what the service could do for him until he began signing up for an account.

The landing page for the silo website, as seen below in Figure 18, aimed to describe how Dyn Inc's service can be utilized by the end-user to accomplish a goal. By providing usage scenarios, the participants were better able to describe the service being offered. The user "wpi-11" stated "Just share your files with people, or listen to music you've shared. Show other people what your screen looks like. You can access your other desktop at the same time." Each of the tabs on the bottom of the landing page described what the DynDNS service could facilitate.



Learn about what **FREE** remote access can do for you!

Get Started!

Access - Remotely use up to three of your computers from anywhere in the world

Easy to use - Interact with your computer remotely as you normally would

Remote Desktop	Share your files	Listen to your music	Get remote assistance	Share your screen
--------------------------------	----------------------------------	--------------------------------------	---------------------------------------	-----------------------------------

Figure 17: Silo Screenshot: Landing Page

The participants that viewed the silo website largely agreed that this landing page displayed useful information. In contrast to the current website's homepage, the interview question "How easy/difficult was it to learn about what the service that this company provides does for you?" returned very favorable answers. User "wpi-10" said, "It was easy, they had just one page that showed everything". The users seemed much more confident in describing how the DynDNS service can be utilized.

Although this approach was successful in demonstrating common uses of the service, it did not accurately portray how the DynDNS hostname service comes into play. Several participants appeared to not understand which platform or technology was being used. They erroneously thought that Dyn Inc. might offer cloud computing, data storage, or the ability to host files on the website itself.

The second task for each group was to create a new account with Dyn Inc. For the current website, the participants had little trouble in completing this step. User "wpi-2" described it as very simple, "The signup process was painless, very minimal amount of information to put in." One aspect that was perceived as needlessly difficult was locating the link on the homepage to create a new account. The most significant usability concern for the DynDNS homepage is the lack of a standalone link for new account creation. The users were forced to click "Sign In" to see this link, as seen below. While performing the task, user "wpi-4" said "I don't know if that's the way you're supposed to go into it. It was kind of small and off to the side. Maybe it could be more pronounced, like 'Make an Account Here'". See Figure 19 (below) for a screenshot of this.

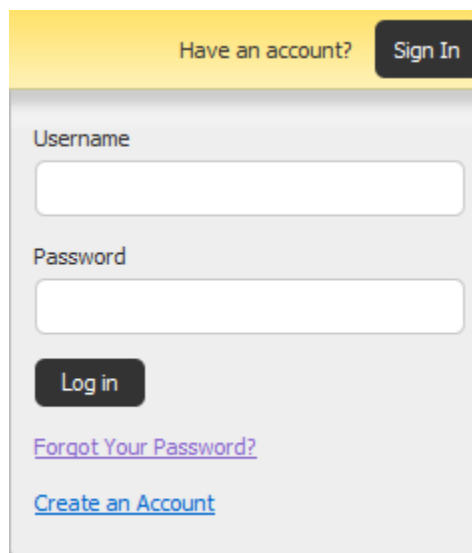


Figure 18: Existing Company Website Screenshot: Create an Account

On the silo website, the landing page directs the user straight to the "Create an account" after clicking "Get Started!". The cognitive walkthroughs and interview questions didn't raise any usability concerns over this signup process.

The third and final task involved signing up for the DynDNS free hostname service. Adding a hostname to the user's account is fundamentally different between the current website and the silo

website. For the current website, there are multiple paths to navigate to the "Add New Hostname" webpage. Users can click on the "Services & Pricing" link on the banner and then select "DynDNS Free", utilize the "Free Domain Name" box on the homepage, or navigate via the navigational pane on the left hand side.

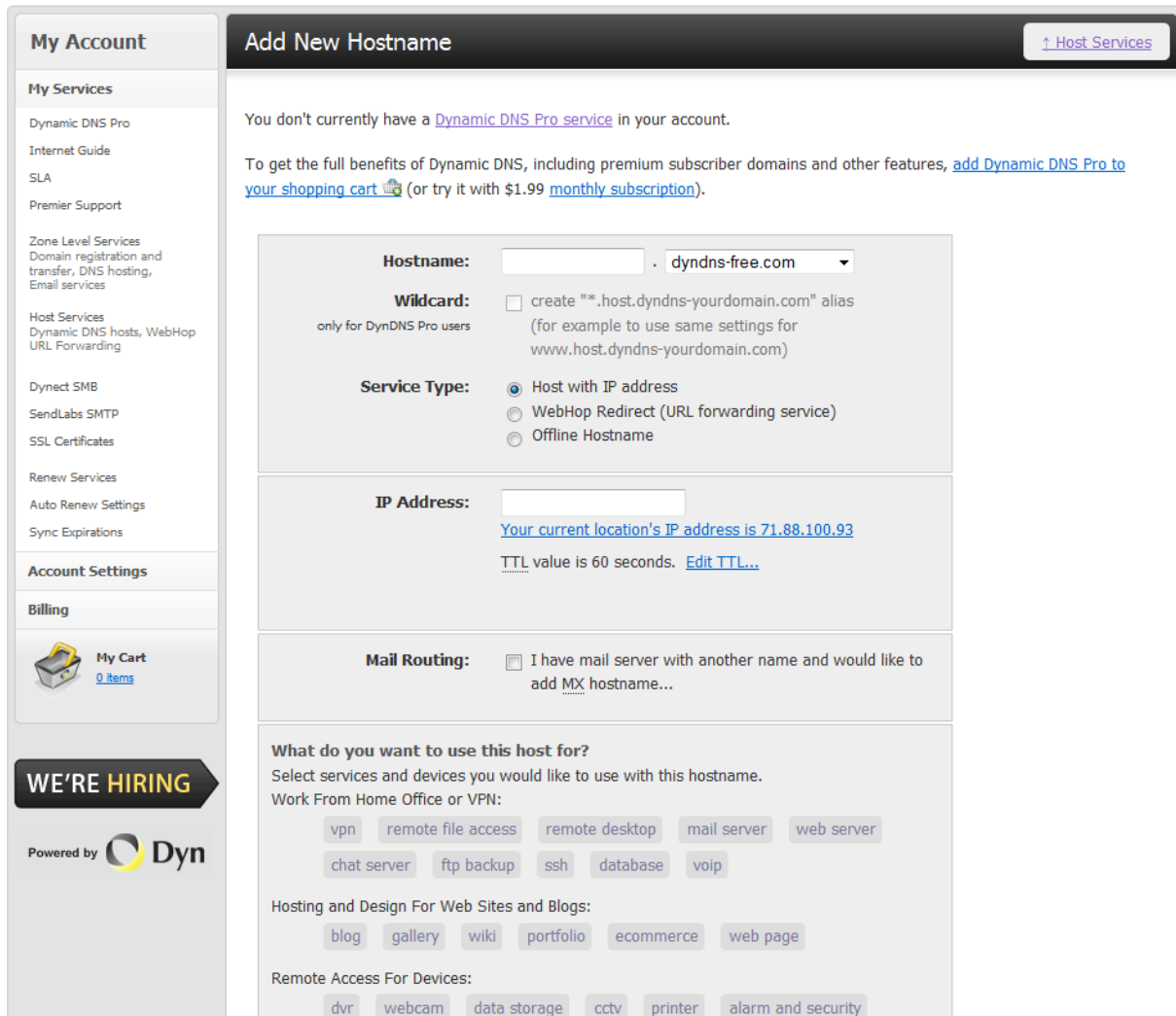


Figure 19: Existing Company Website Screenshot: Add New Hostname Form

Regardless of the path, the user is taken to the "Add New Hostname" webpage, as seen in Figure 20. The participants struggled with the meaning of the technical terms used on this page. The users

largely kept the default options blank because they weren't sure what they were doing. User "wpi-4" describes his/her thoughts, "So now I have to pick a hostname? Right so I need to pick any kind of name for my website, I guess, I think. I don't know what this is, it says wildcard. Oh it says it's only for pro users so you have to pay for that. It says IP address. I'm not a huge computer guy so I don't know what this is telling me. It gives me my current location so I guess I'll just throw that number in there. Seems like the logical thing to do. Don't know what this means, TTL value is 60 seconds. It's asking me if I want, if I have a mail server with another name. I don't know. I'm not going to do that right now. It's got a whole bunch of other things. Hosting and design for websites."

The participant pool was selected from an undergraduate course at WPI, and it was expected for the users to display a general understanding of many of these terms. However, that simply wasn't the case, and the phrases such as "wildcard", "service type", and "WebHop Redirect" only confused the users and created doubt. This was the final task for the current website group.

A screenshot of a web form titled "Step 4" in a progress bar. The main heading is "Choose a name for your computer." Below this is a text input field that is empty, followed by a dropdown menu currently showing "dyndns-free.com". At the bottom left is a yellow "Prev" button, and at the bottom right is a yellow "Next" button.

Figure 20: Silo Screenshot: Step 4 - Add New Hostname in Silo

Although this step was greatly simplified in the silo implementation, the instructions "Choose a name for your computer" (Figure 21) greatly confused many of the non-network savvy users. It offers no

explanation as to what kind of name is required, how it will be used, or what the implications might be. One participant who identified himself/herself as an expert correctly deduced, "That step created a nickname for the IP address. Then you can use that instead of the IP address." The majority of the users, however, entered a name that wasn't appropriate for the situation. For example, user "wpi-16" said "I believe it's what you named your computer originally, like Joe-PC or something. I'm not sure 100%." Several participants entered either "dell" or the model of the laptop that was used for the experiment, indicating that they were unaware of the significance of this unique nickname.

In regards to usability concerns, *"Please enter valid hostname"* is returned for all errors and no explanation is offered. Spaces, punctuation, and other invalid entries are not caught to notify the user of what correction is needed. Similarly, if a user chose a hostname that wasn't available, they weren't instructed to choose a more unique hostname.

The two processes, silo website and current website, were similar up to this point in the designated tasks. The silo website was designed to guide a new user into the practical application of DynDNS' service - remote access to a personal computer. Although the current DynDNS website offers limited direction for users after adding the hostname, the silo website attempts to break down the specific steps needed to utilize remote access software. Step one of the silo asks the user to select the Operating System of the computer they are currently using, as seen in Figure 22.



Welcome brandongrace123!



Figure 21: Silo Screenshot: Step 1 - Operating System Selection

Step two of the silo, seen in Figure 23, gives the user the choice of an "Express setup", which utilizes the Windows Remote Desktop Protocol that is available on all Windows machines, or the "Advanced setup" with VNC software. Every participant that used the silo website chose the "Express setup", because it simply seemed easier and less time-consuming.



Figure 22: Silo Screenshot: Step 2 - Express setup vs. Advanced setup

The silo website processes the choices made by the user in steps one and two, and then displays the appropriate third step to the user. Each participant was handed a piece of paper containing the model of the router to be selected in the dropdown box, as seen in Figure 24.

user through forwarding a port on his/her home router, but that isn't clear from the layout. As user "wpi-12" said, "It's kind of confusing because you see a lot of things going on. You've got a big arrow at the top and you've got the Google Chrome ad. It's kind of hard to figure out where you're supposed to focus on. This seems more like an advertisement than it's telling me what I want to know. I'm not sure what they want me to do. When you read this, it says to get the static IP and then you come back to this page. I feel like this is one of those things where if someone showed you it would be a lot more simple."

PORT FORWARD
FREE HELP setting up your router or firewall

[Router List](#) [Port List](#) [Port Checker](#) [Other Guides](#) [Game Guides](#) [Store](#) [Support](#) [Forum](#)

Click here to Automatically Forward ports with PFCConfig!

- Select your router from a list
- Select the programs you want
- Click 'Update Router'
- You're Done!

Port Forwarding Remote Desktop on the Netgear CG814GCMR

What is Port Forwarding?

To setup port forwarding on this router your **computer** needs to have a static ip address. Try our free **PF Setup Static IP Address Program** which will setup a static ip address for your computer.

Or you can take a look at our [Static IP Address](#) guide to setup a static ip address. When you are finished setting up a static ip address, please come back to this page and enter the ip address you setup in the Static IP Address box below.

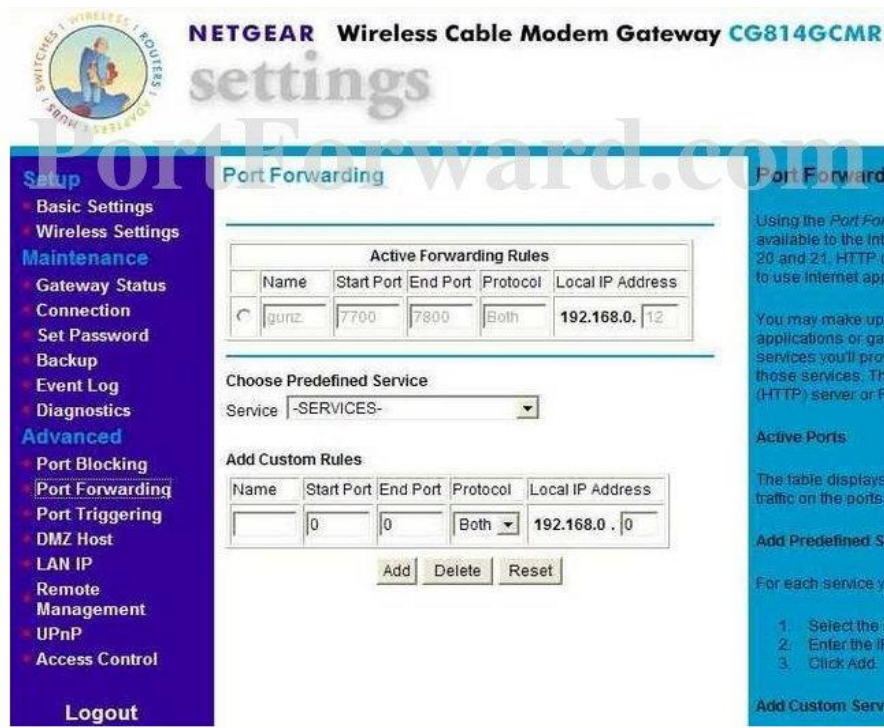
Do not skip this step!

Enter Static IP Address

Figure 24: Silo Screenshot: Portforward.com Tutorial

The participants' behavior while looking over this page suggested that they were hesitant to actually read the port forwarding instructions. They struggled with the meaning of the terminology on the page and scrolled through to the bottom. The second half of the page contains router-specific screenshots, as seen in Figure 26. The pictures proved to be much more useful for the users. They had great difficulty in understanding the explanation provided by portforward.com, but users found that the

screenshots for their specific router combined with the table containing the port information allowed them to get past this step.



We will list a series of lines here that will show you exactly how to forward the ports you need to forward. Remote Desktop requires you to forward the 3389 ports. Go ahead and enter the settings shown above into the **Port Forwarding** menu and then click **Add**.

Name	Start Port	End Port	Protocol	Local IP Address
Name1	3389	3389	Both	192.168.0.10

And that is it! You are done!

Figure 25: Silo Screenshot: Router Interface Screenshot

After minimizing the internet browser and its portforward.com instructions, the participants were instructed to use the shortcut on the desktop to access a simulated router interface. This interface, as seen in Figure 27, was identical to the screenshots seen in the portforward.com instructions.



settings

Setup

- Basic Settings
- Wireless Settings

Maintenance

- Gateway Status
- Connection
- Set Password
- Backup
- Event Log
- Diagnostics

Advanced

- Port Blocking
- Port Forwarding
- Port Triggering
- DMZ Host
- LAN IP
- Remote Management
- UPnP

Reboot
Logout

Port Forwarding

Active Forwarding Rules				
Name	Start Port	End Port	Protocol	Local IP Address

Choose Predefined Service

Service

Add Custom Rules

Name	Start Port	End Port	Protocol	Local IP Address
	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="Both"/>	<input type="text" value="192.168.0.0"/>

Figure 26: Silo Screenshot: Simulated Router Interface

Port forwarding was expected to be seen as a huge hurdle in the process. The more technologically savvy participants seemed to be able to get through this step with little difficulty, "Yeah I think this would get you through it. Tells you everything you would need. It would definitely help me." A more typical assessment of this step was, "I don't think I'd be able to do this myself after reading the steps. Still confusing. There's a lot of instructions." The general trend appeared to be that users couldn't comprehend the instructions, but could copy the information straight over from the table on the bottom of the portforward.com page to the simulated port forwarding. One user noted that having the

portforward.com page displayed side-by-side with the simulated router interface allowed him/her to easily copy over the necessary information.

It became clear that this step was a necessary evil - it was by far the most difficult step of the silo process, but crucial for the use of remote access software. This silo process went above and beyond the account creation and new hostname on the current website in an effort to get new users quickly started with remote access. The cognitive walkthrough ended upon reaching step 5 of the silo. After progressing through the challenging port forwarding step, step five of the silo would have provided additional resources to aid the new user in utilizing remote access software. A download link for the Operating System-specific DynDNS update client is provided, along with a knowledge base article for the selected software (either Windows Remote Desktop Protocol or VNC).

The audio from each of the cognitive walkthrough videos was transcribed and recorded to a data CD containing this MQP document. Please contact Professor Soussan Djamasbi (djamasbi@wpi.edu) to request this data.

5.2.7.2. System Usability Scale Survey

As mentioned in the Methodology, the System Usability Scale (or SUS), is an industry standard for measuring the usability of a website. This scale ranges from 0-100 with a score of 65 or over meaning the site is of a desirable usability. The following is our analysis and interpretation of the collected data.

The results of the test for the silo site and the current website are shown in Table 12 and 13. The left column correlates with a test subject, and the top row follows the standard SUS questions in Table 12 and Table 13.

Table 12: Silo System Usability Scale (SUS) Scores

	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	SUS Score
wpi-10	2	2	4	1	5	1	3	1	5	1	61.5
wpi-11	3	4	3	4	4	2	4	3	2	4	31
wpi-12	4	3	3	4	3	2	3	3	2	2	37.5
wpi-13	5	1	4	1	4	1	4	1	4	2	63.5
wpi-14	3	2	4	2	5	1	3	3	3	2	50.5
wpi-15	4	2	2	5	4	3	2	3	2	5	26.5
wpi-16	3	4	4	3	3	2	4	4	4	3	35.5
wpi-17	2	2	5	2	4	1	5	2	4	3	52.5
wpi-21	4	3	2	2	3	1	4	3	4	4	42
wpi-22	4	4	5	5	3	3	2	2	2	5	26
wpi-23	2	5	1	5	2	4	2	4	1	5	8
wpi-24	4	2	3	4	3	2	2	5	1	4	28
AVGs	3.08	2.62	3.08	2.92	3.31	1.77	2.92	2.62	2.62	3.08	38.54

Table 13: Website System Usability Scale (SUS) Scores

	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	SUS Score
wpi-1	5	1	5	1	5	1	4	1	5	1	69
wpi-2	3	5	5	1	4	2	3	1	4	1	51.5
wpi-3	3	2	3	1	3	2	4	3	3	1	51
wpi-4	2	2	4	3	4	1	4	3	2	3	43.5
wpi-5	3	4	3	3	4	2	3	4	3	4	31
wpi-6	3	1	5	2	4	1	4	2	4	1	60
wpi-7	2	2	2	1	4	2	4	2	5	3	49.5
wpi-8	3	4	4	2	4	3	4	3	3	1	43
wpi-9	5	4	5	5	4	4	5	5	4	5	23
wpi-19	2	4	2	5	3	3	1	4	1	4	16.5
wpi-20	4	2	4	1	3	1	4	3	2	4	47
AVGs	2.69	2.38	3.23	1.92	3.23	1.69	3.08	2.38	2.77	2.15	44.09

The first hypothesis was that the silo website would be scored higher on the System Usability Scale than the current website. An equal variance one-tailed t-test failed to determine if there was a statistical

difference between the mean SUS score for the silo and the current website ($p = 0.206$). The results of the t-test are provided below in Table 14.

Table 14: Results of the t-Test (Usability of the Silo Site versus the Current Site)

Website	Mean	Std. Dev.
Silo	38.54	16.27
Current	44.09	15.47
df= 21, t Stat= -0.836, p=0.206		

The statistical power of the experiment was 23.7%, which indicates that the sample size was far too low to rule out the possibility of the phenomenon. In order to achieve the desired 80% power, a sample size of 82 students for each website (silo and current) would have been required. The large values of standard deviation ($s = 16.27$, $s = 15.47$) suggest that there is a subjective difference in terms of usability for each participant. Another reason for these usability scores is that the silo focused solely on the process. The perceived ease of use of the website is inherently linked with its visual appeal.

5.2.7.3. Interviews

As previously mentioned, a major study of this project included the interview of 23 WPI undergraduate students as they interacted with either Dyn's existing website or the silo website the group proposed and had their development team create. In an effort to extract the most useful information from this study, the group recorded the sessions using voice and screen-capture technologies for later analysis. This section will detail the findings from examining the video clips, as well as convey trends the group noted regarding user behavior, ease of use, and overall reactions to the sites.

The students that were interviewed were split into two groups and either assigned tasks relating to Dyn's current website or to the proposed silo website. The users who examined the current site were

asked twelve questions while those who interacted with the silo were asked those same twelve questions with the addition of one more. The analysis of the interview questions is reported below.

All participants were asked whether they had heard of DynDNS prior to the experiment. The results showed that most participants (90%) were not familiar with the company prior to the experiment (Figure 28).

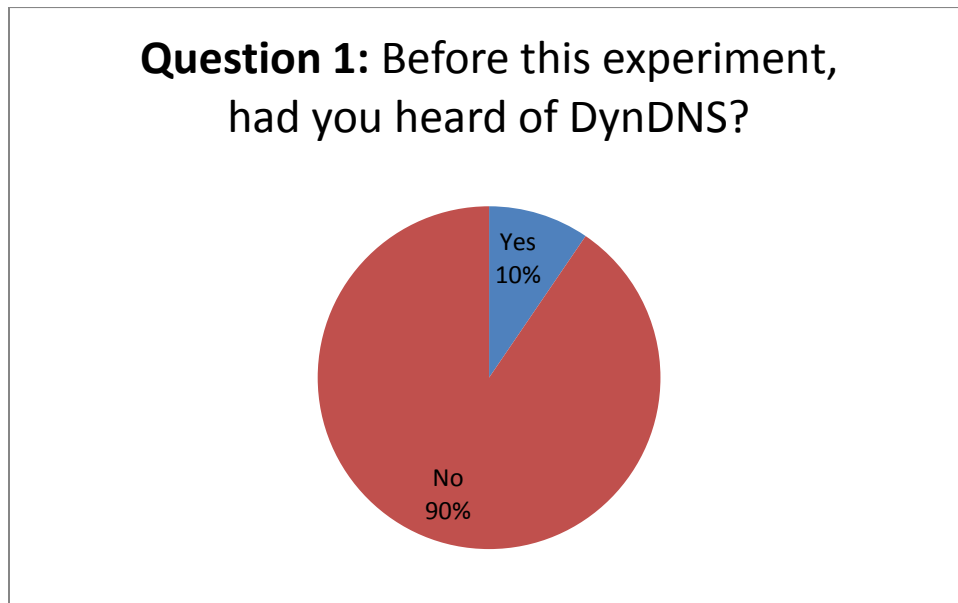


Figure 27: Interview Results: Percentage of Participants Who Have Heard of DynDNS Before

Participants were next asked whether they found the website to be easy or difficult to use, or if they were indifferent (moderate). We found that the majority of users who had experience with the current website found it difficult or moderately difficult to use (a combined 90%), whereas the vast majority of silo site participants (91%) found the site to be easy to navigate.

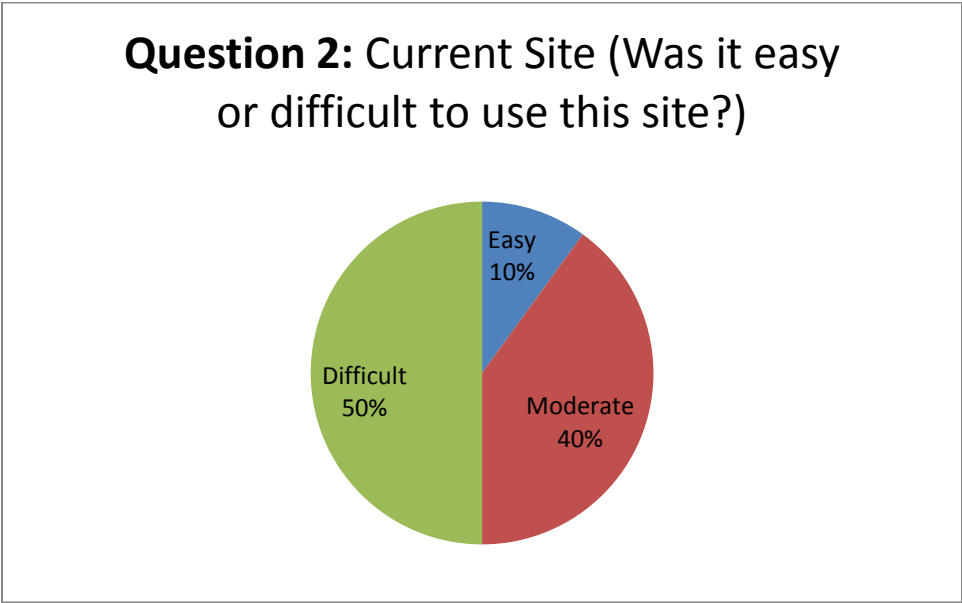


Figure 28: Interview Results: How Difficult to Use Current Website

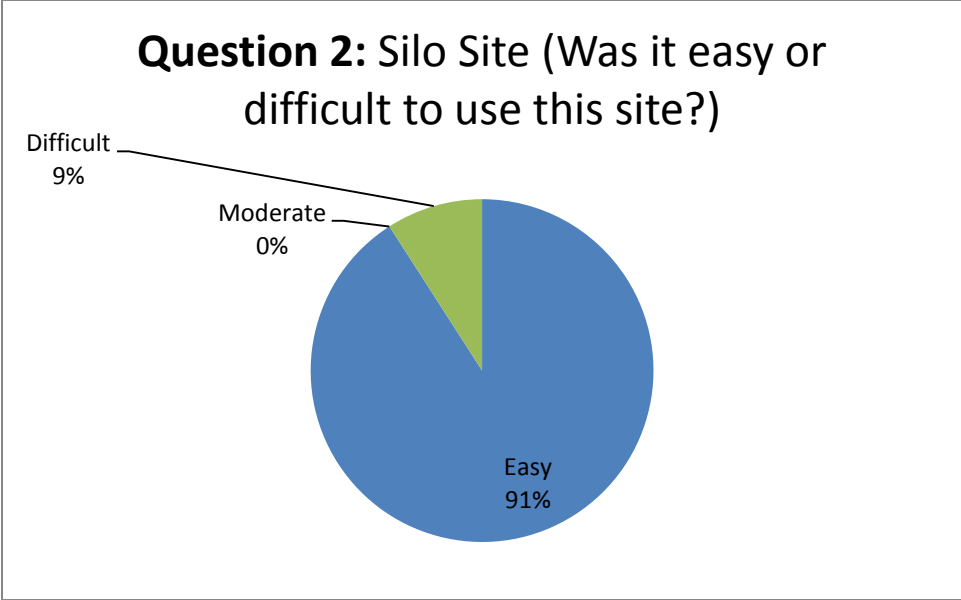


Figure 29: Interview Results: How Difficult to Use Silo Website

Participants were then asked whether they found the website to be useful or not. Surprisingly, the majority of people assigned to explore the current website (60%) found the site to be useful. Roughly the same percentage (64%) of those exposed to the silo site felt the same way.

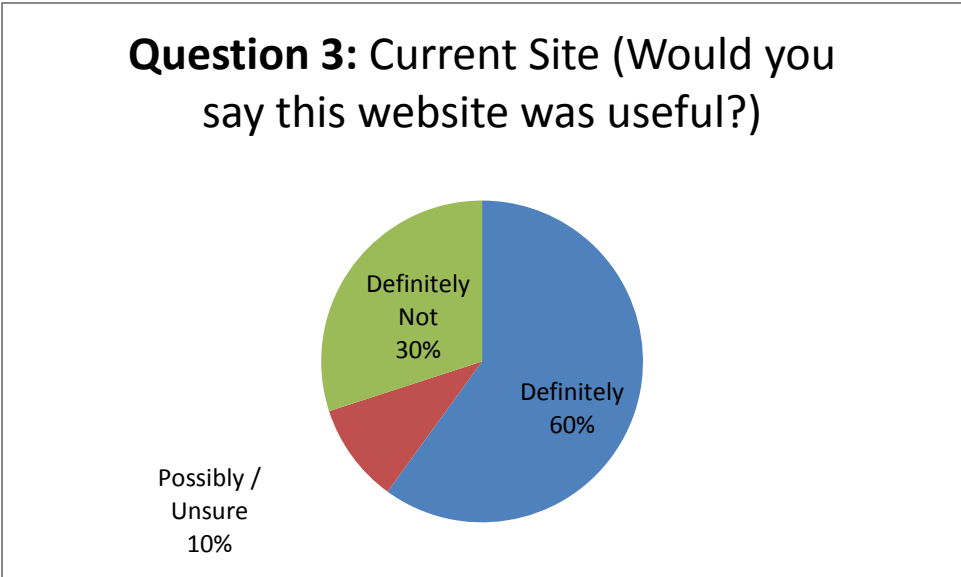


Figure 30: Interview Results: How Useful Was the Current Website

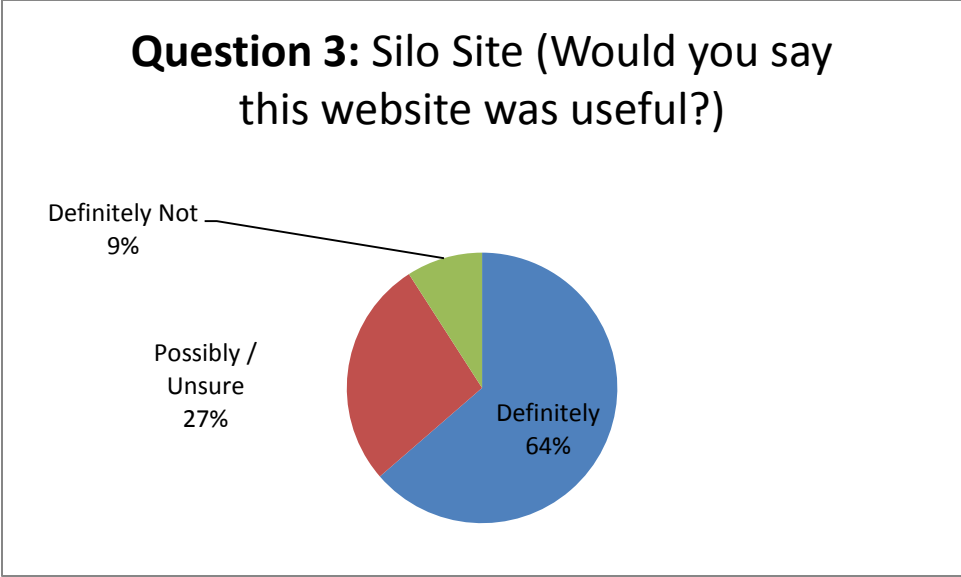


Figure 31: Interview Results: How Useful Was the Current Website

The next question in the interview process asked the potential users where they would be most likely to utilize the DynDNS service. There were several varied responses, which are detailed in the figures below. The majority among both groups, however, was to access a home computer while on the go. An example used was accessing files for a presentation or something that was done at home from anywhere in the world.

Question 4: Current Site (Where would you use this service primarily?)

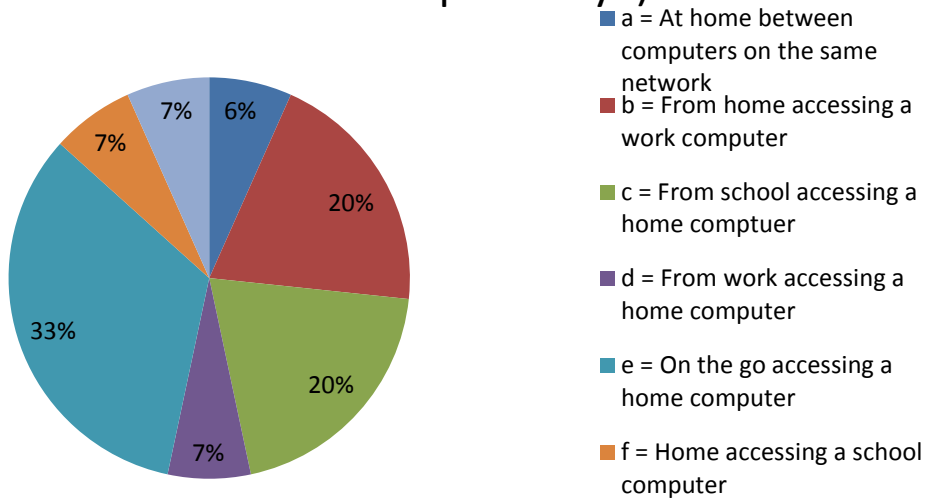


Figure 32: Interview Results: Where Users Would Use Dyn's Service Primarily (Current)

Question 4: Silo Site (Where would you use this service primarily?)

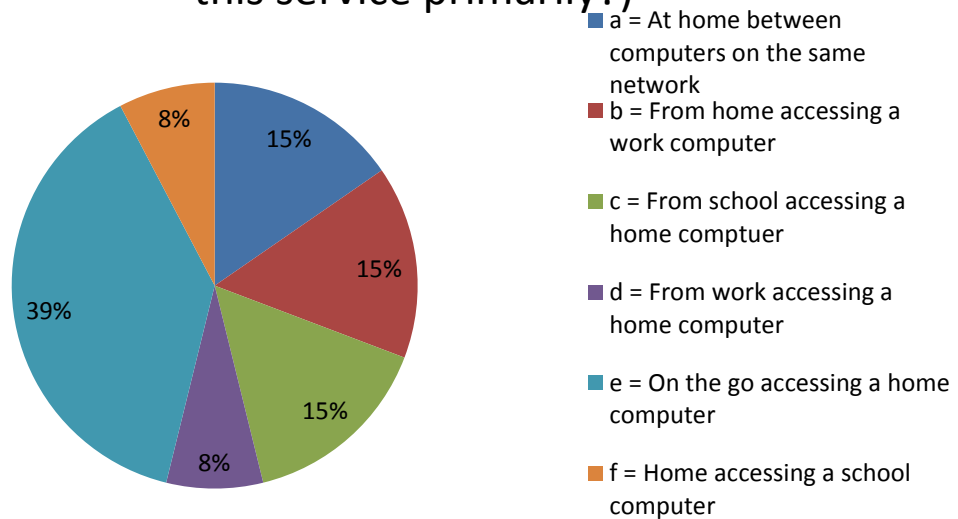


Figure 33: Interview Results: Where Users Would Use Dyn's Service Primarily (Silo)

Participants were then asked how often they might utilize the services offered by Dyn. In both cases, the majority (50% of those exposed to the current site and 73% of those exposed to the silo site) thought it likely they would use the service multiple times per week.

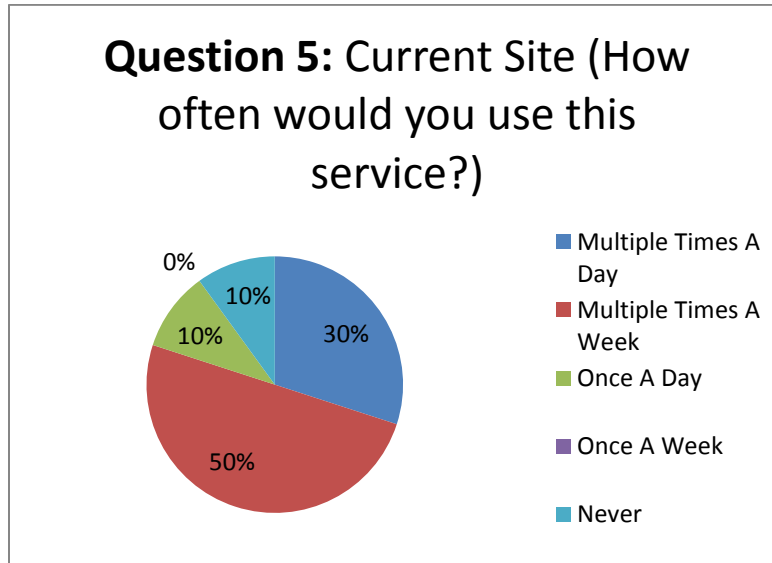


Figure 34: Interview Results: Frequency Users Estimated They Might Use the Product (Current Site)

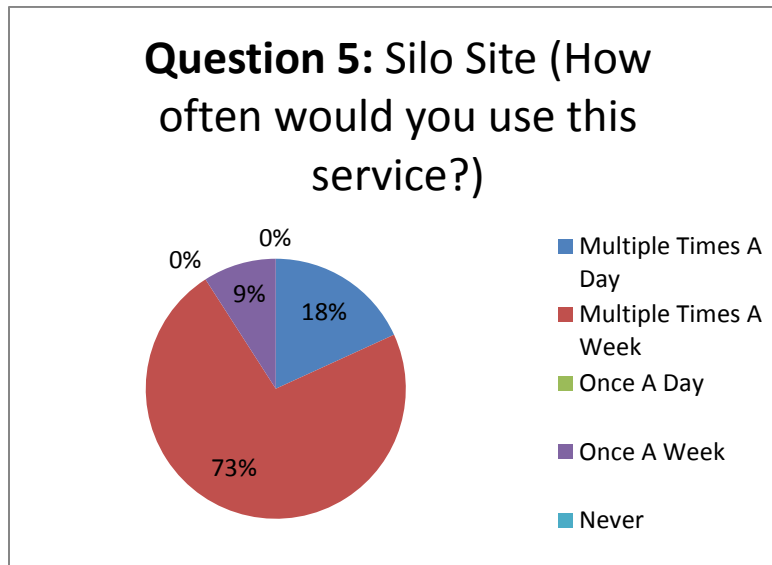


Figure 35: Interview Results: Frequency Users Estimated They Might Use the Product (Silo Site)

The next question was very helpful in gathering user feedback based on the processes they were exposed to during the experiment. This question asked the participant what would have improved the overall experience. This was a multiple choice question in which the user could select multiple answers. The available choices were: images, video tutorials, text references for difficult terms, more instructions, less instructions, icon of the product, or product overview. Both experiment groups (6 respondents in each group) felt that video tutorials would be beneficial. An equal number also wished to see a product overview in the current site.

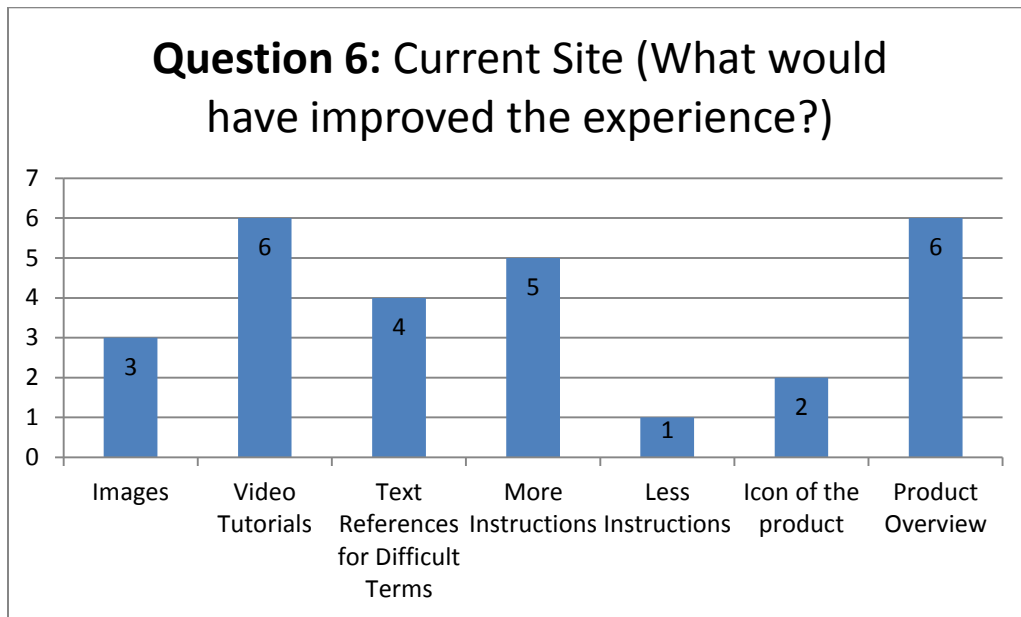


Figure 36: Interview Results: Improvement of Experience (Current Site)

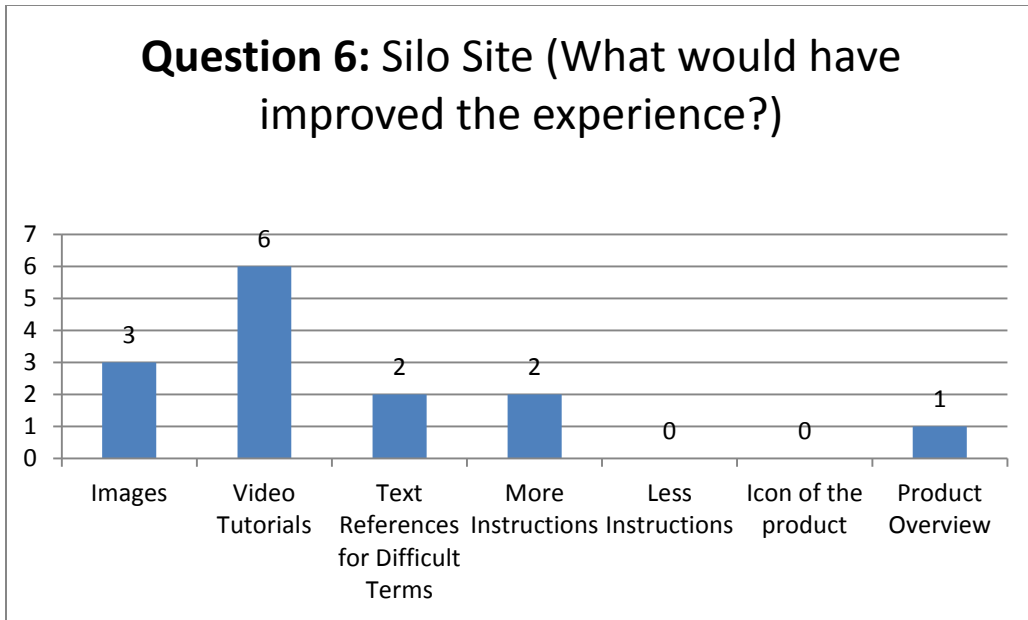


Figure 37: Interview Results: Improvement of Experience (Silo Site)

Participants were next asked to answer whether or not they would sign up for the free service explored in the experiment. The majority in each group felt they would definitely sign up for the service; however, that majority is a smaller percentage in the second group (that examined the silo site).

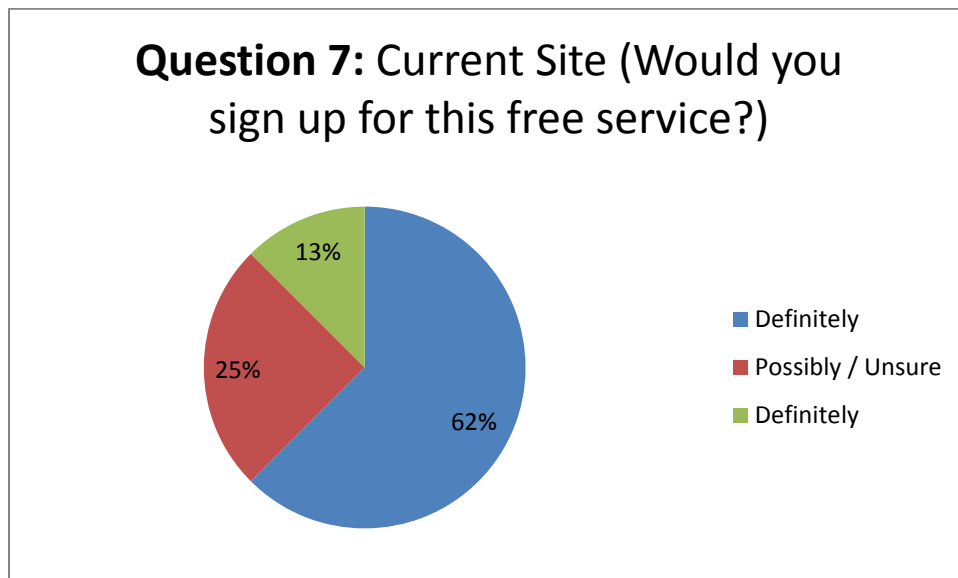


Figure 38: Interview Results: Sign-Up for Service (Current Site)

Question 7: Silo Site (Would you sign up for this free service?)

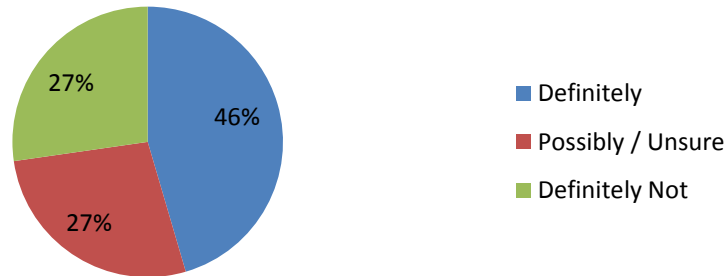


Figure 39: Interview Results: Sign-Up for Service (Silo Site)

The next interview questions gathered feedback on whether the users felt the terminology on the respective websites was clear and helpful. The majority of users exposed to the silo site (64%) felt the terminology was clear and helpful. The majority of those exposed to the current site (40%) were unsure or felt the terminology was possibly clear and helpful.

Question 8: Current Site (Did you find the terminology clear and helpful?)

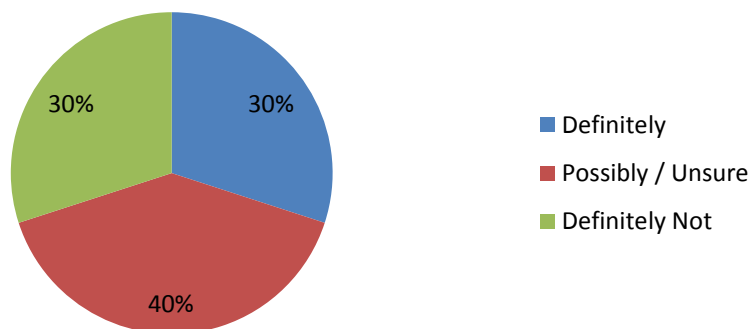


Figure 40: Interview Results: Helpful Terminology (Current Site)

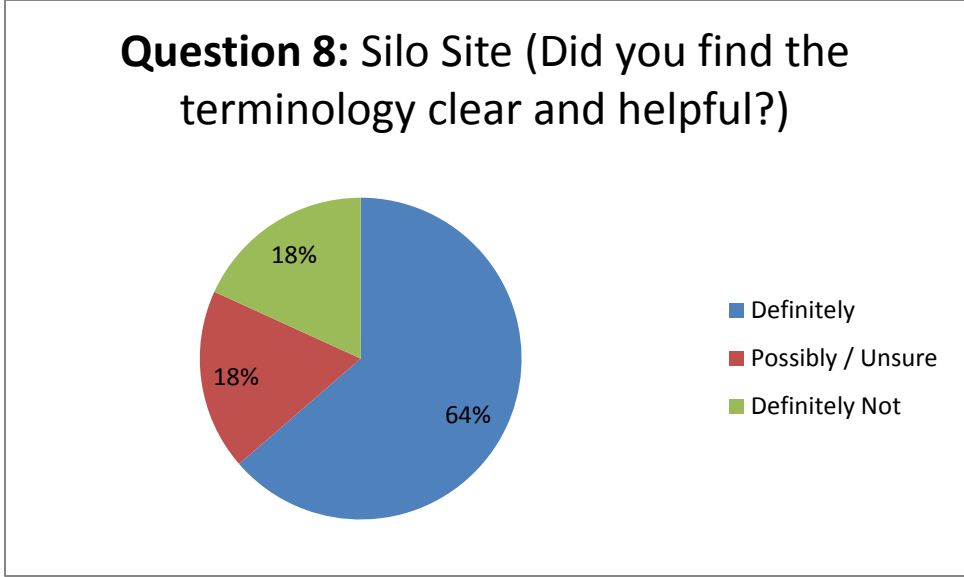


Figure 41: Interview Results: Helpful Terminology (Silo Site)

The next question was another crucial focal point of our project, centering on the issues of trust relating to a user’s experience. In the interview, we asked the participants if they would trust this company (Dyn) to give them good and reliable services. The majority of those observing the existing website (60%) felt that they definitely would, whereas only a small portion (18%) of those exposed to the silo site were equally confident in the same company’s ability to deliver quality. According to prior research, the visual appeal of a website can greatly impact a user’s perception of a company and their ability to offer quality services or products (Djamasbi et al. 2010 a).

Question 9: Current Site (Would you trust this company to give you good and reliable service?)



Figure 42: Interview Results: Website Trust and Confidence (Current Site)

Question 9: Silo Site (Would you trust this company to give you good and reliable service?)



Figure 43: Interview Results: Website Trust and Confidence (Silo Site)

The next question was open-ended and dealt with the participants' perception of the hardest task throughout the entire experiment. A large number of those who used the existing website (56%) felt that the hardest part was determining what the company actually does and offers. The majority of those utilizing the silo site (46%) felt that setting up their routers would be the most difficult step.

Question 10: Current Site (What was the hardest part while completing the three tasks?)

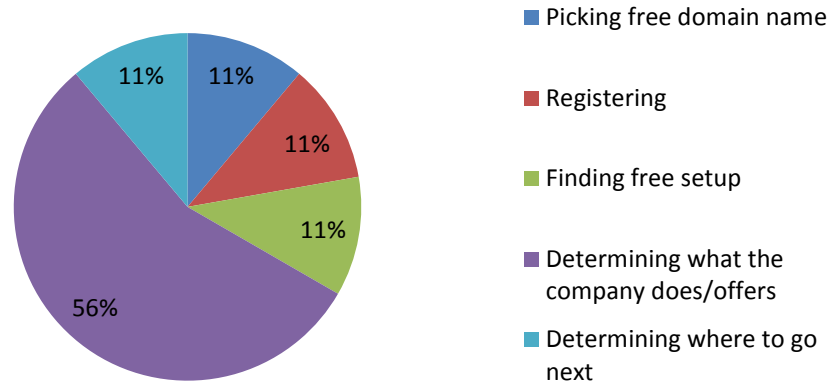


Figure 44: Interview Results: Hardest Tasks (Current Site)

Question 10: Silo Site (What was the hardest part while completing the three tasks?)

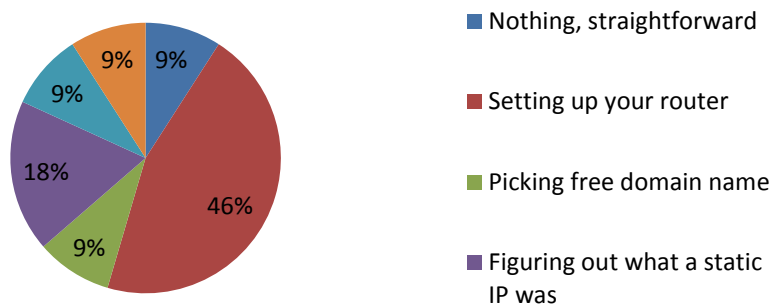


Figure 45: Interview Results: Hardest Tasks (Silo Site)

Participants were next asked if they felt the website was visually pleasing. A large number (80%) of those looking at the existing site felt that it was definitely appealing while only a small portion (18%) of those who looked at the silo site felt the same way.

Question 11: Current Site (Was the website visually pleasing?)

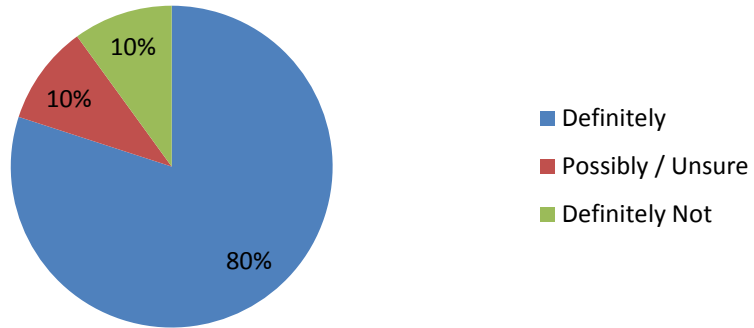


Figure 46: Interview Results: Visual Appeal (Current Site)

Question 11: Silo Site (Was the website visually pleasing?)

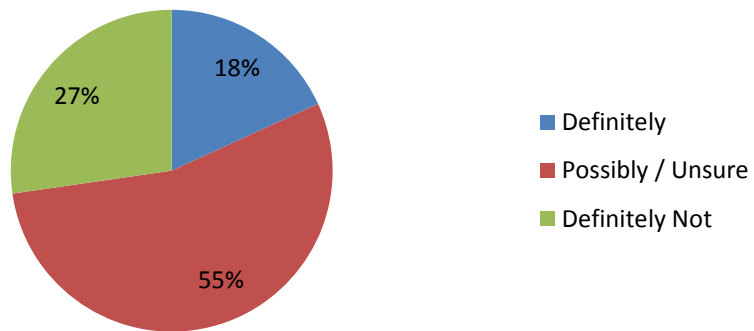


Figure 47: Interview Results: Visual Appeal (Silo Site)

The final question asked to both groups was also open-ended and allowed for participants to offer any additional feedback regarding what they did or did not like. The responses were varied and the majority of users simply responded “no” when asked if they had additional comments. Figure 49 and 50 detail the entirety of the responses the group received.

Question 12: Current Site (Anything else you liked or did not like?)

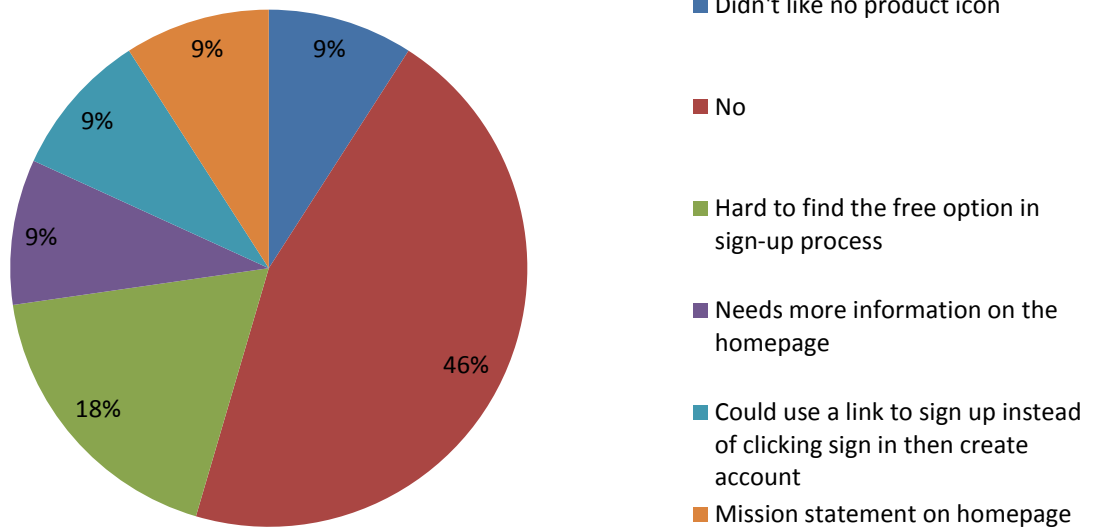


Figure 48: Interview Results: Additional Comments (Current Site)

Question 12: Silo Site (Anything else you liked or did not like?)

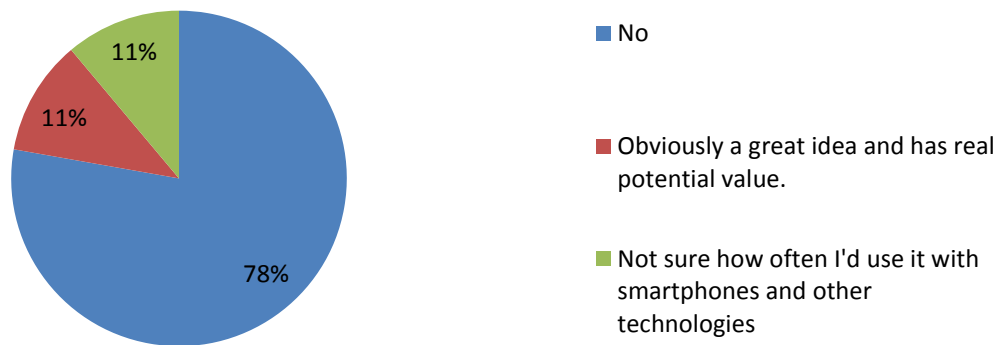


Figure 49: Interview Results: Additional Comments (Silo Site)

Users of the silo site were asked a thirteenth question to offer any insights they might have regarding the silo website, which was still in beta at the time of the study. The majority of respondents commented on the need of overall polishing (backgrounds, colors, and themes).

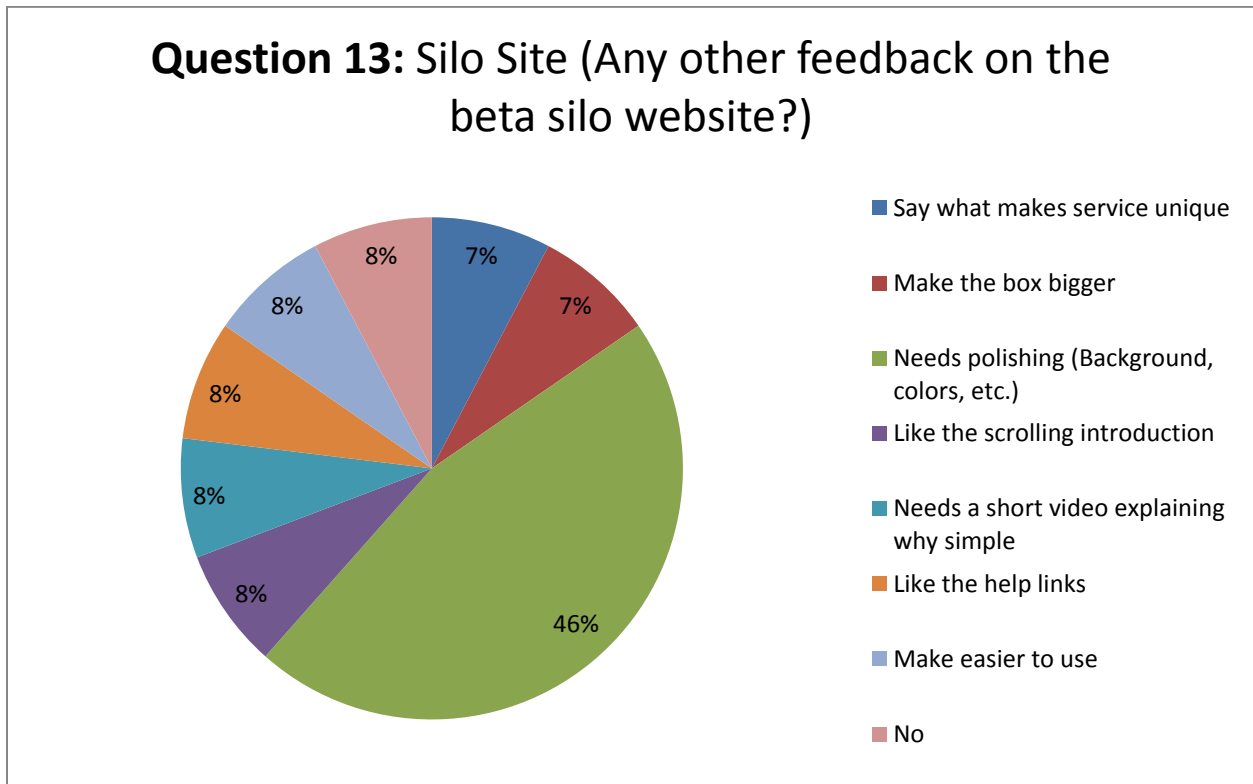


Figure 50: Interview Results: Any other feedback on beta? (Silo Site)

5.2.8. Discussion

The following sections will discuss the respective results from Study II's experiment. These will include discussions regarding the cognitive walkthrough, the SUS survey, and the interviews.

5.2.8.1. Cognitive Walkthrough

The cognitive walkthrough provided great insight into the thought processes of first-time visitors to DynDNS.com and the silo website. One of the goals of this project was to attract new users to Dyn Inc., and more specifically, users who have limited background knowledge and experience with this technology. Through the results of the Google Search Ranking survey, improvements to the semantics

were attempted. Instead of using technical terminology that users might be unfamiliar with, a more user-centered design was established.

Participants who used the current website expressed difficulty in seeing the next step in the overall setup process. First-time visitors of the DynDNS.com homepage may have a wide variety of goals, such as learning about DNS or one of its many other services, reading about Dyn Inc., or seeking a multitude of applications of dynamic DNS. The DynDNS.com homepage doesn't give a clear image of how dynamic DNS is used. It contains a vast amount of technical knowledge that is distributed among a number of subpages, and the first-time visitor might have difficulty in seeing the next logical step. In contrast, the visitors to the proposed silo website have a specific goal in mind. The silo landing page gave users a more concrete description of how DynDNS' service can be used to add value. The silo was successful in dismantling and simplifying the overall steps that a user must go through to get started with remote access software.

5.2.8.2. SUS Survey

The only SUS score above the accepted level (65) is by subject "wpi-1" and is scored at a 69. Not only is this score in the results for the test of the current website, but the average SUS scores (as noted on the bottom row of both Table 12 and Table 13) for the website are higher than the silo scores. While this would seem to mean that the silo is of a lower usability to users than the current site, there are a couple factors to consider.

While participant "wpi-1" was the only subject to score either the silo or the website highly, he/she was also the only subject that had an active account with DynDNS at the time, "I have an account. I created it a while ago (high school)." While they did continue to say, "I don't use it. I use frayed.org [another DNS provider]. No good answer why, just found that easier or more free. Stuck with it because no reason to change", their prior exposure to Dyn's current website and their technical

aptitude likely resulted in the higher SUS score. It is therefore reasonable to argue that this outlying high SUS score does not fairly represent the target market of new and less technical users.

Another important factor in the difference in the SUS scores between the two tests was the process differences between the silo and website test. The silo site includes a step for port forwarding. While this is necessary for setup with both sites, the silo site has this step directly integrated with the signup process, whereas this step is several layers deep after the sign up process has been completed in the current site. This difference made it impossible to directly compare the two signup process, and the inclusion of this step greatly decreased the SUS score of the silo site. This effect is evident by the 46% of responses that noted this step as the hardest part of the sign up process for the silo site. Compared to the 56% response identifying 'Determining what the company does/offer as the hardest part for the current site' as the most difficult part of the process. It is important to take into account that outside of the test, when users come to a page and can't determine what the company offers; they are unlikely to continue with the sign up process.

The silo site had no responses complaining about confusion. However subjects would often be unable to complete the port forwarding step which outside of the test would lead to a higher drop off rate and therefore a less than optimal conversion rate of visitors to customers.

Finally, 82% of the subjects stated that they were unsure if they would trust the silo to give them good reliable services. Because trust is a large component of the SUS scoring system, this uncertainty of the silo negatively affected the silo's SUS scores. The common factor for the lack of trust in the silo was the fact that it was visually undeveloped. Subject "wpi-23" stated that, "I don't think it was I think it almost looked like a fake website." Despite the subjects being informed that the site was still under development, this complaint was common among the participants. This suggests that the

developmental state of the silo decreased the silo's SUS score; therefore a more polished look to it would provide better results.

5.2.8.3. Interviews

Figure 28 demonstrates what Dyn first mentioned to the group as being a potential area for expansion: the non-network savvy users. WPI prides itself on being a highly technical school, and nine out of ten interviewees had not heard of the company or their service before, while most had heard of remote desktop or similar applications. By better marketing to this user group, Dyn will increase its reach and expand its number of customers. This has the potential to bring in more revenue over time as users observe benefits to using paid services as well.

Figures 29 and 30 confirmed what the group predicted going into the interview sessions. Users found the current DynDNS website to be moderately to very difficult to use and navigate while the vast majority of students testing with the silo felt that site was intuitive and easily operated. Going forward, the group will make recommendations to use similar language and themes on the main site that are currently being used on the silo. These and other features are what caused the users to have such a warm reaction to using the site.

The results of the third question, which asked users whether or not they felt the website they were exposed to was useful (Figures 31 and 32), were fairly close between both groups of interviewees. The results of the three studies conducted by the WPI MQP team suggest that the cause of this is twofold. First, the current website uses very low-level, technical writing with few explanations leaving the users confused as to what the company's services can actually do for them. Second, the silo website, although written in a more understandable format, was not aesthetically modified yet so users may have felt it was not useful because they did not trust it. We will discuss the trust issues further with question nine of this interview.

The next question dealt with the user's perceptions of how useful the services offered would be if they were to use them. In particular, the MQP team asked where users would use the services most regularly. Figures 33 and 34 show that regardless of which site the users were assigned, they discovered common uses that they felt would be beneficial to them as students. The majority of both groups would find accessing their own home computer while on the go to be an extremely valuable and useful service. Most users, however, expressed interest in this with the qualifier of it being an easy setup process with little configuration necessary.

The fifth question built off the foundation of the previous one and asked users how often they would use the services. The responses to this question (Figures 35 and 36) indicate in both cases that users predicted they would use such a service fairly frequently, with the majority specifying they might use it multiple times per week, followed by multiple times per day. Using these rough numbers, one could infer that if the service was easy enough for a typical user to configure and begin using, they recognize a potential benefit to their daily lives. If Dyn is able to capture this intrigue in the product, there is real potential to vastly increase their customer base.

Regardless of which site the interviewees were exposed to, majorities in both groups felt the respective websites would benefit from video tutorials, as is evident in Figures 37 and 38. They felt that this media content would make the process of understanding the service, as well as configuring it, easier and would therefore make them more likely to complete setting it up. One can also observe of those interviewed regarding the current website, many users felt the site lacked instruction, details, and a product overview. These concerns were not nearly as prevalent with the silo website. The simplicity introduced using the silo site should be incorporated into the existing DynDNS website to ensure new customers truly understand what they are potentially signing up for.

Similar to the observations made regarding question five, from Figures 39 and 40 one can infer that users would be likely to at least consider signing up for the free DynDNS service. The most probable reason for there being fewer people definitely willing to sign up using the silo website is due to the lack of integration into the theme and layout of the current Dyn website. This is interesting because although the interviewers explained to the potential users being interviewed that the silo site being used was only a beta and had not yet been refined, the users' perception of the site was still impacted. This suggests that the next silo website that Dyn rolls out and runs trials with should have the same look and feel as the current Dyn website. The current site, although lacking in other areas, instills trust and confidence in the users. Someone accessing that site can rest assured that they will receive a quality product while some users of the silo website said the site looked good and had potential but should be made more aesthetically pleasing before deploying the product (thinking it hadn't been implemented yet).

Figures 41 and 42 help illustrate one of the core issues the MQP team wished to examine and test regarding the current DynDNS website: terminology. The users of the existing website were torn on whether or not they felt the terminology used on the site was helpful and clear to them. In contrast, the users of the silo site were confident that the terms were helpful and they felt confident and knowledgeable.

The ninth question (Figures 43 and 44) deals with the issue of instilling confidence in the user about the professionalism of the company by conveying such a message through the website design, layout, and wording. The MQP team's predictions were correct in that the current website does in fact cause users to feel confident in the company and believe that the company will offer quality products and services. This is because Dyn has done a terrific job of researching and developing their website to such an end. The silo website users were not very confident at all, despite knowing that the site was just

a beta and informing users they should only judge based on processes. Once the site is reformatted to feel more like the other Dyn websites, it too will likely cause users to feel confident in Dyn's abilities.

The users who interacted with the current website felt the hardest task by far was determining what Dyn actually does and offers the customer. Please refer to Figures 45 and 46 for the results for this tenth question. This was reinforced by user behavior throughout the interviews including scrolling up and down on the page, rescanning areas they had already read, and repeatedly asking if they could navigate from the homepage. The hardest part for those using the silo site was setting up their router. This, unfortunately, skews the results a bit, since only the silo users had experience with the router setup. If users of the current site were also told to configure their routers, the MQP team predicts they too would have ranked that as highly difficult and inconvenient. Those utilizing the current website were not required to go through the process of configuring a router because Dyn does not currently have that as part of their signup and configuration process. It is an additional step that is listed on a help page, but not actually recommended to the user as being a necessary step to take. The MQP team felt this step was essential in ensuring proper operation of the DynDNS service, and therefore included it in the process on the silo website.

Question eleven (Figures 47 and 48) yielded exactly the results the team expected. Those that used the existing website felt it was visually appealing. This goes hand-in-hand with the website instilling confidence in the users as well. Those who interacted with the unpolished silo website did not, for the most part, feel the website was appealing. Common comments included such things as adding logos and graphics, integrating with existing styles and themes, and overall polishing.

Question twelve (Figures 49 and 50) allowed the users to describe any additional comments they might have surrounding the website or service. Users of the current Dyn website were varied in their responses. A majority, however, felt that it was too difficult to find the free option in the signup

process. Some interviewees attributed this to being a marketing scheme by the company in hopes of users signing up for premium paid services. Other responses included not liking the lack of a product icon, a dislike of the lack of information on the homepage, a dislike of there not being a distinct 'Sign Up' button, and the lack of a mission statement easily accessible from the homepage. Those who viewed the silo website had only two responses. First, that the website had real potential as a good idea (assuming this was only a prototype and not actually based on a real company). The second response was that the users were unsure as to how frequently they may use the service given current technologies such as smartphones.

Users of the silo website were asked a thirteenth question (Figure 51) to offer any insights they might have regarding the silo site, which was still in beta at the time of the study. Not surprisingly, the majority of respondents commented on the need of overall polishing (backgrounds, colors, and themes). There were then relatively even numbers of respondents that felt the company should outline what makes the service unique, better utilize the screen size, and include a short video, perhaps explaining the product or service. Users did like the help links and the scrolling introduction, although some people felt the introduction felt too much like an advertisement with the way it refreshed.

In addition to examining the interview questions on an individual level, the MQP team also related individual responses back to the key root questions asked back in Table 3. The first question was “What’s the general perception for this company and products?” This question was key to understanding the users’ perceptions of the company as a whole. To successfully determine the answer, the team analyzed the results of questions one and nine. Most participants who viewed the current website did trust the company and have a good overall impression while those using the silo site felt they did not entirely trust the company. The second question was “Would they like/use the service? When and why?” The team found answers to this question using the responses to questions four, five,

and seven. The feedback was very positive, meaning that many participants felt they could actually use such a service if it were easily accessible with little to no setup. The third question was “Did the user find the silo site easy or complex? And where are the areas of improvement?” The final root question was “Did the user find the website tasks of signing up for an account and the free service easy or complex? And where are the areas of improvement?” Both these final root questions were answered by the same interview questions: two, three, six, eight, ten, eleven, and twelve. The responses to these questions are all analyzed above; however, the overall impressions were the current site lacks critical company information necessary to paint a picture of what the company does for the users while the silo site makes users uneasy in its current state since it is lacking company colors and styles.

5.3. Study III: Eye Tracking Study

In this chapter, the third study that was conducted is explained and then results are shown and discussed. While Study II tested the user in carrying out tasks on the website, Study III investigates the browsing patterns of the users. Understanding browser’s behavior and viewing pattern is very important in attracting new users (Djamasbi et al. 2010 a). Thus gaining information on browsing patterns can help Dyn to design its website more effectively.

5.3.1.Objective

The objective of Study III was to refine the results of Study II through the use of eye tracking. In particular, the analysis of users’ gaze can help better explain which parts of the websites are viewed by users and attract more attention. Study III tests the perceptions of browsers in regards to visual appeal and ease of use, two things that tend to be very important in enticing users to not move away from the site (Djamasbi et al. 2010 a). Additionally, the eye tracking study supports previous research which concludes that ease of use is affected by visual appeal. Finally, previous studies carried out by the

project team were tested on undergraduate students and Study III displays a population change to professionals in industry.

5.3.2.Participants

Twenty professionals participated in the eye tracking study. Their ages ranged from 23 to 60 (mean=37.33, median = 37). Twelve of these participants were female and eight were male. Participants' profession backgrounds included the following: Financial Analyst, Senior Executive Secretary, Vendor Specialist, QA Engineer, Director of Human Resources, Design Consultant, Software Engineer, Training, Administrator and Systems Analyst.

5.3.3.Design

Participants were randomly assigned to one of the two websites and the participant viewed only that version of the prototype during eye tracking procedures. The experiment was conducted in a lab but was not conducted in groups. Rather, users came into the lab one at a time.

5.3.4.Procedure

The eye tracker was calibrated to each participant, a brief procedure during which the participant watches a circle moving on the screen. Users were asked to browse the websites given and their eyes were tracked for the first 10 seconds of time. The experimenter left the room while the participant completed the study. Upon completion, the participant provided demographic information. Participants were also asked to rate the visual appeal of the page they viewed on a 7 point scale ranging from 1 (not appealing at all) to 7 (very appealing). Additionally, the participants were asked to rate how easy or difficult they thought the site would be to use ranging from 1 (very difficult) to 7 (very easy).

5.3.5.Results

From the eye tracking data, a heat map for each of the websites was generated. This data helped to make recommendations for improving the website. Additionally, the two survey questions

provided information regarding user experience of people who browse the website. Both of these sets of information are described in the following chapters.

5.3.5.1. Heat Maps

Figures 52 and 53 show the heat maps that were produced from the eye tracking experiments. As explained previously, heat maps display how long a user is focused on a point on the screen, displaying colors overlaid onto an image of the screen to denote the time that a user spent on a specific point. Below, red coloring denotes where users spent the longest time fixated in that area and green would be the least amount of time. Finally, yellow denotes a fixation time somewhere in the middle range between the green and red fixation times. The heat maps show the first 10 seconds of viewing.



Figure 51: Current Website Heat map



Figure 52: Silo Site Heat map

Figure 52 shows that users were not scrolling down to the bottom banner of the current website. This is not the case for the silo site shown in Figure 53. The website was designed so that users would not have to scroll to see any information, thus users are exposed to everything on the page. Additionally, by comparing Figures 52 and 53 one can see that there was a strong fixation on the logo on the current website (Figure 52), whereas, not much fixation occurred on the logo on the silo site (Figure 53). Users who were exposed to the silo were concentrated mainly on the “Get Started” button as well as the explanation of the services in the first line.

5.3.5.2. Fixation Count

Additional interesting information that eye tracking can provide is fixation count. Fixation count refers to the total number of fixations a participant has on a pre-defined Area of Interest (AOI) and is an indication that users needed to look at the info more frequently to process it. If an AOI has a large fixation count then it suggests that users had to more frequently return to the AOI during the time the eyes were tracked. The results showed that there were 168 fixation counts on the original site and 16.8 on the silo. This could mean that the silo was easier to process.

5.3.5.3. Order of Fixation

Another interesting aspect of eye tracking data is that it can reveal the order in which parts of the page are viewed. This can help to understand whether the items on the page were placed effectively. Figure 54 shows the areas of interest and the order of fixations that were found. Users tended to look first to the AOI labeled with one, and then to the AOI labeled with two and so on. In other words, users first looked at the logo, then the banner in the middle of the page, and then the navigation banner, etc.

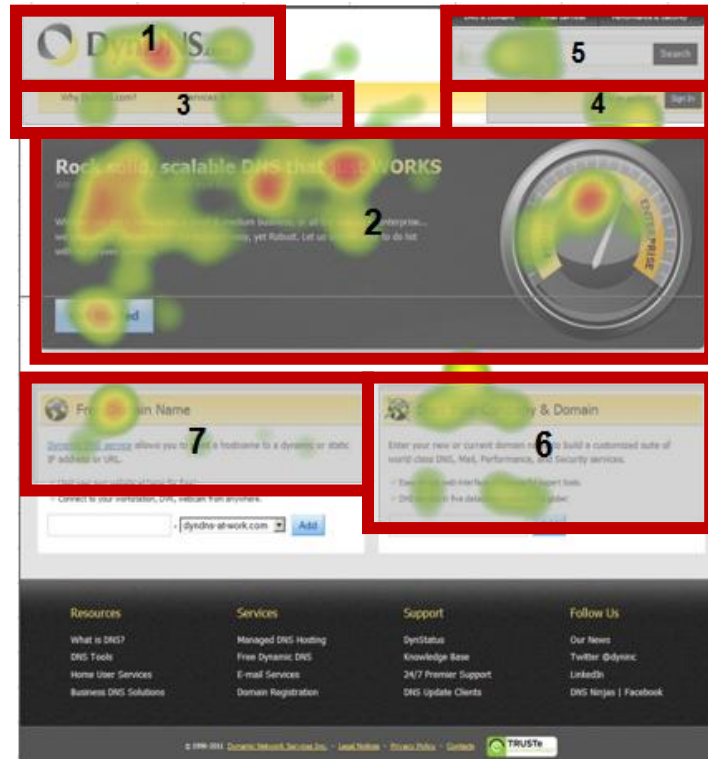


Figure 53: Current Website Heat Map with AOIs and Order of Fixation

5.3.5.4. Fixation Length

Fixation length is the amount of time the user gazes upon different areas of the page. The heat map in Figure 55 displays the amount of fixation time for each area of interest. The percentage on the

page reveals the amount of fixation each AOI (Area of Interest) received of the total 10 seconds that the users' eyes were tracked. For example, the center of the page received the majority of fixation, while the bottom of the page received none. Interestingly, only 7% and 9% fixation time was given to the services areas of interest on the bottom. This suggests that these services perhaps did not gain the level of attention that they were intended to.



Figure 54: Current Website Heap Map with Percent of Fixation Time

5.3.5.5. Distribution of Fixations

The heat map in Figure 56 shows the distribution of fixations by showing the percent of people who looked at each area of interest. 100% of the users looked at the middle of the page, but only half of

the users looked at the services areas of interest for domain name signups below the scroll line. 40% of users looked at the logo and search bars at the top, and only 30% of users' eyes gazed over the navigation bar which directs users to find out more about what Dynamic DNS is as well as enables users to sign in.



Figure 55: Current Website Heat Map and the Percent of People who Looked at each AOI

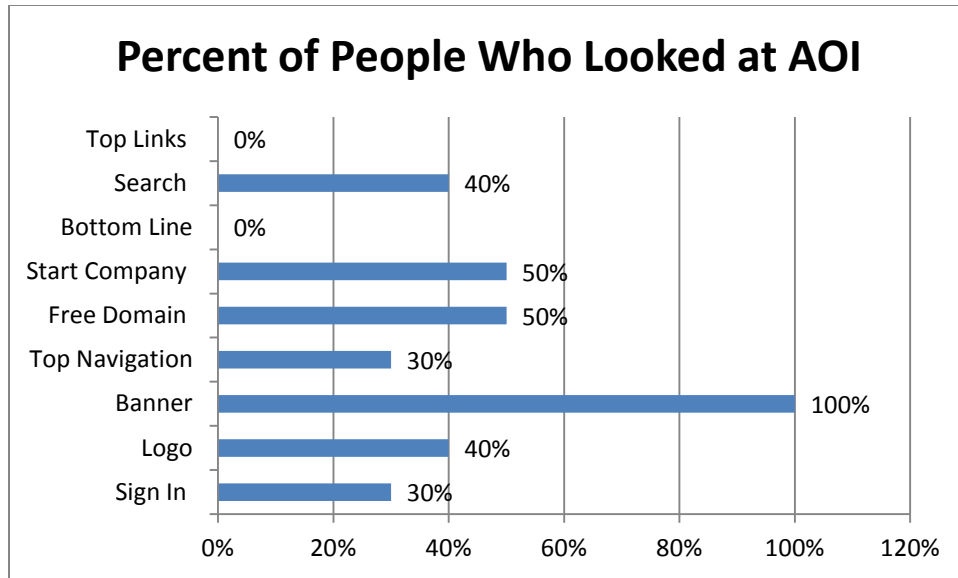


Figure 56: Percent of People who Looked at each AOI

5.3.5.6. Surveys

As mentioned earlier, users completed two surveys after viewing the web pages. The analysis of the survey data is discussed in this section. Again the questions asked the user to rate the visual appeal of the page and how easy or difficult they thought it would be to use. Research suggests that visual appeal has a significant impact on users' perceptions (Djamasbi et al. 2010 a). Thus, the MQP team expected that the two surveys would show strong correlations. To explain this, the MQP team conducted a regression analysis to determine how much of user perceptions of ease of use can be predicted by their rating of visual appeal.

Table 15: Regression Statistics for Ease of Use versus Visual Appeal

DV	IV	B*	t Stat	p
Trust	Visual Appeal	0.42	2.84	0.01

Overall model F = 8.0438; p < 0.001; R² = 0.309;
Adjusted R² = 0.270459

* B = unstandardized coefficient

Table 15 shows that visual appeal was a significant and strong predictor of ease of use. That is, users found the more appealing website easier to use. In particular, the results show that 30% of variation in

ease of use perception is explained by the perception of visual appeal. In other words, the effect size of this phenomenon is quite large (Cohen, 1988) and additional t-tests supported the regression analysis showing that ease of use and visual appeal for the two websites were rated significantly differently.

Table 16: T-Test for Ease of Use

Ease of Use	Mean	Std. Dev.
DynDNS	5.7	1.122
Silo	4.3	2.011
df= 18, t Stat= 2.501, p=0.022		

The t-test in Table 16 shows that ease of use was rated significantly better for the original site. Additionally, the t-test in Table 17 shows that the silo was significantly less appealing than the original site.

Table 17: T-Test for Visual Appeal

Visual Appeal	Mean	Std. Dev.
DynDNS	5.20	1.07
Silo	2.00	0.67
df= 18, t Stat= 7.69, p=0.000		

5.3.6. Discussion

By looking at the heat maps in Figures 55 and 57 one can quickly gather that on the current website, users focused mainly on the logo in the upper left and the banner in the middle. On the silo (Figure 53), you can see that users mostly directed their attention to the “Get Started” button as well as on the first line describing what Dyn’s services can do for them.

The results of the eye tracking suggest that although users spend a significant amount of time looking at the banner on the website (100% of the users spent an average of 58% of the eye tracking

time gazing on this area), users are very confused with the content here. The evidence that supports the users' confusion is the extremely high fixation count of 168 on the current site (Chapter 5.3.5.2). As we have explained through our functionality testing, users do not understand what services the company offers from simply looking at the homepage shown above. As the heat maps show that this Area of Interest is critical, evidenced by fixation length, order and distribution, Dyn should change the content there to help describe their services better.

The silo heat map in Figure 53, at first glance, suggests that users are focusing on the “Get Started” button which is a good start for users to continue along in the process. Also, it seems as though many users are focusing on the first line of the services explanation, which will aid a user in understanding what the company can offer him/her. One of the main differences between the current website and silo is that the silo website has language that is more likely to be understood by typical users.

Other notable takeaways contained within the results of the eye tracking section include the banner AOI shown in Figure 58 and the fact that 100% of people looked at this section for an average of 58% of the time their eyes were tracked. This shows just how important it is for Dyn to have content here that clearly defines what their services are.



Figure 57: Banner AOI

Another thing to note while examining the heat maps is that on the current website very little activity is shown below the scroll line, supporting past research that users are less likely to scroll down while viewing a website (Djamasbi et al. 2010 a). The silo site is fully contained above the scroll line and this is what Dyn should aim for in the future site development.

Through the regression and t-tests from the survey data we found that visual appeal was a significant and strong predictor of ease of use. That is, users found the more appealing website easier to use. This is reinforcing past research that shows a strong link between visual appeal and user perceptions: “the participants’ visual appeal ratings were found to be a significant predictor of their trust ratings with a medium effect size... the beauty of a page may affect whether people trust it,” (Djamasbi et al. 2010 b). Because the silo site was only a beta site with minimal visual design implemented, it makes sense that the t-test shows that the ease of use was rated significantly better for the original site and the silo was significantly less appealing than the original site.

6. Overall Discussion

The project team’s research supports the notion that all aspects of the interaction within the website must work together synergistically to create an enjoyable experience for the user. The website’s layout, color choice, navigational bars, images, and word meanings are only a few of the myriad of factors that can shape a user’s perception of the system.

All of these factors make up a user’s experience of a website and cannot be tested as separate entities. For example, Study II, the lab experiment, tested the functionality of the silo site we proposed even when the visual appeal was not fully developed due to time limitations. While users were able to quickly progress through the steps of the process in the silo with only slight hurdles in Study II, users who were just browsing the website in Study III (eye tracking) did not have a favorable first impression of the website’s ease of use. This leads us to believe that, had the users not been asked to utilize the

functionality in Study II, they would have had the same ease of use perception. In conclusion, our results suggest that visual appeal and functionality are best tested together to obtain a more comprehensive picture of users' reaction.

Usability is an extremely broad term - it encompasses the functionality of the website, perceived (subjective) usability, visual appeal, trust, and user-centered design elements. One of the main goals of the silo was to develop a website that can be utilized by as many new users as possible. This suggests that all aspects of the user experience must come together in order to satisfy users' diverse needs.

Catering the DynDNS.com homepage and silo to new users who are unfamiliar with the role of DNS is a challenge. After briefly browsing either the current website's homepage or the silo's landing page, the participants in the cognitive walkthrough were asked to describe what they believed Dyn Inc. offers as services. In the current website recipients took away very little from the homepage, other than the fact that Dyn Inc. offers DNS and email services for home users and businesses of all sizes. The participants who used the silo website were able to describe the end-uses of the remote access software, such as listening to your music remotely or sharing your screen with others. However, they still failed to grasp what dynamic DNS does, and they weren't able to create a mental image of how the various software components are integrated.

It's also imperative to be forthcoming with how the service is used and the value it adds. The most predominant image on the DynDNS.com homepage contains a speedometer and a short description, "Whether you are a home user, a small & medium business, or all the way up to enterprise... we understand you are busy! Our tools are easy, yet robust. Let us simplify your to do list with our proven services." This image and explanation do little to convey the purpose of Dyn Inc. and its services. The eye-tracking analysis indicated that 58% of the participants' total fixation time was directed at this. A higher-level approach to describing the services offered, and value gained, is likely to

be most effective if placed in this area of the page. Providing additional contextual aid through images, videos, and a conceptual overview will allow a broader user base to learn about the services.

A balance between providing necessary technical background and designing the experience to be as simple as possible for the end-user is imperative. Consider the participants' reactions to the instructions on the PortForward.com page during the cognitive walkthrough of the silo. The introduction of new terminology (Static IP Address) was intended to educate the user; however, in many cases this backfired and only served to make the individual more confused.

The recommendations discussed in the next chapter are aimed at ameliorating the problems discussed here, increasing the positive user experience for Dyn Inc. web users, and ultimately, achieving a net growth of users by attracting new users to Dyn Inc. services.

7. Recommendations

Upon completion of the three studies, the MQP team analyzed the results and compiled recommendations for Dyn to improve the usability of both their current website and the proposed silo website aimed simply at the sign-up process. The analysis of the results suggests that implementation of these suggestions is likely to increase the conversion rate of new visitors to subscribers.

7.1. Current Website

One recommendation for Dyn is to make the homepage more of an informative landing page for first time visitors to the website. Throughout the studies, the participants were repeatedly frustrated at the lack of crucial company information, such as a mission statement and brief overview of services provided and their potential benefit to the customer. This recommendation is founded on the responses to questions six and ten of Study II: Interviews. Question six asked the participants what would have improved the experience and a majority (60%) replied they would have liked to see a product overview.

Question ten addressed which of the three assigned tasks was most difficult to the participant. The majority (56%) responded with “determining what the company does / offers,” indicating that they struggled discovering the company’s core business. The current image of a speedometer pointing to Dynect SMB (Small Medium Business) confused several participants. For example, the cognitive walkthrough in Study II prompted some to ask what SMB was and if the service somehow related to cars. Throughout the experiments, users commented on how they felt the Dyn website was visually appealing. The team observed that this positive reaction to the look and feel of the website positively impacted the participant’s trust in the company as a whole. A more explanatory company homepage will alleviate this confusion and allow users to focus on the value of the product, making them more likely to sign up. In addition to more descriptive text, Dyn can utilize images that more accurately convey their product and service offerings. This will also help make it easier for users to understand the value of their services.

Another recommendation for the company is to have a more direct path for users to sign up for an account. Currently, users must click on the “Sign In” button and then select “Create an Account.” Most users during Study II had difficulty locating the link to create their account. By placing a second button on the navigation bar directly allowing the user to create an account, Dyn will prevent user drop-off due to the frustration of not being able to easily sign up.

7.2.Silo Website

A major recommendation concerning the silo site is the implementation of images to depict the various ways that Dyn’s services can benefit a user. For example, on the page about remote desktop technology, an image of a user on the go connecting to a home computer would be helpful. Using such images will enable even the non-network savvy users to be able to conceptually understand what they are being offered and how it will benefit them in their everyday activities.

During the cognitive walkthrough, users frequently advanced through step three without actually viewing the external site containing port forwarding information, causing them to have to navigate back again. This is a very important issue to fix since it is likely that the drop-off rate will increase if potential users continue forward in the process and end up confused. To solve this issue, the team recommends implementing some code to disable the next button until the user has actually clicked on the button to view instructions. This will ensure users must follow the outlined path, leading to a complete and informed sign up process.

The team noted throughout Study II: Cognitive Walkthrough that there was an opportunity to implement more helpful and informative feedback to the user when errors occur. For example, feedback such as “Please enter a valid hostname” will not accurately tell the user what to do if they do not understand the term hostname. Instead, a pop-up window detailing what a hostname is and represents and why the given hostname is invalid might better inform the user why he or she should enter. The addition of this more helpful error checking will cut down on user frustration and keep them interested in the sign up process.

The group recommended that the silo incorporate the elements of visual aesthetics guidelines to most effectively present the content to the users. Anchoring the user when he or she first sees the web page can be achieved through a human face or a large graphical banner. Other considerations include the size, color, and amount of text used to describe the services. The younger generation of web users needs to be supplied information in a logical way. One especially important concern is the necessity of scrolling down on a page to view more information. Research suggests that these younger people will choose not to scroll down, and instead look toward the navigational pane and the top middle of the page in order to reach certain important content (Djamasbi et al. 2010 a).

Our analysis provides insight for grabbing the user's initial attention and then directing the user toward the services and the signup process. Due to the time and resource restrictions of the company, the MQP team focused only on examining the sign up process and did not address the aesthetics of the silo site. As our results show, future studies are needed to examine our recommendations with respects to aesthetics of the website.

7.3. Current and Silo Websites

A final recommendation for both the current website and the silo site addresses the issues users experienced throughout the sign up process involving confusion over what particular terms meant, such as IP address and hostname. The team observed participants pausing for periods of time when terms such as these surfaced during the signup process. They also appeared confused where to go next after a section of the process was completed. The team's recommendation to solve these issues is twofold. First, users felt that videos and multimedia content explaining the overall process as well as helpful hints along the way would engage the user and make them feel less lost while signing up. Second, useful explanations of tricky terms would be hugely beneficial to potential users. This information could be conveyed using hover technology, showing descriptions if a user places the mouse over a word he or she doesn't understand. By making the user feel more informed, Dyn will increase the likelihood of them completing the sign up process and becoming a customer.

8. Limitations

As with any lab study, the results of this study were limited by the tasks and the experimental environment. However, we tried to minimize the limitations of the study to the best of our ability by designing realistic and relevant tasks.

One of the limitations of this study was its sample size. Though the data from the tested subjects was profound, the small sample sizes resulted in data analyses that could have been significant with larger sample sizes. Reasons for our study's low sample size could be attributed to the time constraints of both the MQP team and the company, as well as the recruitment process. The time constraint was formed both by the time available before the project deadline and the company's time constraint regarding developing and hosting a beta site before the end of the year. Future studies are needed to address this limitation.

Additionally, the silo site design itself was another factor affecting our study that was directly due to a time constraint. Although we knew it would be better for the silo site to be more aesthetically pleasing for the lab experiment that was conducted, it was not possible given the company's constraints. Starting in December, Dyn's design and development team went into a period of moratorium where they could not add anything new to the given lines of code, meaning we could not embellish upon our functional silo site. Future studies can be done on a more visually appealing silo site which is enveloped in the Dyn 'wrapping.'

Finally, the lab that the experiment was done in can be seen as a limitation because a project team member had to facilitate the cognitive walkthrough, SUS survey, and the interview. If these interactions were anonymous, the user may have answered some of the questions regarding their understanding of the content differently. For example, many users often complained throughout the processes/tasks and could not grasp a good understanding of Dyn's services, but then at the end when we asked them to rate their experience, rated it as a good experience that was easy. This could be because the participants often like to please the experimenter. Future studies can address this issue by using surveys instead of interviews.

9. Further Research

In the future, our study can be expanded to take into account these limitations. That is, future studies can find more significance with larger sample sizes. Another example of further research which was stated in the last chapter would be the use of surveys so that the interviewer's presence does not have any impact on the user responses.

Something else that may be interesting to look into and also would contribute to the wealth of literature out there would be to do further research on how a user's knowledge and interest in technology affects their answers for the SUS survey.

Additionally, if DynDNS acquires the information on PortForward.com's site, a usability study could prove that the information is better received by the user when they do not have to go to an external website to get directions on this step.

Most importantly though, the silo site prototype that was made for this experiment could benefit greatly from another usability test once the visual appeal is up to a higher standard. Once the graphics and visual appeal are matured and the silo appears in the DynDNS homepage 'wrapper,' a project team could conduct similar usability tests to compare the functionality of the silo site to the current site. In particular, an eye tracking study can reveal whether the new design is effective in communicating the intended information. Contributions

10. Contributions

The practical implications of this project are clear when compared to our goals the project team set out to achieve. The main goal of our research for Dynamic Inc. was to make recommendations to improve the user experience of the DynDNS.com website and the silo website, thereby attracting new

users to Dyn Inc. services and leading to increased market share. To do this the project team took two steps.

The first step was to make Dyn Inc.'s services easier to access, utilize and understand with a silo website. After drawing conclusions on the best key words to use for the typical users to understand in Study I (Google search study), we were able to create a silo site that made it easier for users to find out what each service does, where to sign up, and how Dyn's services will solve their problems with the silo website. The silo website screenshots can be found in Appendix 12.4. This prototype streamlined the signup process and added a valuable introduction to the services offered by Dyn Inc. in regards to remote desktop access. Through testing, the project team has been able to work to improve even more on this site and our recommendations are in Chapter 7.

The second sub-goal of our research was to understand the reaction of the non-network savvy population to Dyn's website who have certain tasks like setting up a remote desktop connection and file sharing in mind. We approached this goal by studying the web search behavior of those users who wish to fulfill these tasks, but might not understand how Dyn's website can help solve their problems. The team conducted studies on users' Google search patterns for remote desktop needs, as shown in Chapter 5.1 (Study I) of this paper. Our silo site only addressed Dyn's service for remote desktop connection but can also be modeled for other services.

Through completing these studies we were able to examine our research questions (proposed in Chapter 3). We reported to Dyn on how technical sites similar to DynDNS (indirect competitors) convey the message of their services to the non-network savvy market and find a better more effective way to direct customers to individual services faster. This research can be referenced in Chapter 3.3. Additionally, we came up with ideas to reach the typical potential users who have a need for remote access, but may not know that DynDNS can address their need. For example, Dynamic DNS should work

to increase their Google ranking when certain search terms are entered. Once, users are signed up and start using the free services which the project team promoted in the silo site, some will inadvertently look for paid services. By implementing and evolving the simple silo site to help users get signed up and set up with Dyn's remote access services, Dyn Inc. will get closer to attaining its main goal of attracting new users to Dyn Inc. services once the silo site is live and made available to users. Our work also serves as a model for DynDNS to replicate for their other services as well, bringing in even more of a user base.

Contributions by this project work will also benefit the depth of literature that exists for usability studies. Our research has reinforced that a site's visual appeal is very important and affects the ease of use of a website. Although the functionality of the silo site that was created was beneficial, the project team still found evidence that the ease of use was lower than the current site due to the lack of visual appeal. The evidence to suggest this was strong in the eye tracking study because users were judging the ease of use from just some browsing activity. When we asked them to complete tasks explicitly, users could do so and rated the ease of use a bit higher. This suggests that when doing a usability project one cannot separate look and feel from the process and functionality of a website and these two aspects of a website must go hand in hand.

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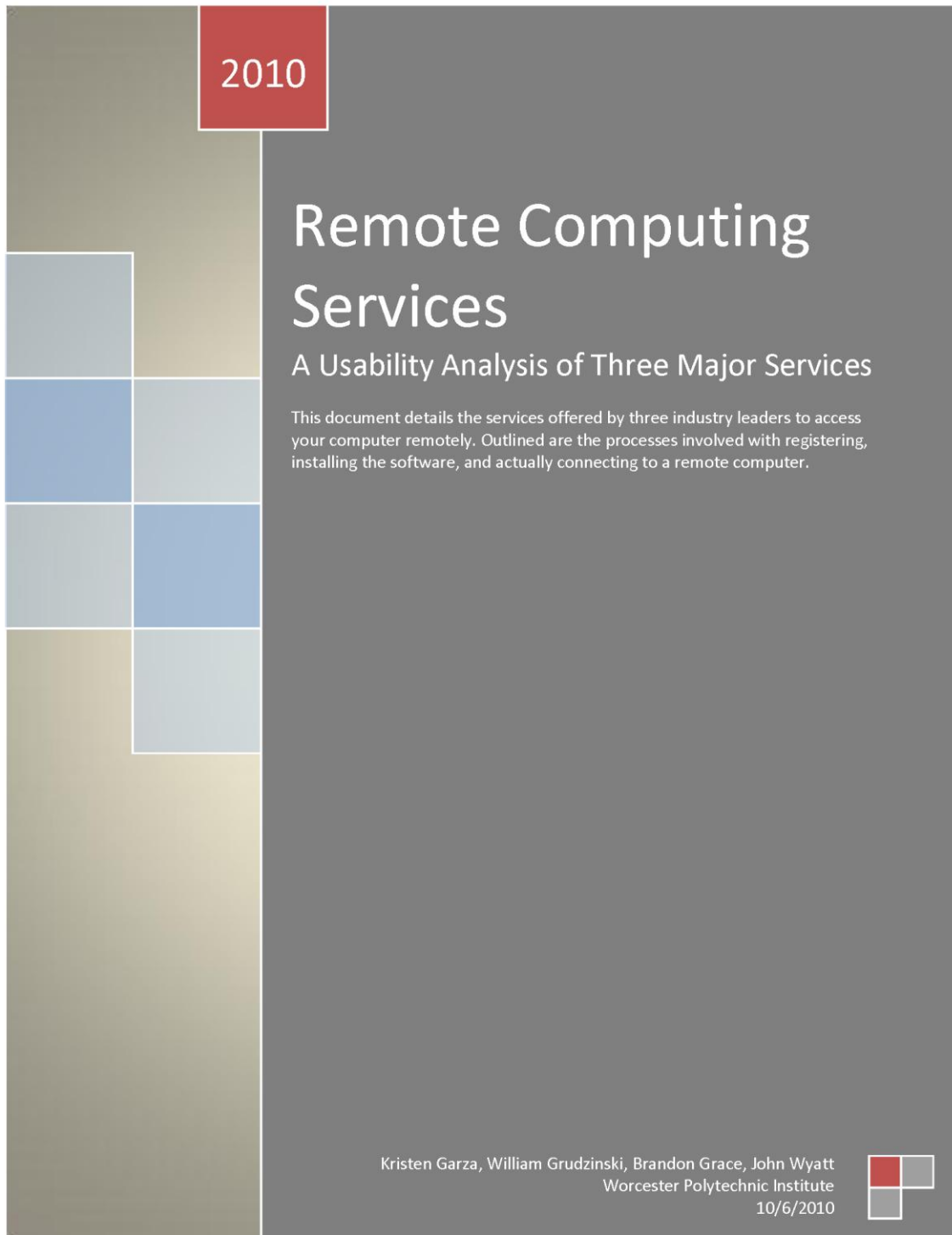
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12. Appendix

This section contains additional information referenced in the text as well as the MQP team's meeting minutes. Appendix 12.1 is a separate report the MQP team developed on DynDNS's competitors. Appendix 12.2 is the original System Usability Scale developed by Brooke in 1996. This scale is described further in the text in section 4.3.1 and was adopted to fit the need of measuring the usability of a website and the silo process. Appendix 12.3 is a print out of the Google Search and User Roles Survey. This survey was distributed through the use of Google Forms. Appendix 12.4 contains the screen shots from every step in the developed silo. These images depict what users saw during the study. Appendix 12.5 is a flyer for the Study II: Silo Implantation and Testing. This flyer was used to inform potential study participants about what to expect during the study. Appendix 12.6 was the script used during Study II: Silo Implantation and Testing. This script insured that every participant received nearly identical treatment and instructions during the study. Appendix 12.7 is a compilation of all the meeting minutes that were recorded throughout this project. Appendix 12.8 contains the presentation that was given to Dyn Inc. on March 2, 2011 in which the MQP team detailed the study results and provided recommendations for the silo and current website. Finally, Appendix 12.9 is the poster that was created for the project presentation day at WPI.

12.1. *Remote Computing Services*




2010

Remote Computing Services

A Usability Analysis of Three Major Services

This document details the services offered by three industry leaders to access your computer remotely. Outlined are the processes involved with registering, installing the software, and actually connecting to a remote computer.

Kristen Garza, William Grudzinski, Brandon Grace, John Wyatt
Worcester Polytechnic Institute
10/6/2010



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Overview

The trials detailed below were designed to examine the remote computing solutions offered by indirect competitors to DynDNS—GoToMyPC, LogMeIn, and RemotePC. These companies are indirect competitors because while the services they offer are possible using DynDNS services, they are not explicitly offered and are therefore not directly comparable. Aspects of the services that were of particular interest include the signup process, the installation of necessary software, and the process of accessing a computer remotely.

Service Descriptions

GoToMyPC

GoToMyPC is a solution that “enables fast, easy and secure remote access to a Mac or PC from any Web browser.”¹ It is a software solution offered by Citrix Online, which is a division of Citrix Systems, Inc. According to Citrix’s website, Citrix Online is an extremely fast-growing division of the company, with an excess of 17,000 new customers each month.² This high number of new users illustrates the obvious demand of both consumer and business markets for such services.

LogMeIn

LogMeIn is a solution that enables users to remotely access their computers, with many additional services. “Users worldwide rely on LogMeIn solutions for remote control, file sharing, systems management, data backup, business collaboration and on-demand customer support of PCs, servers, Macintosh computers, smartphones and other connected devices.”³ LogMeIn understands the high demand for such services, and therefore offers its basic remote desktop software free of charge to anyone looking to simply access a computer while away from their home. The more sophisticated services, such as remote control via a mobile device, carry additional subscription fees.

RemotePC

RemotePC is a single service offered by Pro Softnet Corporation, which offers several other web-based products for remote productivity. “RemotePC’s mission is to provide secure, easy and fast remote access solutions for a consumer base that spans across segments - from individuals to small and medium businesses.”⁴ Utilizing this solution, users are able to increase their productivity by accessing necessary information and systems while away from their home or office.

¹ http://www.gotomypc.com/remote_access/remote_access

² <http://www.citrixonline.com/about.tmpl>

³ <https://secure.logmein.com/US/about/aboutus.aspx>

⁴ <https://www.remotepc.net/corporate.htm>

Technical Setup

The three solutions examined offer cross-platform functionality and were tested on both Windows and Mac computers. The exception is RemotePC, which only allows for one host to be registered under the trial agreement, without the ability to change it. Therefore, once it was registered on the Windows 7 test machine it could not be changed to the Mac machine. The Windows test machine is a Dell e6400 Latitude notebook running Windows 7 x64 and the Mac test machine is a PowerBook G4 running Mac OS X 10.5 Leopard. These two machines were networked using a Netgear gigabit switch (GS108), receiving data from a Motorola SurfBoard (SBG900) on a residential Charter Communications internet line. The machine that accessed the two test machines remotely is another Dell e6400, running Windows Vista x86. This machine connected to the internet wirelessly using an enterprise network at Worcester Polytechnic Institute (WPI) unless otherwise noted.

Account Setup and Client Installation (for Windows)

GoToMyPC

This section details the account setup and installation process for the GoToMyPC service.

1. From the GoToMyPC homepage (www.gotomypc.com) it is very easy to initiate the process of signing up for their service. At the bottom of the page, there is a form to fill out.

The screenshot shows the GoToMyPC homepage with a sign-up form. At the top, it says "Access your Mac or PC from anywhere" and "30 DAYS". Below this is a globe icon and a list of benefits: "With GoToMyPC, you have the power to: Work on your Mac or PC from Home - in real time, Travel anywhere and use your computer remotely, Increase your work flexibility and productivity, Access your files, programs, email and network". A "FREE FOR 30 DAYS" banner is present. The form includes fields for "First Name" (William), "Last Name" (Gardinski), "Email Address" (dynamap-test@wpi.edu), and "Re-enter Email Address" (dynamap-test@wpi.edu). There are checkboxes for "Please email me GoToMyPC specials and the quarterly newsletter" and "I agree to the Terms of Service. (Required)". A "CONTINUE" button is visible. The footer includes "©1997-2010 Citrix Online, LLC. All rights reserved." and the Citrix Online logo.

Figure 1: GoToMyPC Homepage with Web Form

- The second step of the signup process is to set an account password.

GoToMyPC® Access Your Mac® or PC from Anywhere

Create Password

Your Progress

Your GoToMyPC account has been created. A confirmation has been sent to the email address shown below. If this email address is incorrect, change it now.

dynnmp_tact@wpi.edu

To continue with GoToMyPC setup, you must create a password for your account and click Continue.

Account Information

Create Password: 8 characters – both letters and numbers

Re-Type Password: Passwords must match.

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Figure 2: Account Setup - Set Password

- Next, the user is required to enter payment information (such as a credit card) even if only signing up for the free trial. This requirement may deter some users who wish to only try the service, and are not comfortable disclosing payment information at this stage in their relationship with the company.

GoToMyPC[®] Access Your Mac[®] or PC from Anywhere

Your Billing Information (for After Your Trial Expires)

Your Progress

Enter Your Billing Information

"If it's a free trial, why do you need my credit card?"
Once your free trial has ended, your membership will be automatically renewed so you can continue the service without interruption. **You will never be charged during your free trial, and you can cancel at any time.**

Credit Card Number: Type: Expiration Date:

Full Name on Credit Card: Card Security Code:

Note: We use maximum encryption so that your credit card info is safe and secure. [More about security.](#)

Billing Address

Street 1: Street 2:

City: State/Province:

ZIP/Postal Code: Country:

Phone:

*GoToMyPC free for 30 days. You may cancel anytime during your trial and your credit card will not be charged. If GoToMyPC is providing value, do nothing, and your membership will continue at a flat monthly rate of \$19.95 USD, or switch to an Annual Plan for as little as \$14.95 USD a month.

GoToMyPC | Privacy Policy | Send a Friend a Free Trial | Become a Partner | Terms of Service | Privacy Policy

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Figure 3: Account Setup – Payment Information

- Once payment information has been provided the user is brought to a page with a link to install the GoToMyPC software if they are connecting from the machine they wish to access remotely. The installation process is simple and outlined below:

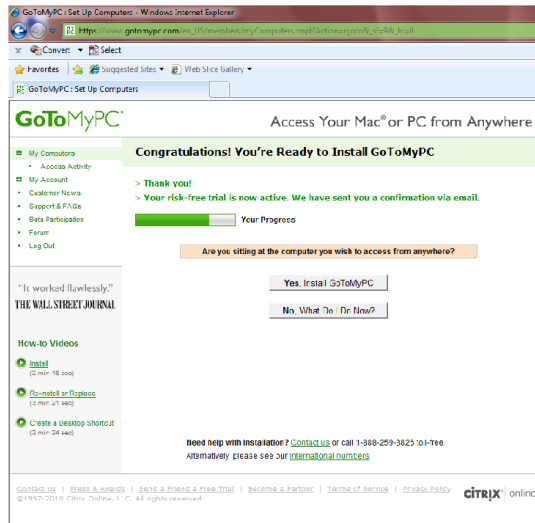


Figure 4: Installation Process - Initiation

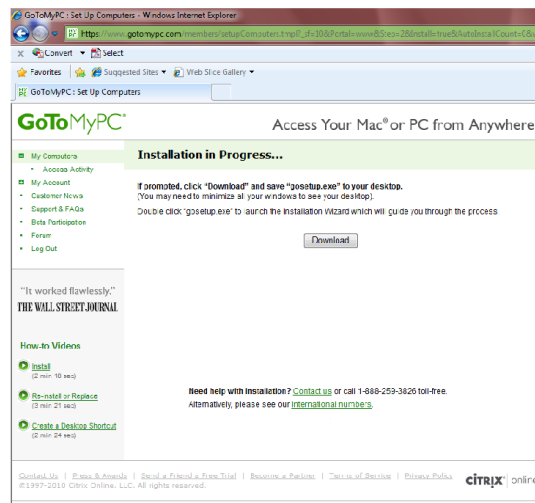


Figure 5: Installation Process – Download Software

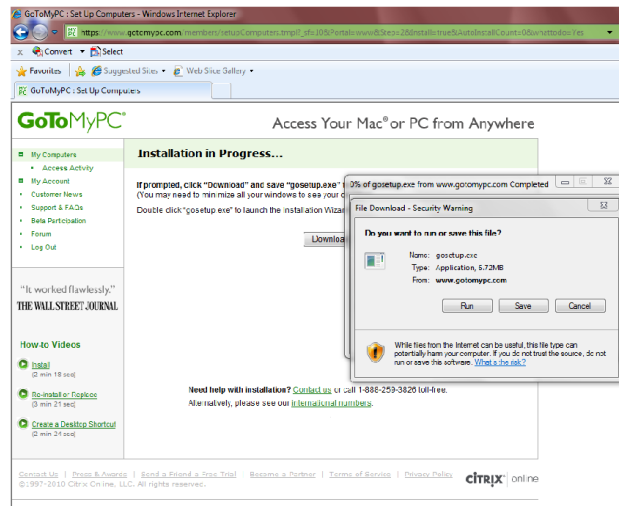


Figure 6: Installation Process – Run Installer

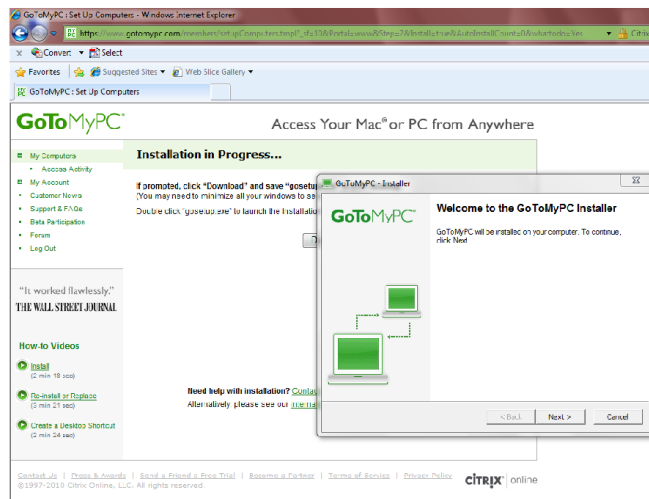


Figure 7: Installation Process – Select "Next" To Install

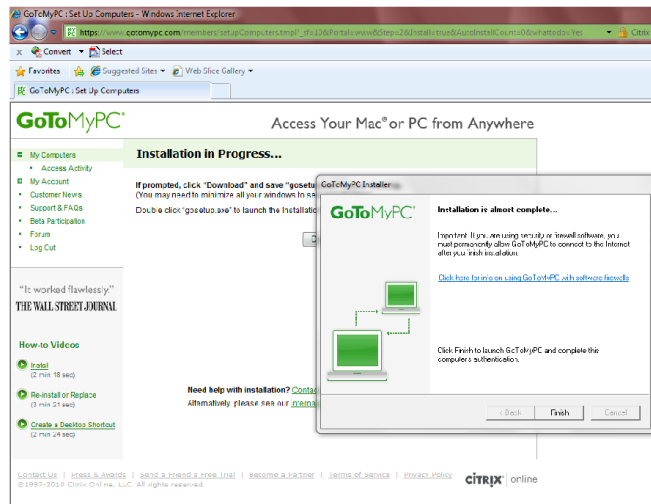


Figure 8: Installation Process – Complete
 (Note the process only required the user to select “Next” then performed all the installation tasks silently without prompts)

- Once the software has been successfully installed, the program prompts the user to enter login credentials which were created during the account setup process.

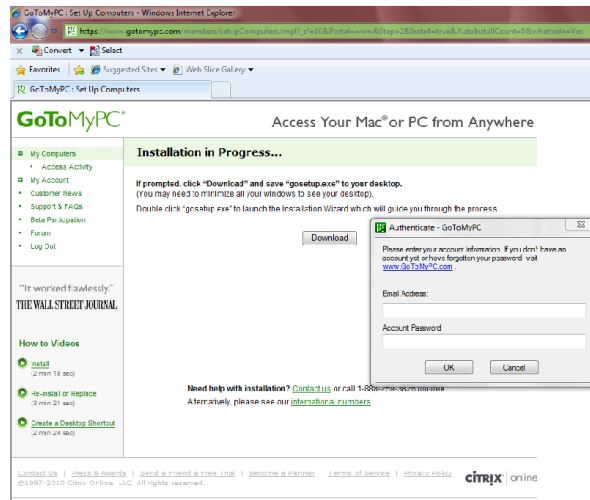


Figure 9: Authentication after Installation

- Now the software is running on the PC and is ready to be accessed remotely. The website brings the user to a page with more information on now accessing the machine, with a tutorial video. Informing the user of how to utilize the service once it has been installed is an important feature to have.

GoToMyPC[®] Access Your Mac[®] or PC from Anywhere

Welcome, William!

GoToMyPC has been successfully installed! Now what?

How to Get Started Using GoToMyPC
4 min 35 sec

To connect to this computer:

- Leave this computer on and connected to the Internet.
- Go to another computer, visit www.go2mypc.com and log in.
- Click the Connect button on the My Computers page.

Important Tip:
Right-click on the MY PC icon in your system tray to open Preferences. Invite a guest to your computer, access user help and more.

Need help with installation? [Contact Us](#) or call 1-888-259-3820 toll-free. If you are not in the U.S. or Canada, please see our international numbers.

Contact Us | News & Events | Send a Friend a Free Trial | Become a Partner | Terms of Service | Privacy Policy

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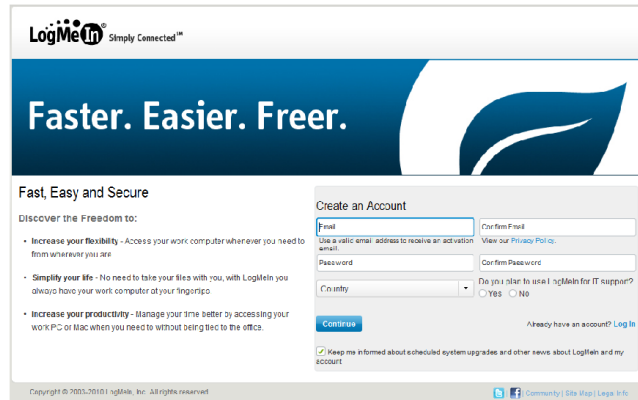
citrix online

Figure 10: Installation Success Page with Informational Video

LogMeIn

This section details the account setup and installation process for the LogMeIn service.

1. From the LogMeIn homepage, it is easy to sign up for a new account by using the web form.



The screenshot shows the LogMeIn homepage with the slogan "Faster. Easier. Freer." and a large blue leaf graphic. Below the slogan, there is a section titled "Fast, Easy and Secure" with three bullet points: "Increase your flexibility", "Simplify your life", and "Increase your productivity". To the right of this section is a "Create an Account" form with fields for Email, Confirm Email, Password, Confirm Password, and Country. There are also radio buttons for "Do you plan to use LogMeIn for IT support?" and a "Continue" button. At the bottom of the form, there is a checkbox for "Keep me informed about scheduled system upgrades and other news about LogMeIn and my account." and a link for "Already have an account? Log In".

Figure 11: LogMeIn Homepage

2. Once the user fills out the above form, the system prompts to download the configuration software for whichever platform the computer is running. The screenshots below detail the installation process of this software.

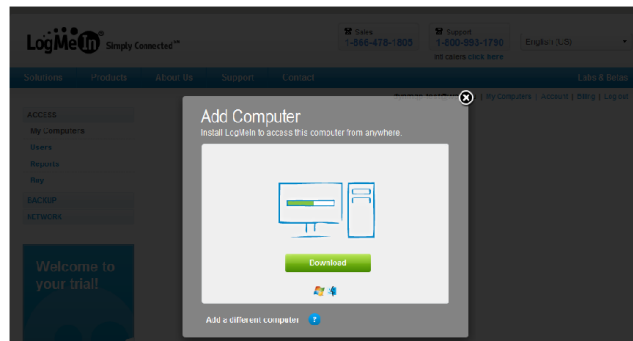


Figure 12: Installation Process – Download Software

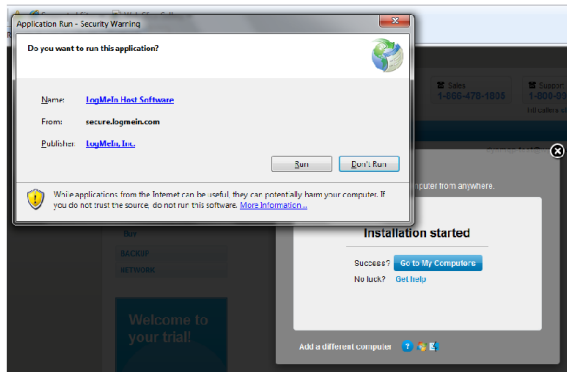


Figure 13: Installation Process – Allow Software to Run

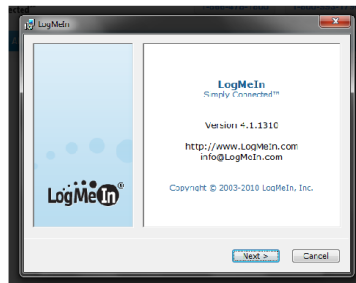


Figure 14: Installation Process – User Must Click "Next"

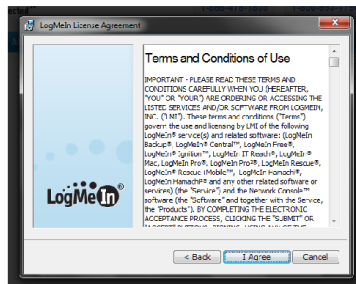


Figure 15: Installation Process – User Must Agree to Terms of Use

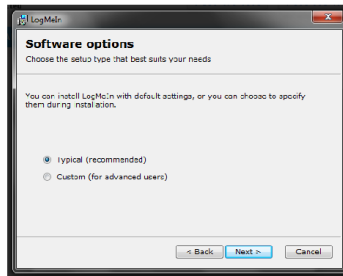


Figure 16: Installation Process – User Decides Type of Installation
(Typical for most users, Custom for those users wishing to modify advanced settings)

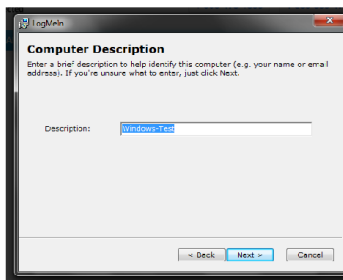


Figure 17: Installation Process – Specify Host Name

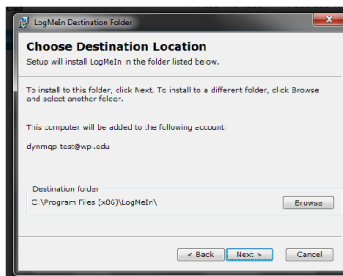


Figure 18: Installation Process – Choose Install Location

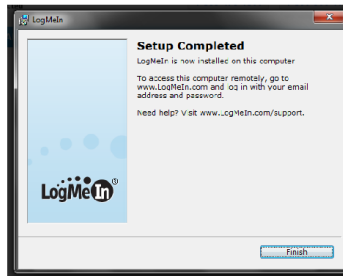


Figure 19: Installation Process – Success

3. Upon completion of the installation process, the user is prompted to test the machine from a nearby computer or simply close the application until a later time.

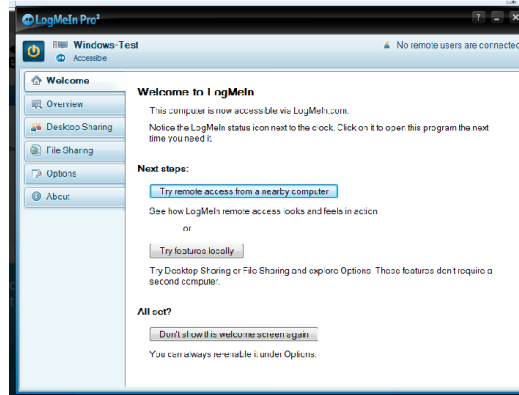


Figure 20: Welcome Screen to LogMeIn Client

RemotePC

This section details the account setup and installation process for the RemotePC service.

1. From the RemotePC homepage, it is easy to sign up for a new account by clicking the “Sign up” button that takes the user to the account sign up form. In addition to account information, the user must also choose which service to sign up for.


The screenshot shows the RemotePC homepage. At the top, there is a navigation menu with links for Download, Overview, Demo, Pricing, Partners, Support, and Faq. Below the menu is the RemotePC logo and a login section with fields for Username or Email address and Password, and a Login button. A main banner features the text "Remote Access with superior performance*" and "Access your Office PC from Anywhere; try out the RemotePC service free for 30 days". To the right of the banner is a support contact number: 1 800 949 3555, with business hours from 9:00 AM to 6:00 PM PST. Below the banner are three pricing plans:

- Remote Access for Consumers:** Secure remote access to your internet enabled office or home computer. [More >](#)
 - Basic Plan:** USD 4.95 per month for one PC. [View Demo](#)
 - Plus Plan:** USD 9.95 per month for three PCs. [View Demo](#)[Sign up >](#)
- Remote Access for Small Business:** 25,000 remote computer access from a single account. [More >](#)
 - Small Business Plan:** USD 49.95 per month for 25 PCs. [View Demo](#)[Sign up >](#)
- Remote Access Helpdesk:** Support multiple remote computers in real-time from anywhere. [More >](#)
 - Helpdesk Basic:** USD 14.95 per month for 3 concurrent computers; Unlimited Technicians. [View Demo](#)
 - Helpdesk Enterprise:** USD 74.95 per month for 25 concurrent computers; Unlimited Technicians. [View Demo](#)[Sign up >](#)

At the bottom right, there is a "Customer" section with the text "Allow the technician to remotely access your PC to troubleshoot/fix." and a "Connect" button with a "6-digit Pin Code" input field.

Figure 21: RemotePC Homepage

Home
Download
Overview
Demo
Pricing
Resources
Support
Faq



Sign up for a new RemotePC account

All information is mandatory.

<p>First Name <input type="text"/></p>	<p>Last Name <input type="text"/></p>
<p>Username <input type="text"/></p>	<p>Email <input type="text"/></p>
<p>Password <input type="password"/></p>	<p>Confirm Password <input type="password"/></p>

Password must be A-Z, a-z, 0-9, between 4 and 16 characters.

Select Plan Type

Select the subscription plan. If you are evaluating RemotePC, you may opt for the free trial.

Plan Types	No. of Host(s)	Monthly Plan	Yearly Plan
RemotePC Basic Free Trial	1	<input checked="" type="radio"/> 30 Day Free Trial	NA
RemotePC Basic	1	<input type="radio"/> USD 4.99	<input type="radio"/> USD 49.90
RemotePC Plus Free Trial	3	<input checked="" type="radio"/> 30 Day Free Trial	NA
RemotePC Plus	3	<input type="radio"/> USD 9.99	<input type="radio"/> USD 99.90
RemotePC Small Business Plan 1	25	<input type="radio"/> USD 49.99	<input type="radio"/> USD 499.90
RemotePC Small Business Plan 2	50	<input type="radio"/> USD 99.99	<input type="radio"/> USD 999.90
RemotePC Small Business Plan 3	100	<input type="radio"/> USD 149.99	<input type="radio"/> USD 1499.90

Geographic Information

Country State (Only for US Residents)

United States of America Choose a state

Note: Geographic information is used to optimize your RemotePC connectivity.

Verification

Enter the text as it is shown in the box below. This verification is necessary to prevent automated registrations.

7 7 6

I would like to receive updates on RemotePC by email.

Submit

By clicking on Submit, you agree to the [Terms of Service](#).

Figure 22: Account Signup Form

2. After completing the sign up process, the user is brought to the download page to begin the installation process, which is outlined below.

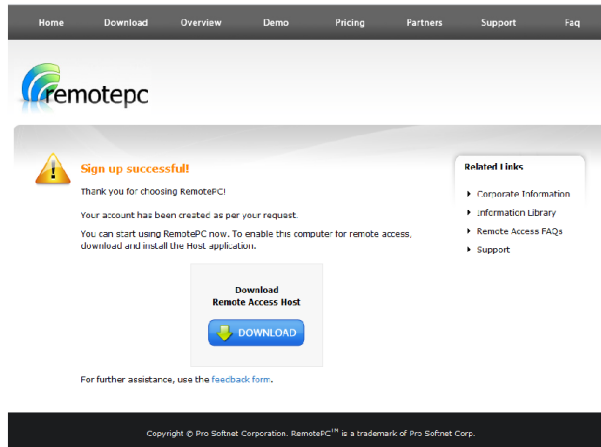


Figure 23: Installation Process – Download Software

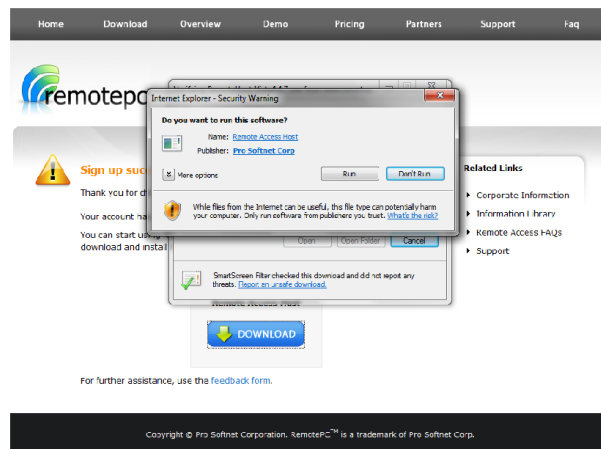


Figure 24: Installation Process – Run Installer

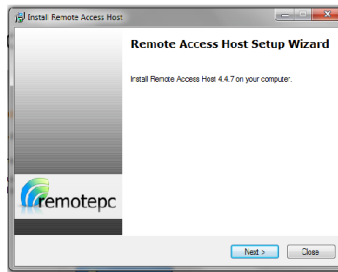


Figure 25: Installation Process – User Must Click “Next”

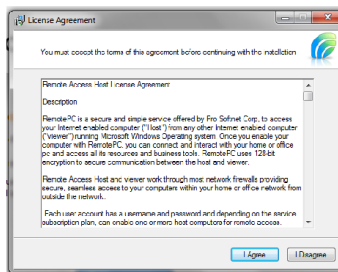


Figure 26: Installation Process – User Must Accept Terms of Use

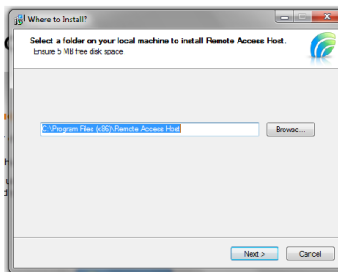


Figure 27: Installation Process – Installation Directory

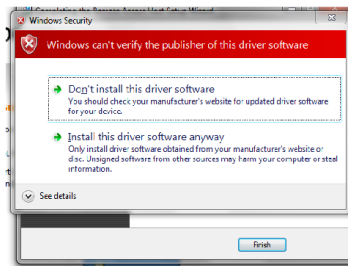


Figure 28: Installation Process – Security Alert
(Software publisher cannot be verified so user must choose to install despite this risk)

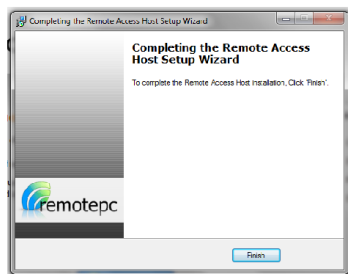


Figure 29: Installation Process – Success

3. Upon successful installation of the software, the user is left at the software download page without any instructions as to what steps should be taken next.

Installations on Mac Test Machine

GoToMyPC & LogMeIn

The installation processes for GoToMyPC and LogMeIn on the Mac OS are almost identical to the Windows installers.

RemotePC

This software could not be activated on the Mac because it had already been installed on the Windows machine, and the RemotePC trial does not allow for the changing of remote hosts without charging the user money.

Trials

Access Mac from Windows Vista using GoToMyPC

For this trial, the Windows machine that accessed the Mac remotely was connected to a Verizon Wireless 3G network. The steps outlined below show the process of accessing that Mac:

1. Go to GoToMyPC homepage (www.gotomypc.com) and log in using previously created account.



Figure 30: GoToMyPC Homepage

- After logging in, the user is brought to a page listing the machines that have been registered using the GoToMyPC service. In the case of this trial, the Mac test machine is listed. To access the machine, the user must click the Connect button.

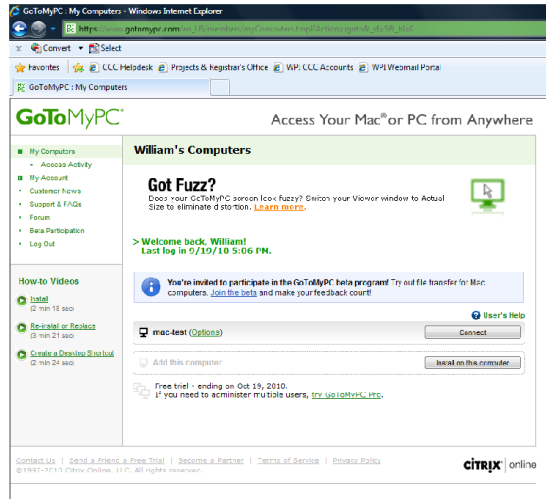


Figure 31: Index of Registered Computers

- Clicking the Connect button in the previous step brings the user to the page pictured below, with another button, Launch. This will launch the web-based viewer application.

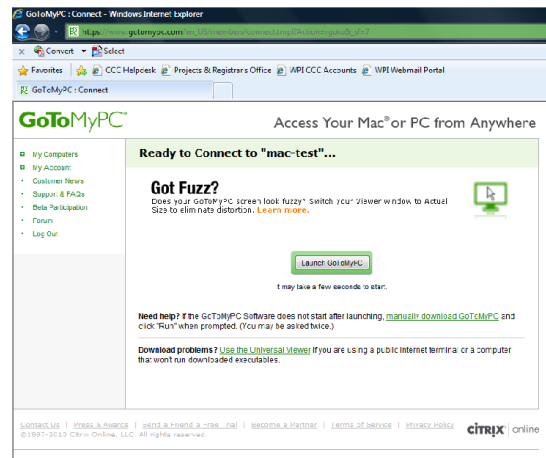


Figure 32: Launch Page

- The system will then prompt the user for the Access Code for the remote machine, which was set up during the install process on the remote machine.

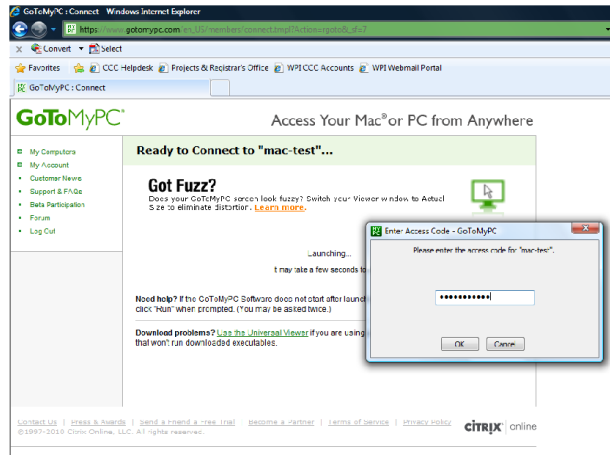


Figure 33: User Authentication

- The user will then be granted access to the remote machine via the web-based GoToMyPC application.



Figure 34: GoToMyPC Web Interface for Mac Test Machine

Access Mac from Windows Vista using LogMeIn

The steps outlined below show the process of accessing the test Mac remotely:

1. Go to LogMeIn homepage (www.logmein.com) and log in using previously created account.

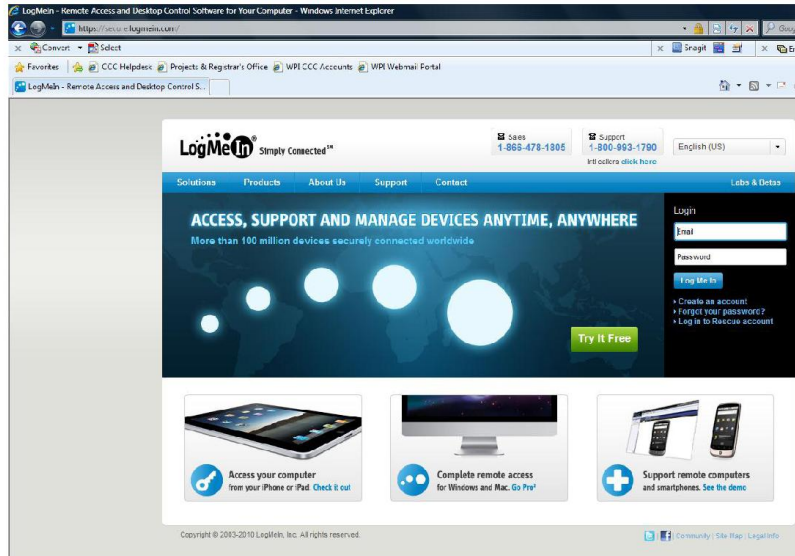


Figure 35: LogMeIn Homepage

- After logging in, the user is brought to a page listing all the machines that have been registered for the LogMeIn remote access service. This service allowed for the registering of multiple hosts, even using a trial account, so both the Windows and Mac test machines are listed. For this trial, the Mac will be accessed by clicking on the Remote Control button under the “mac-test” machine.

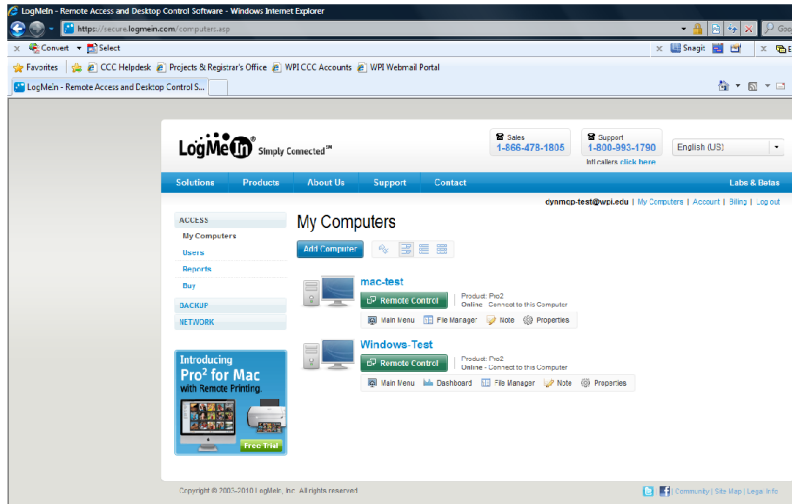


Figure 36: Index of Registered Computers

- Once the connection is made with the remote machine, a security page will launch, asking you for credentials to access the remote machine. Unlike the GoToMyPC service, these credentials are the same used by users to log into the machine locally.

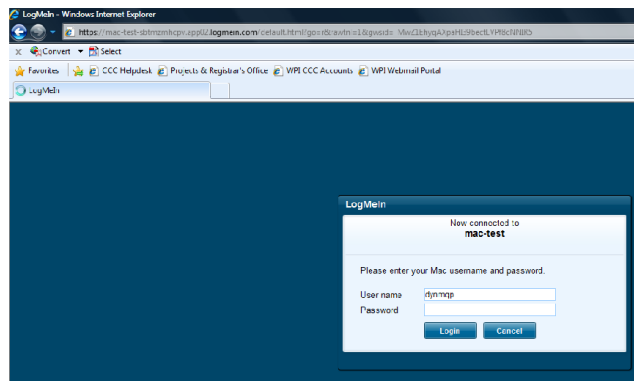


Figure 37: Authentication Page

4. After the authentication is complete, the user will have full access to the remote machine.

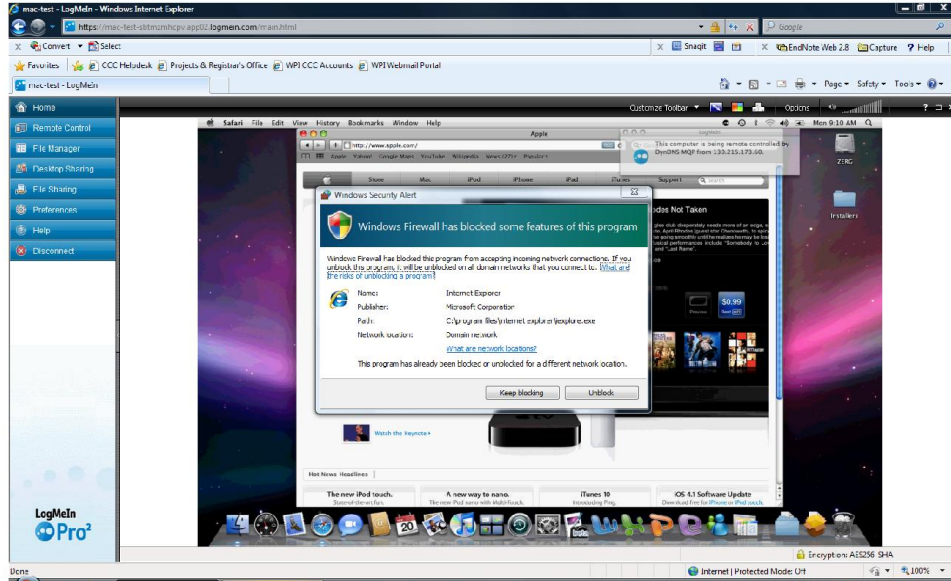


Figure 38: LogMeIn Web Interface for Mac Test Machine

Access PC from Windows Vista using GoToMyPC

The steps outlined below show the process of accessing the test PC remotely:

1. Go to GoToMyPC homepage (www.gotomypc.com) and log in using previously created account.

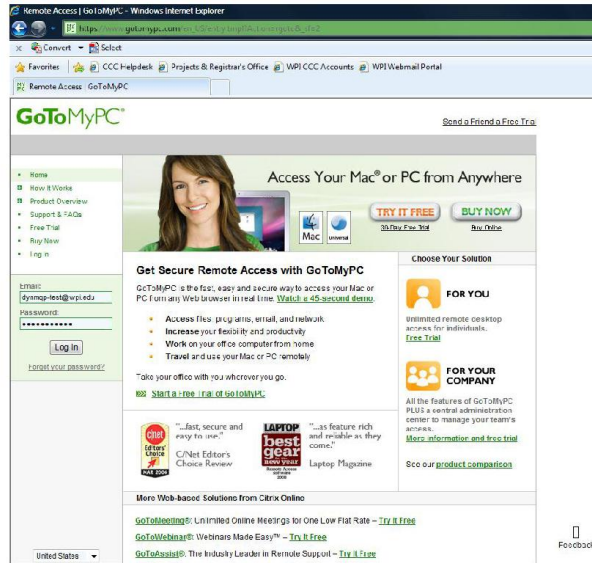


Figure 39: GoToMyPC Homepage

- After logging in, the user is brought to a page listing the machines that have been registered using the GoToMyPC service. In the case of this trial, the Windows test machine is listed. To access the machine, the user must click the Connect button.

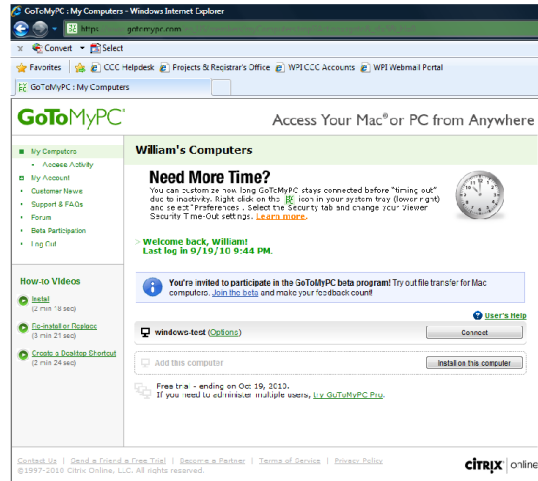


Figure 40: Index of Registered Computers

- Clicking the Connect button in the previous step brings the user to the page pictured below, with another button, Launch. This will launch the web-based viewer application.

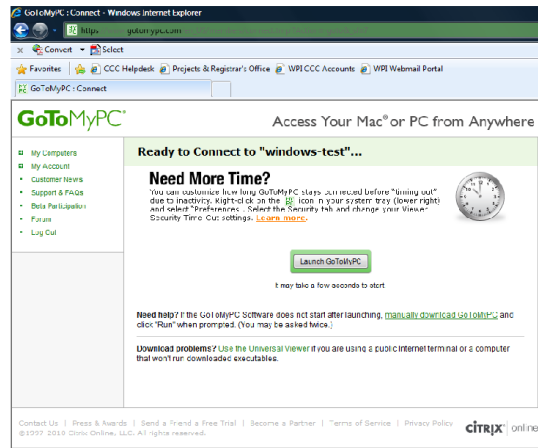


Figure 41: Launch Page

- The system will then prompt the user for the Access Code for the remote machine, which was set up during the install process on the remote machine.

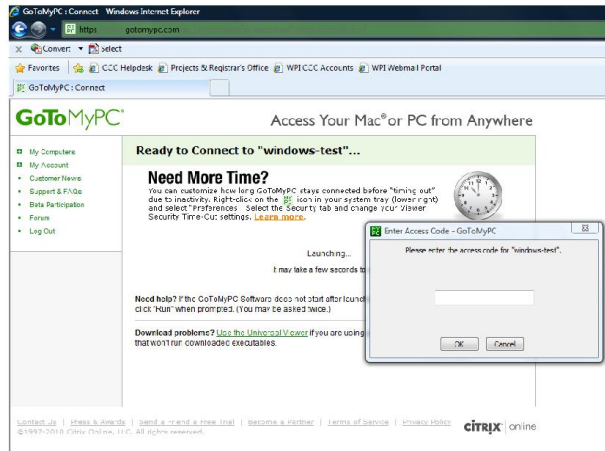


Figure 42: User Authentication

- The user will then be granted access to the remote machine via the web-based GoToMyPC application.

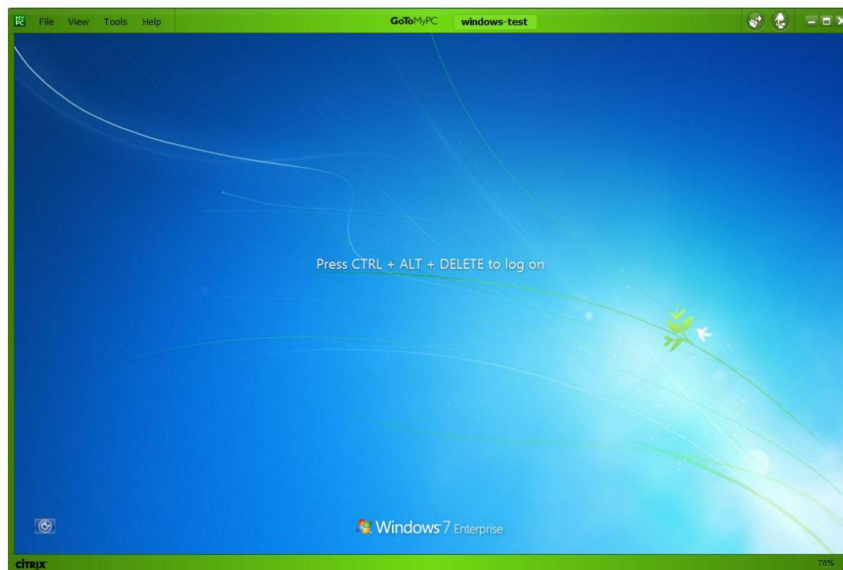


Figure 43: GoToMyPC Web Interface for Windows Test Machine

Access PC from Windows Vista using LogMeIn

The steps outlined below show the process of accessing the test PC remotely:

1. Go to LogMeIn homepage (www.logmein.com) and log in using previously created account.

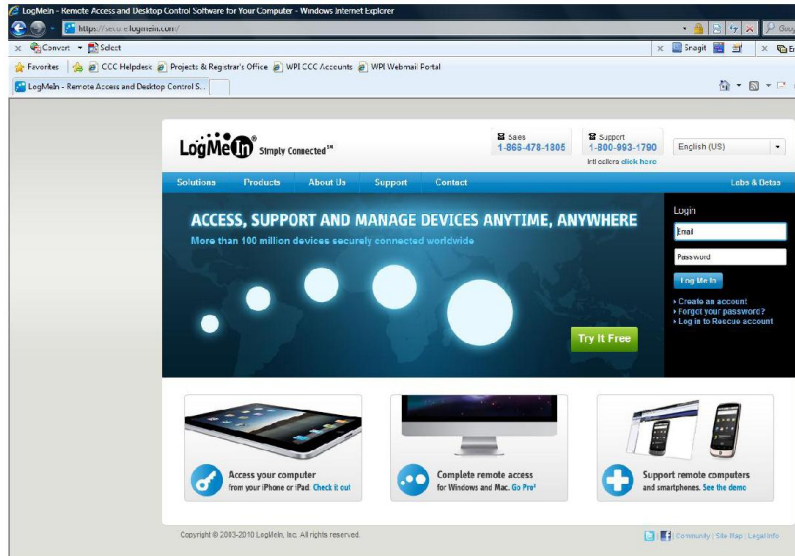


Figure 44: LogMeIn Homepage

- After logging in, the user is brought to a page listing all the machines that have been registered for the LogMeIn remote access service. This service allowed for the registering of multiple hosts, even using a trial account, so both the Windows and Mac test machines are listed. For this trial, the PC will be accessed by clicking on the Remote Control button under the “Windows-test” machine.

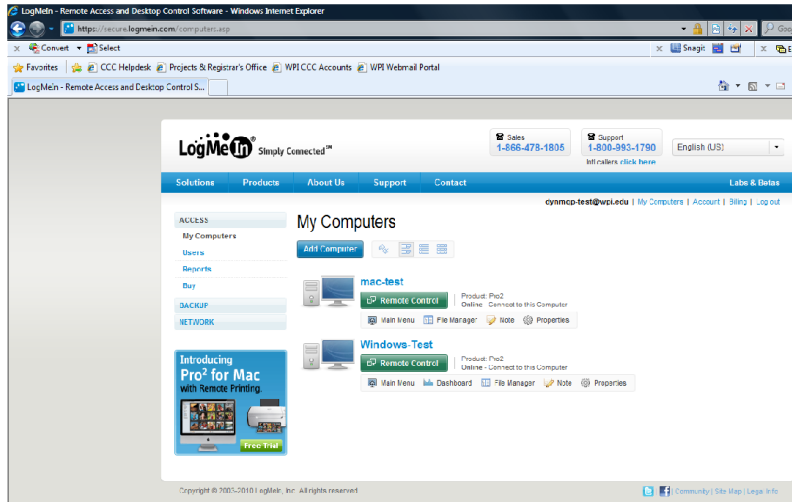


Figure 45: Index of Registered Computers

- Once the connection is made with the remote machine, a security page will launch, asking you for credentials to access the remote machine. Unlike the GoToMyPC service, these credentials are the same used by users to log into the machine locally.

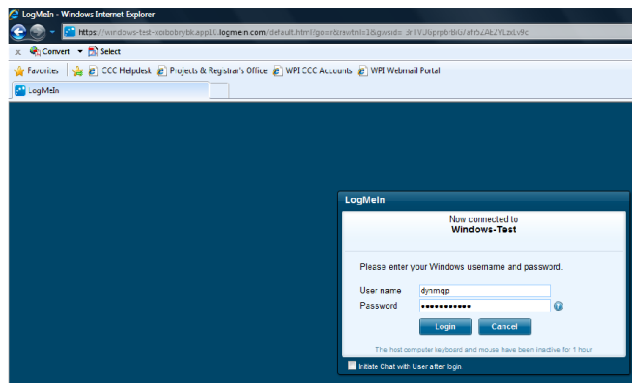


Figure 46: Authentication Page

4. After the authentication is complete, the user will have full access to the remote machine.

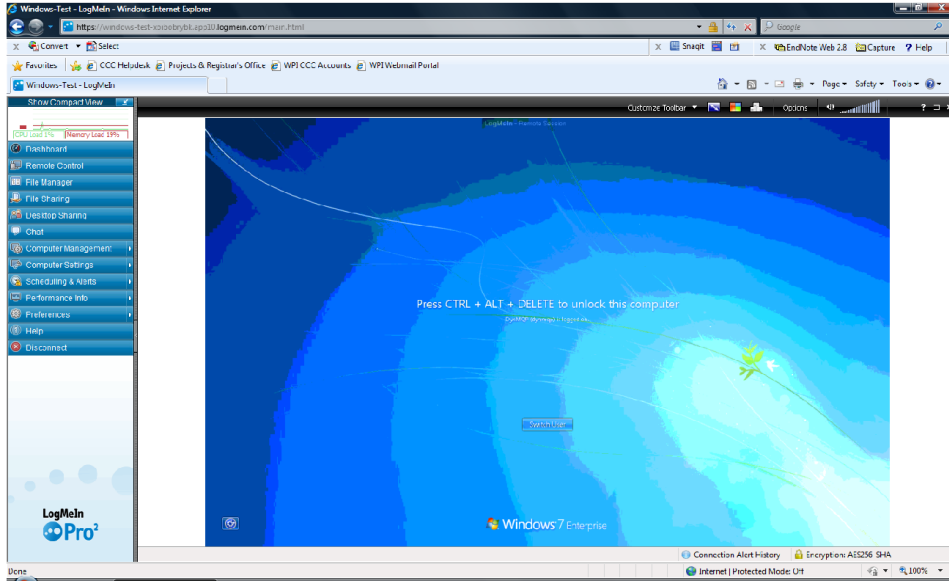


Figure 47: LogMeIn Web Interface for Windows Test Machine

Access PC from Windows Vista using RemotePC

The steps outlined below show the process of accessing the test PC remotely:

1. Go the RemotePC homepage (www.remotepc.com) and log in using previously created account.

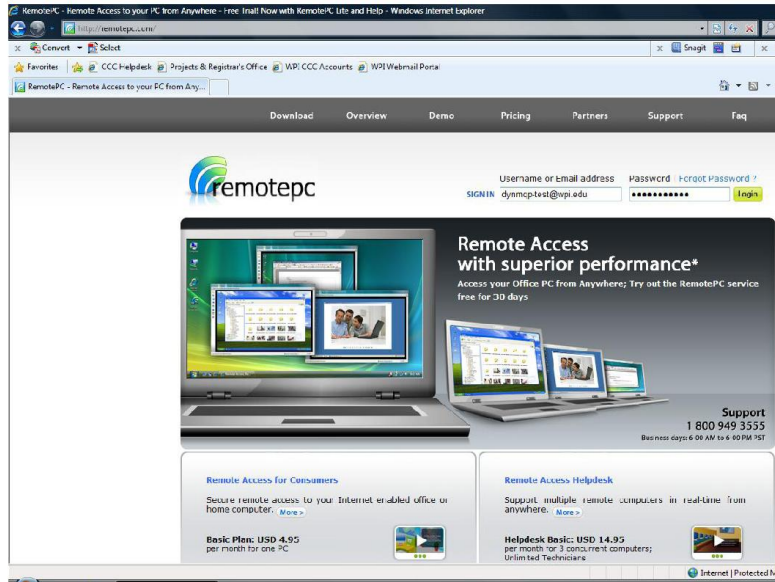


Figure 48: RemotePC Homepage

- After logging in, the user is brought to a page listing the machines that have been registered to the specified account. In this case, there is only the one machine (Windows-test) registered since there is a limitation of one host. To access the machine, the user must click the Connect button.

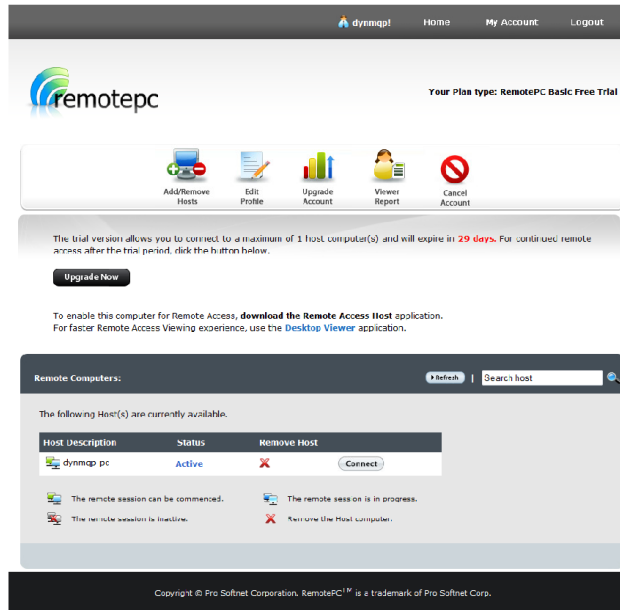


Figure 49: Index of Registered Computers

- After initiating that connection process, a waiting page loads.

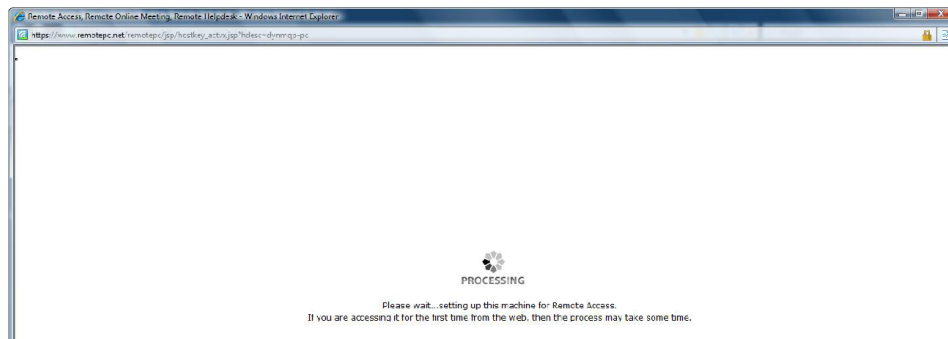


Figure 50: Processing Page during Connection Initialize

- 4. There are two subsequent setup screens that pop up next, to install an ActiveX Control and the application itself.

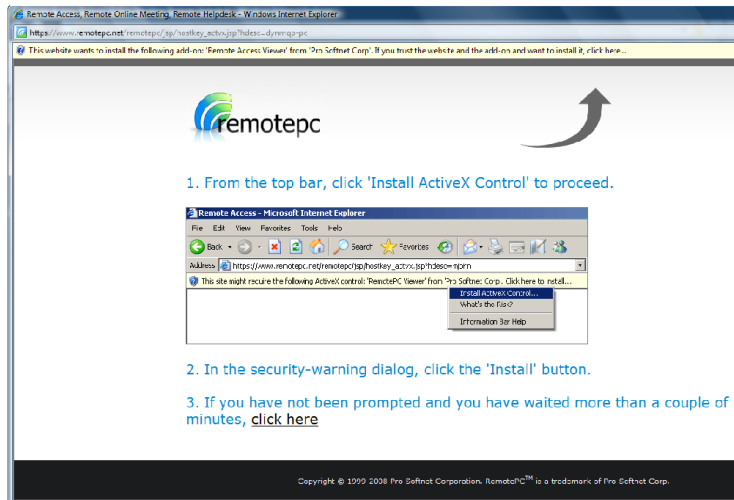


Figure 51: ActiveX Installation Page

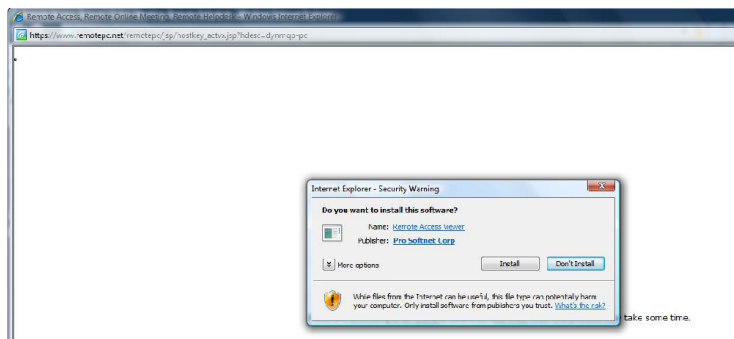


Figure 52: Application Installation Page

- The system will then prompt the user for the Host Key to access the remote machine. This key was set up during the install process on the remote machine.

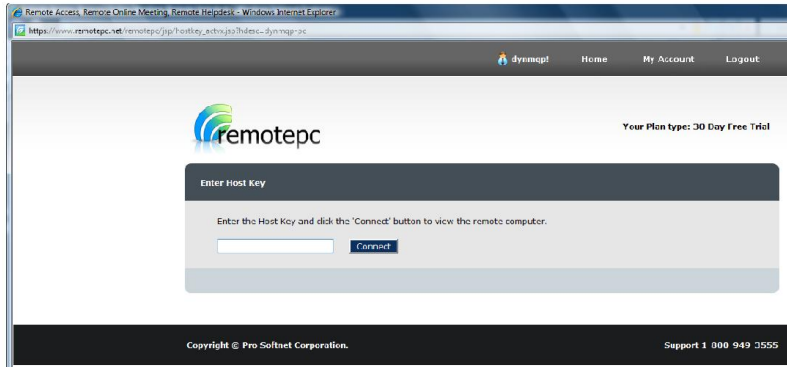


Figure 53: User Authentication

- The RemotePC web interface then began loading, but actually failed the first two times this process was carried out. Both times, a white screen loaded, which eventually failed to load.

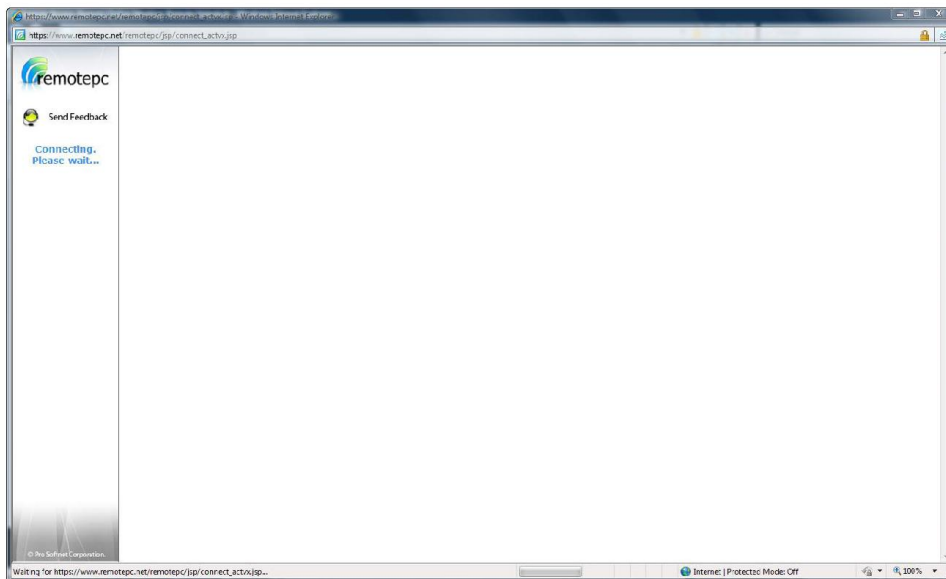


Figure 54: Failed Launch of Remote Session

7. The third time yielded a successful connection to the remote machine. The web interface is pictured below:

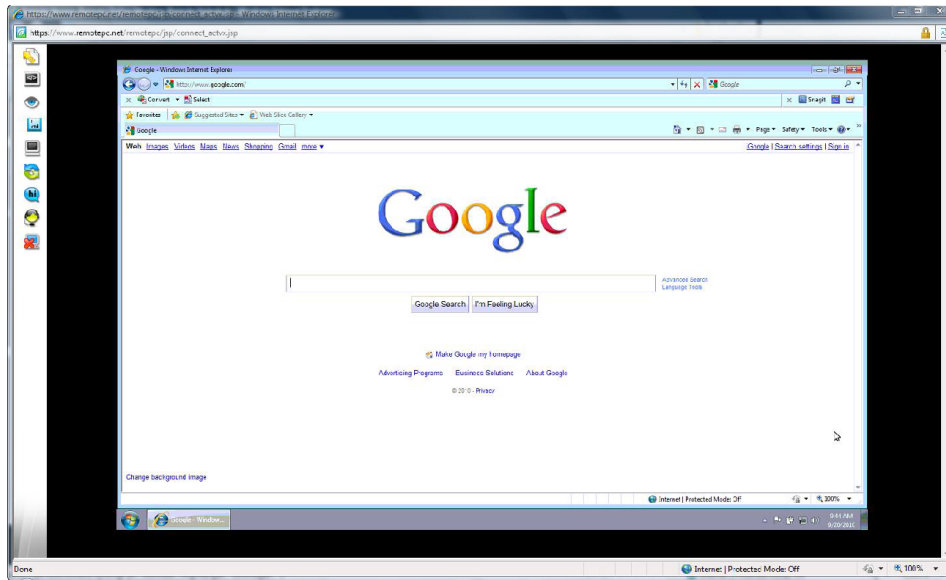


Figure 55: RemotePC Web Interface for Windows Test Machine

Conclusions

GoToMyPC

GoToMyPC was a feature-rich solution to remote computing with an easy to use interface. A user can log into the web portal from any browser, and easily select which computer to connect to. The GoToMyPC solution does exactly what it advertises; it enables a user to easily connect to a remote computer. It does not offer many additional features, such as those offered by LogMeIn (including computer statistics).

LogMeIn

LogMeIn was the clear leader with regard to the available technology and overall ease of use. Once the machines were configured, the process of connecting to a remote computer was seamless. The other two services offered a similar web portal to access machines; however, there are a few features that set LogMeIn apart. First, once a remote session is terminated, the user is not left on an authentication or setup page as is the case with the other services. Instead, the user is redirected to a list of all available machines, so that another remote session may be initiated or the web session may be exited. Another benefit to this service was the easy access to statistics about the remote computer. On the left-hand side of the remote screen, there is a panel of tools and utilities available to examine things such as

power and computer management, processor and memory statistics, and diagnostic information. These features are very useful when using a remote computer, giving the user easy access to vital information. Unfortunately, these features are currently only available when accessing a Windows computer.

RemotePC

RemotePC was definitely the least user-friendly and most unproductive solution out of the three tested. The software is not properly signed so that a user must agree to install unsigned software during the installation process when alerted by Windows Security. The service also failed to connect to the remote computer during the first two attempts, without offering any support or help. On the third attempt, the machine was finally able to be accessed. On closing the remote session, the user is left on the page detailing the launch process, instead of being brought back to the index of computers available. Another major flaw was the inability to change or modify the existing computer registration under the free trial, which is the reason the group was unable to perform analysis on using RemotePC to access a Mac computer.

12.2. System Usability Scale

	Strongly disagree					Strongly agree
1. I think that I would like to use this system frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
2. I found the system unnecessarily complex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
3. I thought the system was easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
4. I think that I would need the support of a technical person to be able to use this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
5. I found the various functions in this system were well integrated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
6. I thought there was too much inconsistency in this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
7. I would imagine that most people would learn to use this system very quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
8. I found the system very cumbersome to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
9. I felt very confident using the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
10. I needed to learn a lot of things before I could get going with this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	

12.3. Google Search and User Roles

Internet and Web Search Survey

This survey seeks to discover common search patterns among college students. If you have questions or concerns about this survey, please email us at: dynmap@wpi.edu.

How would you rate your technical ability using a computer?

- Expert
- Advanced User
- Novice

How many hours per day on average do you spend on the Internet?

- <1
- 1-3
- 3-5
- >5

Do you access your home computer from another physical location?

- Yes
- No
- Unsure

If yes, what service or program do you use?

Suppose you need to access a presentation from your home computer for a meeting in ten minutes. Using a search engine such as Google, what would you search for to solve your problem (which keywords would you use)?

Suppose you now wish to share pictures with your family from your own website (e.g. www.picasa.com). Using a search engine such as Google, what would you search for to solve your problem (which keywords would you use)?

How do you learn about new technologies? (Check all that apply)

- Web Search (Google, Yahoo, etc.)
- Friends / Family
- Co-Workers
- Social Networking
- Magazines / Articles
- Television
- Advertisements
- Online Media
- Other:

What do you think is more important in a website:

- Functionality
- Image / Appeal
- Unsure

Have you heard of DynDNS before?

- Yes
- No
- Unsure

If yes, how did you first discover DynDNS's service?

- Web Search (Google, Yahoo, etc.)
- Friends / Family
- Co-Workers
- Social Networking
- Magazines / Articles
- Television
- Advertisements
- Online Media
- Other:

Powered by [Google Docs](#)
[Report Abuse](#) - [Terms of Service](#) - [Additional Terms](#)

12.4. Silo Website Screenshots

This appendix illustrates the process of signing up for a DynDNS Free account using the silo website implemented by the MQP team.



DynDNS.com
by Dynamic Network Services Inc.

Learn about what FREE remote access can do for you!

Get Started!

Access - Remotely use up to three of your computers from anywhere in the world

Easy to use - Interact with your computer remotely as you normally would

Remote Desktop | [Share your files](#) | [Listen to your music](#) | [Get remote assistance](#) | [Share your screen](#)

Figure 58: Silo Site (Main Page - Tab 1)



Learn about what FREE remote access can do for you!

Get Started!

Sharing Content - Allow anyone, or only certain people, to access and download pictures, documents, or other content such as music!

Remote Desktop	Share your files	Listen to your music	Get remote assistance	Share your screen
--------------------------------	----------------------------------	--------------------------------------	---------------------------------------	-----------------------------------

Figure 59: Silo Site (Main Page - Tab 2)



Learn about what FREE remote access can do for you!

Get Started!

Your Tunes - Save your songs on your home computer, and listen to them from anywhere in the world!

Open Your Songs to the World - In a band and want to share your newest songs? Allow them to listen and stream your music without even having to download!

Remote Desktop	Share your files	Listen to your music	Get remote assistance	Share your screen
--------------------------------	----------------------------------	--------------------------------------	---------------------------------------	-----------------------------------

Figure 60: Silo Site (Main Page - Tab 3)



Learn about what FREE remote access can do for you!

Get Started!

Help - Get help with your computer problems by allowing your friends and family to help you by temporarily connecting to your computer.

You Have Control - Let only the people you approve, access your computer.

[Remote Desktop](#)

[Share your files](#)

[Listen to your music](#)

[Get remote assistance](#)

[Share your screen](#)

Figure 61: Silo Site (Main Page - Tab 4)



Learn about what FREE remote access can do for you!

Get Started!

Show them what you're looking at - Let your computer screen be seen by anyone you want. It's that easy!

Phone conference tools - Get your point across by letting anyone see what you are looking at - including Slide Shows, Images, Word documents and so much more!

[Remote Desktop](#)

[Share your files](#)

[Listen to your music](#)


[Get remote assistance](#)

[Share your screen](#)

Figure 62: Silo Site (Main Page - Tab 5)



Create an account or log in to continue

Username
Password
Confirm password
Email
Confirm Email
Security Image 
Enter the numbers from the above image:

Subscribe to DynDNS.com newsletter (1 or 2 per month)
 Dyn Inc. press releases
 I agree with the [acceptable use policy \(AUP\)](#) and [privacy policy](#).

Already Registered?
Username
Password


[Forgot your password?](#)



Figure 63: Silo Site (Create an Account)



Create an account or log in to continue

Username
Password
Confirm password
Email
Confirm Email
Security Image 
Enter the numbers from the above image:

Subscribe to DynDNS.com newsletter (1 or 2 per month)
 Dyn Inc. press releases
 I agree with the [acceptable use policy \(AUP\)](#) and [privacy policy](#).

Already Registered?
Username
Password

[Forgot your password?](#)



Figure 64: Silo Site (Create an Account - Filled Out)



Welcome dyn-test!

Step 1 2 3 4 5

Which Operating System are you using?

Windows

Mac OS X

Next

Figure 65: Silo Site (Choose an Operating System)



1 Step 2 3 4 5

Select one of the following options.

Express setup
Windows Remote Desktop Protocol

Advanced setup
VNC

Prev Next

Figure 66: Silo Site (Choose Express or Advanced Setup)

1	2	Step 3	4	5
---	---	---------------	---	---

Specify your router manufacturer and model.

Clicking on the "View Instructions" button will bring you to an external website. Follow the step-by-step on-screen instructions on that website.
 Then, return here and click the "Next" button to complete the last 2 steps.

Figure 67: Silo Site (Pick Your Router)



PORT FORWARD
FREE HELP setting up your router or firewall

Router List
Port List
Port Checker
Other Guides
Game Guides
Store
Support
Forum

Ads by Google
Port Forwarding
Xbox Live Ports
Router Firewall
Linksys Ports
Port Router

Click here to Automatically Forward ports with PFConfig!

- Select your router from a list
- Select the programs you want
- Click 'Update Router'
- You're Done!

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Port Forwarding Remote Desktop on the Netgear CG814GCMR

What is Port Forwarding?



AWARD WINNING OPEN SOURCE VPN
IPSec & SSL OpenVPN
Secure Site-to-Site or Remote Access FREE SOFTWARE

To setup port forwarding on this [router](#) your **computer** needs to have a [static ip address](#). Try our free [PF Setup Static IP Address Program](#) which will setup a [static ip address](#) for your computer.

Or you can take a look at our [Static IP Address](#) guide to setup a static ip address. When you are finished setting up a static ip address, please come back to this page and enter the ip address you setup in the Static IP Address box below.

Do not skip this step!

Enter Static IP Address

Google - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media

Address <http://www.google.com/>

GoToMyPC
Access your Mac or PC from any web browser.



Figure 68: Silo Site (External Link to PortForward.com)



1	2	3	Step 4	5
---	---	---	--------	---

Choose a name for your computer.

▼


Prev Next

Figure 69: Silo Site (Choose a Hostname)




1	2	3	4	Step 5
---	---	---	---	--------

Follow the on-screen instructions to download the DynDNS installer



[Download Now](#)
DynDNS® Updater (4.1.6)
For Windows 2000 or later

Follow the link to set up Windows Remote Desktop to remotely access your machine.



[Instructions for Windows 7](#)
[Windows Vista](#) or [Windows XP](#)

Prev Next

Figure 70: Silo Site (Configure the Client)



CONGRATULATIONS!

You have successfully created your free DynDNS account. You will now be able to remotely access the computer that you are using right now from anywhere in the world! You can remotely access other computers by following these 5 steps on any other computer.

[Your DynDNS Hosts](#)

Figure 71: Silo Site (Process Complete)

My Account

My Services

- Dynamic DNS Pro
- Internet Guide
- SLA
- Premier Support
- Zone Level Services
Domain registration and transfer, DNS hosting, Email services
- Host Services
Dynamic DNS hosts, WebHop URL Forwarding
- Dynect SMB
- SendLabs SMTP
- SSL Certificates
- Renew Services
- Auto Renew Settings
- Sync Expirations

Account Settings

Billing


 My Cart
[0 Items](#)

 GET ENTERPRISE DNS

DYNECT
WE'RE HIRING
[↑ My Services](#)

Host Services

Hostname	Service	Details	Last Updated
dyn-test.dynDNS-home.com	Host	130.215.27.7	Feb. 16, 2011 11:21 AM

[» Host Update Logs](#)

 Join the discussion in the [DynDNS Community](#) for tips and tricks, demos, suggestions, user help and much more.

Check out what our users are talking about below:

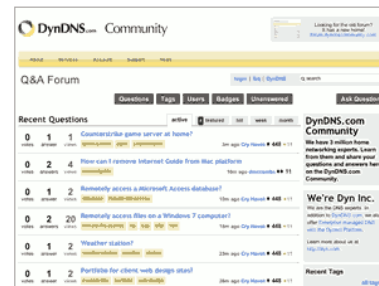
Recent conversations on web server:

- [Unable to access my web server from DynDNS](#)
- [Apache to External?](#)
- [Help MX A and CNAME records \[closed\]](#)
- [Can't Connect to Windows 2003 IIS Web Server \[closed\]](#)

Recent conversations on remote file access:

- [Seagate Black Armor Remote File Sharing Question \[closed\]](#)
- [Only read access on files via ftp \[closed\]](#)
- [Remotely access files on a Windows 7 computer?](#)
- [Free automated backup of remote files? \[closed\]](#)
- [remote access to IP camera works, but name.dynDNS-remote.com does not \[closed\]](#)

Recent conversations on ddns:



The screenshot shows the DynDNS Community Q&A Forum interface. It includes a search bar, navigation tabs (Questions, Tags, Users, Badges, Unanswered), and a list of recent questions with their respective counts and titles. The questions listed include topics like 'CounterStrike game server at home?', 'How can I restore Internet Guide from Mac platform?', 'Remotely access a Microsoft Access database?', 'Remotely access files on a Windows 7 computer?', 'Weather station?', and 'Partible for client with single ip?'. There is also a 'Recent Tags' section at the bottom right of the forum view.

Figure 72: DynDNS List of Hosts

12.5. Experiment Flyer

Earn Extra Credit in BUS3010

**by participating in a
Web Usability STUDY**

STUDY PURPOSE: You are invited to participate in a research study on web usability. To do this you will follow several instructions at a computer to complete a signup process.

DATES: December 13th, 2010

APPROXIMATE LENGTH: 20 Minutes

START TIME: Scheduled from 2pm-4pm at 20 minute intervals. Sign up in class on paper or email kgarza@wpi.edu.

YOU MUST RESERVE A SPACE IN ORDER TO PARTICIPATE.

STUDY DESCRIPTION:

If you agree to be in the study, you will be asked to do the following things:

- Answer a few questions about yourself and your experience with the Web.
- Complete a few steps on a website.
- Read and carefully answer some follow-up questions.

Note: If you feel uncomfortable once you begin the study, you may stop participating at any time. Also, please note that this study has been approved by the Internal Research Board at WPI.



CONFIDENTIALITY:

Efforts will be made to keep your personal information confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. Your identity will be held in confidence in reports in which the study may be published.

Organizations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the investigators and their research associates, and the WPI Institutional Review Board (IRB) or its designees.

If you have any questions about the study: **Dr. Soussan Djamasbi (508) 831-5266** or djamasbi@wpi.edu and put **Web Usability Study** in subject line.

If you have any questions about scheduling: **Kristen Garza** kgarza@wpi.edu and put **Web Usability Study** in subject line.

(IRB Approval: 2010-139)

12.6. Experiment Script

Organization

- ◆ 3 Rooms: WB206, WB209, Mgmt Conference Room
- ◆ Testing will begin at 2 o'clock and commence at 5 o'clock
- ◆ Will G. will run tests in WB206
- ◆ Brandon will run tests in WB209
- ◆ John will run tests in Mgmt Conference Room
- ◆ Kristen will be runner/assist in anything that may come up

Checklist

- ◆ Reserve laptops (3) for each room (Pick up on Dec 13th at 12 o'clock)
- ◆ Reserve microphones (3) for each room (Pick up on Dec 13th at 12 o'clock)
- ◆ Ensure camtasia is on the computers (for screen capture)

Setup

- ◆ IRB Consent forms in each room
- ◆ Computer and microphone set up in each room
- ◆ Internet connection in each room confirmed
- ◆ Live URL of silo and DynDNS website URL typed on separate pieces of paper available to Will, Brandon, and John.
- ◆ Naming convention: CAM-WPI-X
- ◆ Shortcut to router simulation HTML page on desktop

Room Assignments and Site exposure assignments

Yellow: New Wizard

Blue: Current Site

	Room: WB 206	Room: WB 209	Room: Management Conference Room (2 nd floor WB)
2:00-2:20 pm	WPI-1	WPI-10	WPI-18
2:20-2:40 pm	WPI-2	WPI-11	WPI-19
2:40-3:00 pm	WPI-3	WPI-12	WPI-20
3:00-3:20 pm	WPI-4	WPI-13	WPI-21
3:20-3:40 pm	WPI-5	WPI-14	WPI-22

3:40-4:00 pm	WPI-6	WPI-15	WPI-23
4:00-4:20 pm	WPI-7	WPI-16	
4:20-4:40 pm	WPI-8	WPI-17	
4:40-5:00 pm	WPI-9		

Part One: Introduction

Script: Thank you for taking part in the study. Before we begin, please fill out the WPI informed consent statement for this study. Please note that the entirety of this session will be recorded. If you do not wish to continue, you may leave now.

<user signs the form>

Thank you again for being present. This experiment should not take more than 20 minutes of your time. We will now begin.

At this time, you may open Internet Explorer on the computer in front of you and type in the following URL (*hand them the piece of paper with appropriate URL (website or silo) on it*).

(Once the site is loaded proceed to script in part two)

Part Two: Directions

Script for Participants exposed to the Wizard/Silo:

Imagine that you want to access your files on your home computer from on campus. You find out from a friend that DynDNS offers a service that will help you to solve your problem and you ask your friend to send you the link. The link brings you here, to this website. Please explore this website and walk through the steps given to utilize their services. Please note that this site is still in beta, therefore it does not have polished graphics. Please keep this in mind as you walk through the experiment for we are going to be looking for feedback.

As you do so, you will participate in a cognitive walkthrough. This means that as you explore the website you will think aloud everything that is going through your mind. Please speak out loud any thoughts you are having, anything you like or dislike, and how you are feeling etc. Your statements do not have to be complete sentences and may be stream of consciousness.

After you investigate the first page please summarize in your own words the services that are offered without looking at the screen.

<time for user to complete task on first page of silo>

When user is finished summarizing say: "Ok, now please make an account"

When user navigates to the first step of the process say to them:

When you sign up for a free account please use the following information to complete the sign up process. You may make up your own password. *<hand user a piece of paper with username and email on it>*

<time for user to complete tasks>

When user navigates to Step 3 (port forwarding) say to them:

On this page you will be asked to select your router manufacture and model number. Please use the information on this sheet to complete this process. *(hand them a sheet of paper, wait for them to select router and click the link)*

After you have read these instructions and are ready to continue, please double click the icon on the desktop labeled "Router Setup.html"

<After the user completes the last step of the silo>

Thank you for participating in the tasks given on the DYN website. We would now like for you to answer some questions verbally that appear on a survey. In order to keep this study controlled, questions and answers and dialogue between you, the participants, and myself will be limited. Please answer the questions on this survey to the best of your ability.

<user is asked the questions on the SUS appropriate for the silo site>

Thank you for answering our survey questions.

Proceed to script in Part Three

Script for Participants exposed to the Website:

Imagine that you want to access your files on your home computer from on campus. You find out from a friend that DynDNS offers a service that will help you to solve your problem and you ask your friend to send you the link. The link brings you here, to this website. You will have three tasks.

1. Investigate what DynDNS does for their customers and explain this in your own words.
2. Make an account with DynDNS.
3. Sign up for their free domain name service.

When you have finished each task we will remind you of the next task. As you do so, you will participate in a cognitive walkthrough. This means that as you explore the website you will think aloud everything that is going through your mind. Please speak out loud any thoughts you are having, anything you like or dislike, and how you are feeling etc. Your statements do not have to be complete sentences and may be stream of consciousness.

1. Please begin by investigating what DynDNS does for their customers (please remember to think aloud) and then please summarize in your own words the services that are offered without looking at the screen. (*must restrict user to the homepage*)

If the user does not explain it in their own words and just reads off the page, follow up and ask them if they know what that services means or not.

<time for user to complete task>

2. Ok. Please make an account with DynDNS.

<time for user to complete task>

3. Please sign up for DynDNS' free domain name service.

<time for user to complete task>

Ok. Thank you for participating in the tasks given on the DYN website. We would now like for you to answer some questions verbally that appear on a survey. In order to keep this study controlled, questions and answers and dialogue between you, the participants, and myself will be limited. Please answer the questions on this survey to the best of your ability.

<user is asked the questions on the SUS appropriate for the website>

Thank you for answering our survey questions. (*proceed to script in Part Three.*)

Part Three: Interview

Now we would like to ask you a few open ended questions about your interaction. Again, please answer to the best of your ability.

Interview Questions to ask users who looked at the Silo:

- ◆ *Before this experiment, were you familiar with DynDNS?*
 - *If Yes, ask how familiar they are with the company, what services they used, how they liked the services they used*
- ◆ *How easy/difficult was it to learn about what the service that this company provides does for you? Please explain.*
- ◆ *Do you think that the service that this company provides for remotely accessing your files might be useful to you? Why/Why not?*
- ◆ *Where would you use this service primarily?*
 - *At home between computers on the same network*
 - *From home accessing a work computer*
 - *From school accessing a home computer*
 - *From work accessing a home computer*
 - *On the go accessing a home computer*
- ◆ *In the course of a week, how often would you use this service?*
 - *Multiple times a day*
 - *Multiple times a week*
 - *Once a day*
 - *Once a week*

- Never
- ◆ Which of the following would have improved your experience?
 - Images
 - Video tutorials
 - Text references for difficult terms
 - More instructions
 - Less instructions
 - Icon of the product
 - Product overview
- ◆ Would you consider signing up for the free service that this company offers? Why/why not?
- ◆ Do you think the terminology and explanations used in the sign up process were clear and helpful?
- ◆ Would you trust that this company would give you good reliable services?
- ◆ In your opinion, what was the hardest part of the process?
- ◆ Do you think it was visually pleasing? Why/whynot?
- ◆ As we mentioned before, this is a beta test and we plan on polishing the interface. We would appreciate feedback on how you would like to see the final product.
- ◆ Was there anything else that you liked or did not like?

Interview Questions to ask users who looked at the website:

- ◆ Before this experiment, were you familiar with DynDNS?
 - If Yes, ask how familiar they are with the company, what services they used, how they liked the services they used
- ◆ How easy/difficult was it to learn about what the service that this company provides does for you? Please explain.
- ◆ Do you think that the service that this company provides for remotely accessing your files might be useful to you? Why/Why not?
- ◆ Where would you use this service primarily?
 - At home between computers on the same network
 - From home accessing a work computer
 - From school accessing a home computer
 - From work accessing a home computer
 - On the go accessing a home computer
- ◆ In the course of a week, how often would you use this service?
 - Multiple times a day
 - Multiple times a week
 - Once a day
 - Once a week
 - Never
- ◆ Which of the following would have improved your experience? (mark as many as you wish)
 - Images
 - Video tutorials
 - Text references for difficult terms
 - More instructions
 - Less instructions
 - Icon of the product
 - Product overview
- ◆ Would you consider signing up for the free service that this company offers? Why/why not?
- ◆ Do you think the terminology and explanations used on the website, and in the sign up process were clear and helpful?

- ◆ *Would you trust that this company would give you good reliable services?*
- ◆ *In your opinion, what was the hardest part of completing the 3 tasks?*
- ◆ *Do you think the website was visually pleasing? Why/whynot?*
- ◆ *Was there anything else that you liked or did not like?*

<User answers the questions above>

This is the end of the experiment. Your name will not be associated with any of the answers that were given today. Thank you for your time.

12.7. Meeting Minutes

MQP Meeting Notes: August 31, 2010

Attendees: Soussan Djamassbi (faculty advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss project overview
- ◆ Set project expectations
- ◆ Fill out necessary paperwork
- ◆ Tentative schedule
 - Meetings with Professor: Tuesday 12-1pm WB206

Minutes:

- ◆ Company:
 - Jeremy Hitchcock
 - Dynamic Network Services
 - 1230 Elm Street, Fifth Floor, Manchester, NH 03101, USA
 - P: +1.603.296.1554 :: C: +1.603.391.4494
- ◆ Usability project (website? Current users? Use of site? Or attract new users?)
- ◆ Meet with client on Friday (8am-1pm or after 6pm) or Thursday (12-2pm)
- ◆ Are company's customers from US or international?
- ◆ Project overview:
 - Meeting with sponsor
 - Find out interests (i.e. website layout)
 - Come up with program / plan to test
 - Prototypes (for new website)
 - Test new layout
 - Create realistic prototype to try going live with it
 - Eye tracking (10-20 people)
 - ◆ Interesting component for project
 - Take note of certain things when meeting with the sponsor
 - What kind of data is already being collected
 - Brainstorm questions, explore website
 - Get a general idea of what "usability" encompasses
 - For info on eye-tracking, use Google Scholar to search for "eye tracking Djamassbi"
- ◆ A-Term:
 - What is question and how can answer be found?
 - Experiments and data collection
 - Surveys? Eye-tracking?
- ◆ B-Term:
 - Collect data
 - Analyze data
- ◆ C-Term:
 - Write-up / analysis
 - Present to company with recommendations / future steps
 - May include a prototype
 - Business value (new customers? Revenue generation?)
 - Potential to publish and present to a conference (*not part of the MQP grade)
- ◆ Expectations:
 - Weds should be dedicated to MQP
 - 15-18 hours per week
 - Agenda paper-trail of progress
 - Professional language

- Appendix to write up (MQP document)
 - Examine MQP from 2008 about usability at Fidelity for reference
- ◆ Document Layout:
 - A-Term:
 - Proposal document:
 - ◆ Industry
 - ◆ History
 - ◆ Questions
 - ◆ Literature review
 - ◆ Methodology
 - B-Term:
 - Changes may occur to methodology
 - Results section
 - C-Term:
 - Contribution
 - Future studies
 - Recommendations
 - ◆ Prototype
- ◆ Meetings with professor, Tuesdays 12-1 in WB 206

Deliverables:

- ◆ Questions for first meeting with sponsor
- ◆ Potential usability research topics / metrics
- ◆ Read “Efficiency, Trust, and Visual Appeal: Usability Testing through Eye Tracking”
- ◆ 2008 MQP: http://www.wpi.edu/Pubs/E-project/Available/E-project-042208-111154/unrestricted/Fidelity_MQP_2008.pdf
- ◆ Get an idea of what “usability” encompasses
<http://en.wikipedia.org/wiki/Usability>

MOP Meeting Notes: September 3, 2010

Attendees: Soussan Djamassbi (faculty advisor), Jeremy Hitchcock (company sponsor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Introductions / Meet with Sponsor
- ◆ Company Background
- ◆ Project Expectations
- ◆ Questions and Answers
- ◆ Tentative Schedule

Minutes:

- ◆ Scope of meeting today: creative meeting
- ◆ Dynamic Network Services presentation
 - Company started in 1998
 - Five WPI alumni on staff
 - Based in Manchester, NH
 - Services span from individual to enterprise
 - Various DNS-related services
 - Latency is very important in enterprise
 - Enterprise: load balancing, etc
 - Personal: home web services (dynamic IP)
 - DynDNS
 - 15-20 million users over time
 - Personal service primarily
 - Domain registrations, DNS, email
 - Dynect
 - Enterprise service
 - Load balancing, DNS
 - Twitter, Flickr, Zappos are customers
 - Think of DynDNS website as an e-Commerce Portal
 - 95-97% of users are free users
 - Renewal rates used to be 50-65%
 - Increased renewal rates by moving expiration dates to weekdays (not weekends)
 - Introduced auto-renewal feature
 - Data collection
 - Number of users
 - Renewal activity (organized by days of the week)
 - Deletion of users
 - Newsletters, communities (on Twitter)
 - Audience roles
 - Build a computer or buy one?
 - Usability
 - Fun or profit?
 - Came up with 8 basic roles for their customers
 - Technology can be used for a variety of things
 - As registration occurs for DynDNS sites, there is now a question pertaining to purpose / intended use
 - About half of paying customers are outside of the US
 - About 70% male, 30% female
- ◆ Audience analytics is the most underused thing with potential
 - Haven't explored what this data can be used for
 - There is much data that has been collected but some of its potential just hasn't been harnessed yet

- ◆ One aspect not tracked: referrals (question was taken off because the data wasn't used; dropped because having an extra question in registration process can be harmful)
- ◆ About 4 million users total, only about 150,000 have some form of paid service
 - Potential idea to discover what services are being used for: script to scan websites and look for © or inc. to determine if it is a business service
- ◆ User comprehension
 - Goto my PC (corporate solution)
 - What problem are the users trying to solve?
 - Potential personalized portals based on audience roles
 - Only show services that may be of interest or use to particular group of people
 - Hi-Tech vs. Low-Tech
 - Image vs. Functionality
 - Business vs. Personal
- ◆ To get data from users, used surveys (with incentives, without incentives, witty language)
- ◆ Interact with very angry users and very enthusiastic users; not much is known about the users in the middle
- ◆ When the referral question was on the site, most common answer was “through a friend”
- ◆ Need to determine scope of project:
 - If data is already there, we can focus on analysis
 - Net growth of users or net growth of revenue (most important)
 - What types of data would be needed to examine this?
 - Is it already collected or do we need to collect new data?
 - Good amount of user and financial data is in Google Analytics
 - Audience roles data is maintained in separate store
 - Other idea: how to make sure revenue flows once people open up an account
 - Long-term goal: give results to development team to make changes to site (can be run in parallel with project as well)
 - Real-time detection based on platform / device
 - Can do traditional data collection via surveys
 - Never tried focus group (have users who have never heard of site and see how they interact with the website)
 - Focus group might be very useful
- ◆ Plan to meet at company every Wednesday in A-Term, maybe every other in B-Term

MOP Meeting Notes: September 7, 2010

Attendees: Soussan Djamasbi (faculty advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ How to document expenses?
- ◆ Company History/Industry Overview
 - Due By Next Tues
- ◆ Literature Review
 - Self accountability for # of articles to read weekly
- ◆ Topics to study/review
 - Personalization
 - User behavior
 - Segmentation
 - Browser/OS specific pages
 - Geography specific pages
- ◆ Sign up for DNS free service
- ◆ Watch DNS video (web clip)

Minutes:

- ◆ SharePoint
 - Add professor
 - Company contacts cannot be added (only for WPI community)
- ◆ Dropbox
 - Potential solution for sharing files between WPI and Dyn
- ◆ Expense report for mileage / trips to NH
 - Receipts for tolls, parking, etc.
- ◆ Look for competitors from business point of view
- ◆ Website is unclear on exactly what services they provide
 - Could be impacted by user's age, type of business, etc.
- ◆ Goal: convince people they need to switch to use DynDNS
- ◆ Competitor analysis (from e-Business class)
- ◆ Timeline / goals
 - Divide tasks / milestones
- ◆ Articles to read (save and archive on sharepoint?)
 - Short description of why we picked a particular article
- ◆ Find additional articles:
 - ACM Portal (IEE)
 - CHI Conferences
 - Ebsco
- ◆ John to send link to video with instructions to set up Dyn account
 - <http://www.youtube.com/watch?v=bI52nF1BRNo&feature=related>
- ◆ Training videos
 - Caricatures / cartoons to keep interest
 - Test results of people watching them
- ◆ Website color scheme?
- ◆ System Usability Scale (SUS Survey – modified for web)
 - Search for Fidelity
- ◆ Google analytics vs. Alternatives
- ◆ Potentially try an A/B site (old with a new alternative)
 - Use Google analytics to track responses

MQP Meeting Notes: September 14, 2010

Attendees: Soussan Djamasbi (faculty advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Tomorrow's Plan – Career Fair
- ◆ Library Consultation
- ◆ Company History/Industry Overview
 - Company History almost done
 - Industry Overview needs more
- ◆ A-Term Timeline and Outline

Minutes:

- ◆ Examples/Ideas of Methods we may use
 - Use test to build on each other. Build steps to reach goal.
 - Look at Memory/Recall test –Can use for research with Fidelity.
 - Give tasks
 - Professor has surveys for this
 - Online surveys
 - ◆ > # of participants
 - ◆ Their customs
 - ◆ WPI – control lab therefore use dyn user group for surveys
 - Phone interviews
 - Interview in lab
 - Focus group only after control group for publication records
 - Give SUS after that
 - Don't design own surveys, use industry standards. (ex SUS)
 - “If you wanted to find out _____ what would you search for?”
 - Gain User Profiles| age, gender, computer experience, work and industry
 - Use test site simultaneously to current site. Expose to users, which attracts / keeps more users to /on the site
 - Give users a task and time limit and do a focus group after the observing – can they find the info?
 - Eye Tracking
 - Are they paying attention to the support page? Must choose exactly the research questions we want to collect and must make beneficial for fidelity
 - Ex of task: if you go to website you can get to your folders at home. Go Where do they look?
 - Prototype A and B
 - Were changes effective?
- ◆ Search experiment| What do people search for when looking for a dyn-like product?
- ◆ Human Subject Training (IRB Form)
- ◆ How is the industry using browser / OS information?
- ◆ NIH training and Review Board
- ◆ Review Board must approve the methods we're using
 - 4/5 weeks to approve
 - Easy ammendments
 - Must submit ASAP
 - May not need to mention fidelity eye tracking
- ◆ Industry
 - Support, infastructure
 - Providing service of
- ◆ For the first chapter in our MQP document
 - What is the problem that we're charged with; problem space

- Make website more usable for new users w/o repelling the current users/upset them
- ◆ For the second chapter in our MQP document
 - Business value, what does it mean?
 - Also, a more detailed section later (# of users, change in growth)
- ◆ Idea for project
 - Give idea now and track it for a month show examples
- ◆ Pay attention to laymen terms going forward
 - Back up files remotely
 - Use home computer as web users
 - Access files from home
- ◆ Google Ranking
 - Searching things
 - Ask friends for suggestions
 - Does DYN dns come up ?
 - Competitors?
 - 15-20 til we see overlap
 - Gather gender, age, ask the 3 questions,
 - Typical survey that measures people in users' technical aptitude

Deliverable

- ◆ Nail down research questions
- ◆ Detailed Timeline
- ◆ Get minutes approved for next time

MQP Meeting Notes: September 15, 2010

Attendees: Cory Von Wallenstein (Dyn Company Contact), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Progress Report (SharePoint)
 - A-Term timeline
- ◆ Discuss potential topics of focus
- ◆ YouTube video as idea for Dyn homepage (<http://www.youtube.com/watch?v=TJfrNo3Z-DU>)

Minutes:

- ◆ Met with Cory before Career Fair to discuss project so far
- ◆ Dyn, Inc. serves several different markets (hard to pinpoint direct competitors)
- ◆ Dyn DNS
 - Geared to college-aged technical people doing “cool tech things”
 - Money comes from IT consultants and geeks that want the personalized feel of the paid services
 - Domain name, email backup, etc.
- ◆ “Postini” – acquired by Google; industry leader in “email stuff”
 - Approx \$500 million annually, Dyn is \$2 million
- ◆ DNS market is approx. 15-20 million worldwide, Dyn occupies about ½ that
- ◆ 100,000 domains registered thru Dyn (GoDaddy is definitely the leader – 200 million)
- ◆ Want to extract revenue out of existing customers
- ◆ NoIP (copycat of Dyn, 1/10 the size); TZO (another copycat*)
- ◆ Enterprise services:
 - No. 1: Ultra DNS
 - No. 2: Dyn Enterprise
- ◆ Growth is in users that don’t have very technical backgrounds
- ◆ Dyn has 4 million users, about 200,000 paying (pro version)
- ◆ Email services (mailhop), slowest growing area; already saturated the market
 - Dyns email services: per domain
 - Google (Postini): per user → greater revenue stream
- ◆ Two Possible Paths for Project:
 - Eye-tracking results
 - Caution against improving site for existing users
 - Symantec parameters
 - Presentation of ideas (currently on very high level)
 - Broaden audience
- ◆ What does market leader in this category do on their website?
- ◆ What does market audience for non-technical look like?
- ◆ Eye-tracking for A/B sites
 - What about website to interest people
- ◆ Dyn working with Lacie to do remote hard drives (easy)
- ◆ iPad growth in a new area
- ◆ Focus group is better way to go: very indepth sample
 - Better than surveys
 - Don’t go to survey first
- ◆ Video
 - Presenting in a silo website (must change service delivery before)
- ◆ Creating silo websites for individual products / services

Questions:

- ◆ What sites does the target market use / like and what can we take from that?
- ◆ The market has been saturated, so how do we reach the rest of them?

Deliverables:

- ◆ Will / Brandon – Examine competitors in the different markets, write about technical differences, financial differences, etc.
- ◆ Kristen – Research questions and corresponding methodology.
- ◆ John – tbd

MQP Meeting Notes: September 21, 2010

Attendees: Professor Djamasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Progress Report (SharePoint)
 - A-Term timeline
- ◆ Discuss project scope (after meeting with Cory last week)
 - Review research questions and goals
- ◆ Review IRB / Need Professor's signature
- ◆ Turn in hard copies of Company Background and Industry Analysis

Minutes:

- ◆ How do other technical sites target non-technical audiences?
 - How do they explain their services?
- ◆ Is the technical market truly saturated for Dyn Inc. ?
- ◆ Signup for new users is very important:
 - Filling out forms
 - Number of options
- ◆ Focus on measurable goals
- ◆ Use silo sites, but make changes that have a measurable effect.
- ◆ Eye tracking – Use on paid services page
 - Time to first fixation
 - Areas of interest
- ◆ Use intention to measure success (21 weeks is too short to measure gained customers)
- ◆ Project scope
 - Net growth of users
 - How to measure goals
- ◆ User personalization of web site
 - Check if first time user
 - Simple home page
 - Technical pages a few clicks away
- ◆ Scent of information: algorithms to detect user behaviors
- ◆ Questions to ask
 - Do you think this is something you would be interested in?
 - How much would you be willing to pay for the ability to access your files from any computer?
- ◆ Watch | PBS – The Persuaders (Marketing / Behavioral economics)
- ◆ Silo site – Very Simple Silo Site -> hide the technical stuff below, interested parties will be willing / able to find it
- ◆ What is feasible to do and measure in 21 weeks?

MQP Meeting Notes: September 28, 2010

Attendees: Jeremy Hitchcock (company advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss project goals / progress

Minutes:

- ◆ Discussed the email responses from last Wednesday meeting at Dyn
- ◆ Best way to approach project:
 - Focus on current products/services
 - Look at number of products per customer (i.e. dns, email, etc.)
 - How other companies bundle their services
- ◆ User Sign-up Process
 - Best approach for project focus
 - Different content for different users
 - Segment users
 - Homepage, services pages, shopping cart
 - Geography, browser, audience roles
 - Ways to increase workflow
- ◆ Data collection:
 - Smaller focus groups better
 - Larger-scale surveys are possible
 - Eye-tracking of current page (on-board)
- ◆ How to measure goals:
 - Workflow process
 - People hit homepage
 - People that go thru process (drop-off rate)
 - Consolidate steps
 - ◆ Brand loyalty
 - ◆ Social media
 - Confirm email address step
- ◆ Google Analytics
 - Meet with Alex Sergejev to get tour of analytics
 - How to segment users
 - Track audiences
 - Goal conversions

MQP Meeting Notes: September 28, 2010

Attendees: Professor Djasasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Revised research questions / project goals
- ◆ Outline
- ◆ Discuss revised project scope (conference call with Jeremy)

Minutes:

- ◆ Reviewed the research questions document
 - Would like to see options (A, B, C) and how the results can be tested
 - 1st question: strictly research
 - 2nd question:
 - Have to talk to target market
 - Figure out how to reach them
 - Goal is to understand something
 - 3rd question: should be split into two separate questions (different recommendations for each)
 - Goal can be tested, measured using Google Analytics and/or eye-tracking
 - Nothing wrong with concepts of research questions, just need to improve wording
 - Goals need to be measurable
- ◆ Reviewed company / project goals
 - Net growth of users
 - Accessible typically means blind, etc. (Can screen-reader read their website? Do they want to add this functionality?)
 - Goal, how it's measured, actions to perform, measure if what you did was an improvement
 - "How do you find the services to access your machine away from your home?" → test with eye-tracking while users try to perform specific tasks
 - Reach different markets
 - This might be a sub-goal of "net growth of users"
 - Net growth is a good project by itself; reaching different markets (ok to do experiment only, maybe a survey), if it's too involved, drop it
 - "Push order through with fewer click" → good recommendation to make to company
- ◆ Be sure to keep company goals separate from the project goals (don't want to promise something that cannot be fulfilled)
- ◆ Need to finish analysis before any recommendations can be made
 - Proposal must be finished by the end of A-Term
 - Prototype work should be completed during the beginning of B-Term
 - Data gathering should be completed during B-Term (and completed towards the end)
 - Shoot to have analysis done during Christmas time
 - Aggressive schedule
- ◆ Examined Project Outline
 - Want to start shifting a large amount of focus to writing parts of the document
 - Find out what really relates to project and only include those in the MQP document
 - SUS
 - ◆ How users perceive usability of the website
 - User experience research
 - ◆ Visual aesthetics
 - ◆ Functionality / usability
 - Focus group: "wishy-washy" not really technical data
 - Experiment (lab—controlled), better more scientific results
- ◆ Will have contribution to literature / theory at the end of the project

MQP Meeting Notes: October 5, 2010

Attendees: Professor Djamasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Review IRB
- ◆ Progress Report
 - A-Term timeline
- ◆ Discuss revised project scope
- ◆ Discuss Proposal

Minutes:

- ◆ Professor gave assignment regarding DynDNS services in class, will send results to us (part of the analysis – if don't hear by end of this week, send an email)
- ◆ Send IRB form to Professor this week (already sent)
- ◆ Have Jeremy sign off on proposal to have it in writing (silo site, etc.)
- ◆ Talk to Jeremy about what he would prefer to see in this proposal:
 - Opportunity identification (not PROBLEM)
 - Methodology (solution, innovation to create opportunity)
 - May not wish to see background info, etc.
 - May be okay with bringing the MQP document
- ◆ Proposal should be separate from MQP:
 - Goal
 - Solutions
 - Include a one-page document for them to sign (send via email beforehand, but need a signature at the end)
- ◆ For this week:
 - Get IRB through (send emails to Professor)
 - Look at data from graduate class (regarding DynDNS)
 - Plan for proposal presentation (discuss where he would prefer to meet, what day? – shoot for beginning of B-Term)
 - 11am ? (let professor know ASAP)
- ◆ Professor gone December 10-15

MQP Meeting Notes: October 12, 2010

Attendees: Professor Djasmasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Progress Report
 - A-Term timeline
 - B-Term timeline
- ◆ Discuss Proposal
 - Feedback from draft?
 - Methods outline
- ◆ Discuss proposal date (if we hear back)

Minutes:

- ◆ Reviewed timelines
- ◆ Eye tracking will likely be a separate study at Fidelity (not the same group of students as at WPI; probably Fidelity employees)
- ◆ Grad class on Tuesday nights (can use for a study) – ends in December
 - Email professor for potential dates to survey class (17 people)
- ◆ Statistical analysis: repeated measure (might need more people)
- ◆ Decide what we want to study/test and then send to professor; will offer additional suggestions after that
- ◆ For a study focusing on web search terms, etc. 17 people should be more than enough
- ◆ Repeated measure:
 - See two sites (original vs. silo)
 - See which one they use better
 - Problem: be careful about tasks assigned (two tasks must be comparable in difficulty / requirements)
- ◆ Show methodology and questions; find power (sample size necessary) → determined on type of test (repeated measures or between measures) and test (simple t, regression, etc.)
- ◆ Look at SPSS for statistical analysis (Excel is an alternative)
- ◆ Can use class that has seen the site before and compare that to showing site to friends who haven't seen it yet
- ◆ Of 17 people: all have seen site, 2 use the services

PROPOSAL FEEDBACK:

- ◆ Need a seamless flow of ideas (use same tone)
- ◆ Perhaps delegate an editor to ensure same tone / flow throughout paper
- ◆ Continuity
- ◆ Need to read as if never seen document / heard of service before
- ◆ Doesn't need to be technical; explain things along the way (i.e. IP addresses)
- ◆ Use analogies that can help non-technical people relate to the problem / solution
- ◆ Use a table to detail services (offer high level and detailed explanations)
- ◆ Shouldn't need to use large / highly-technical terms to discuss the concepts; should be able to put into own words using analogies and easier to understand examples
- ◆ Flip negativity statements into positive light (show the client the "good")
 - Find the opportunity (there will be a problem, but present it in a positive way)
 - Example: Looking for solution to expand from the target market; open market to wider audience = opportunity for growth
- ◆ Don't lie
- ◆ Introduction is too short (needs to be longer with analogies, etc)
- ◆ User experience: Research on Usability (change this chapter title)
- ◆ Competitor Analysis (change this chapter title)
- ◆ Make chapter 3 ... Research Goals and 3.1 Company Website
- ◆ Executive summary: limit to one page (good preview of the document → overview)
- ◆ What is the business value? Most important detail for judging of project.

- ◆ Research is good if looking to get published
- ◆ Put the business value into executive summary
- ◆ Could shift focus to proposal to get that done before the start of B-Term (methodology and business goals / problems / questions)

MQP Meeting Notes: October 26, 2010

Attendees: Professor Djasmasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Review Meeting Minutes from last meeting (10/12)
- ◆ Progress Report
 - Proposal Document Revisions
 - Methodology Section Feedback
 - B-Term timeline
- ◆ Discuss proposal presentation time/date
- ◆ Grade on banner: SP

Minutes:

- ◆ December 13th is the best date to do study in Professor Djasmasbi's class
- ◆ Look into getting the SPSS statistics software
- ◆ Create script for lab experiment
 - Plan the setup beforehand
 - Run from 2-4pm
 - Be consistent when dealing with subjects
 - Consent form
 - Do we need raffle prizes?
 - How are we going to interview afterward?
- ◆ SUS is used for evaluating user experience for web
- ◆ Find specific design theories
- ◆ Content siloing: virtual vs. directory
- ◆ Show layout of competitors to subjects
 - Look at visual appeal
 - Randomize the order
- ◆ Look into submitting paper to HCI conference in July

MQP Meeting Notes: October 27, 2010

Attendees: Professor Djasmasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss powerpoint
- ◆ Go over the methodology/proposal
- ◆ Discuss proposal presentation time/date

Minutes:

- ◆ Business opportunity: tap into new target market
- ◆ The research goal is to investigate and understand user behavior
 - We will do two studies to investigate
 - Google survey to understand how to get users to site
 - SUS A/B testing to test effectiveness
- ◆ Look into different ways to group content on DynDNS site
 - Virtual silos
 - Look at competition
 - Incorporate best design practices
 - Visual design
 - Moving images
 - Hierarchy of information
 - Human faces
 - Banners
 - Scrolling
 - Navigation
 - Search engine optimization
- ◆ Cite specific papers as evidence for our designs
 - Visual theory
 - Faraday, 2000
 - Djasmasbi et al, 2010
- ◆ Plan to meet with Marissa from Fidelity on 11/16 on WPI campus

MQP Meeting Notes: November 8, 2010

Attendees: Professor Djamasbi (advisor), Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss surveys
- ◆ Go over B term timeline
- ◆ Discuss experiment

Minutes:

- ◆ Marisa from Fidelity will be coming on 11/16
 - Need to email availability to Prof. Djamasbi
- ◆ Google search survey changes:
 - Print out survey and discuss survey with each subject
 - Record the interview
- ◆ Make/finalize scripts for Google search and A/B experiment
 - “It’s possible to access your PC from anywhere, how would you search for this service?”
 - “Do you know of any services that allow you to access your PC?”
 - “What do you use to do this?”
- ◆ Image questions:
 - What is important to you in a website?
 - What do you like?
 - For your first visit, what is most important?
 - What drives you away from a website?
- ◆ Send Prof. Djamasbi the source of current TAM questions
- ◆ Find validated TAM questions for trust
- ◆ Send initial site concepts to Prof. Djamasbi by tomorrow

MQP Meeting Notes: November 10, 2010

Attendees: Cory von Wallenstein (company advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss project goals / progress
- ◆ Discuss silo site concepts
- ◆ Discuss timeline

Minutes:

- ◆ Issues identified on www.dyndns.com
 - No brand recognition
 - What does the company do?
 - Why use the website?
- ◆ Kristen's design:
 - A brief introductory video like dropbox, metaweb
 - Show what users do with DNS
 - Contact Edward Bender @ Dyn to work with marketing consults
 - They are hoping for January release
 - They will be around in late November or December
- ◆ Will's design:
 - Opportunity for remote access growth?
 - No, Logmein controls it
 - Can we monetize users going to Logmein?
 - Silo site as a wizard to help people setup service
- ◆ John's design:
 - Simplify the language
 - People don't know what DNS and hostname mean
- ◆ Brandon's design:
 - Use-case scenarios
 - Resources are already on Dyn website, we need to get people there
 - Get people categorized into goal early
 - Using this goal, direct them toward correct resources
 - Criterion used in decision tree
- ◆ Three pieces in the puzzle:
 - DNS + port forwarding + service
- ◆ Silo site ideas
 - Drive traffic to silo site
 - Use case scenarios
 - Decision-tree flowchart
 - Upsell to dynDNS ninja star
 - Help people get over initial setup hurdles
 - Collect data on success rate for setting up service
- ◆ Assignments
 - 1. How to drive traffic to silo
 - 2. How do we lay out silo to visually convey our message and walk the user through the decision tree
- ◆ Create storyboard for video, use short 30 sec video at whiteboard in meantime

MQP Meeting Notes: November 11, 2010

Attendees: Professor Djamasbi (advisor), Brandon Grace, Kristen Garza

Agenda:

- ◆ Review the mock up for the wizard

Minutes:

- ◆ We went over the proposed mock ups and were able to agree on changes to make before we sent the ideas over to Dyn

MQP Meeting Notes: November 15, 2010

Attendees: Professor Djasmasbi (advisor), Brandon Grace, Kristen Garza, Will Grudzinski, John Wyatt

Agenda:

- ◆ Review the mock up for the wizard
- ◆ Brainstorm ideas for eye-tracking at Fidelity for meeting with Marisa

Minutes:

- ◆ We went over additional mock-up designs for the wizard and obtained feedback from Professor Djasmasbi with changes to make
- ◆ Planned potential eye-tracking studies to discuss with Marisa for study at Fidelity

MQP Meeting Notes: November 16, 2010

Attendees: Professor Djamasbi (advisor), Brandon Grace, Kristen Garza, Marisa Siegel, John Wyatt

Agenda:

- ◆ Review current design
- ◆ Discuss option of eye-tracking study at Fidelity

Minutes:

- ◆ Actively revised silo wizard throughout meeting
- ◆ Tentative dates for eye-tracking over winter break
 - Contact Marisa to expand eye-tracking test scope
 - marisa.siegel@fmr.com

MQP Meeting Notes: November 17, 2010

Attendees: Cory Von Wallenstein (project sponsor), Matt Durazzani, Brandon Grace, Will Grudzinski, John Wyatt, Kristen Garza

Agenda:

- ◆ Discuss signup process changes
- ◆ Go over powerpoint slides of new website design

Minutes:

- ◆ This is our conceptual design for the silo site
- ◆ We grabbed pieces of the current Dyn site and condensed it into a single five step signup process
- ◆ The wizard will cater exclusively to remote access
 - Tell users what they can do
 - Collect needs from user
 - Make recommendations
- ◆ Workflow-specific welcome message via email
- ◆ We will use all the router manufacturers/models from www.portforward.com
- ◆ Deliver the functional requirements and linear flow of the silo to Matt by the end of Thursday, November 18th
- ◆ Work with Matt and Alex to have requirements complete by end of Friday, November 19th

MQP Meeting Notes: November 22, 2010

Attendees: Professor Djamasbi (advisor), Brandon Grace, Kristen Garza, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss submitted mock-up
- ◆ Plans for A/B Study with Professor Djamasbi's class

Minutes:

- ◆ We looked at the final proposal that was submitted to the development team at Dyn
- ◆ Reviewed and finalized plans for the A/B study with Professor Djamasbi's class in mid-December
 - For Monday:
 - Flyer
 - Script
 - Signup method

MQP Meeting Notes: November 29, 2010

Attendees: Professor Djamasbi (advisor), Brandon Grace, Kristen Garza, John Wyatt

Agenda:

- ◆ Discuss game plan for Cognitive Walkthrough experiment
- ◆ Marissa – Fidelity
- ◆ Google Search Survey Progress

Minutes:

- ◆ Game Plan
 - ◆ - 3 rooms
 - ◆ - 20 min experiments
 - ◆ - total 28 students
 - ◆ - Dec 13th 2-4
 - ◆ - need computers, camtasia set up, audio set up
 - ◆ - scheduling contact me
- ◆ Marissa
 - ◆ - email her to schedule eye tracking things
- ◆ Google Search
 - ◆ - google search survey – did a few and they aren't giving us anything useful, we're going to have to change it/tweek it

MQP Meeting Notes: December 1, 2010

Attendees: Cory Von Wallenstein (company sponsor), Brandon Grace, Kristen Garza, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss game plan for Cognitive Walkthrough experiment
- ◆ Discuss eye-tracking experiment with Cory
 - Once we get silo, will send to Marisa (Fidelity) and formulate best method for study
- ◆ Google Search Survey Progress (sent email out this AM, possibly have preliminary results by meeting time)
- ◆ Check status of silo site (anything we need to do?)
- ◆ See if there's anything else Cory sees that should be happening right now

Minutes:

- ◆ Ran through the live silo wizard
- ◆ Suggested changes to the developed silo
- ◆ Must make any changes to the site before tomorrow because it gets pushed through live and we can't make any more changes because of the moratorium
- ◆ We can continue to make changes to show in the lab but can't go live
- ◆ For the experiment we actually must use the live site because we can't use the dev site (would need to have VPN on the computers)
- ◆ Lab users should use the username "WPI-____"
- ◆ Can give voucher to the first 30 people for 15 dollars
- ◆ Must send Corey the emails of these people
- ◆ We then gave live updated on survey and eye tracking
- ◆ Action Item: Must send link to djam and marissa when it goes live

MQP Meeting Notes: December 6, 2010

Attendees: Professor Djamasbi (advisor), Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss upcoming experiment with class
 - Send script to professor
- ◆ Discuss silo website developed by Dyn

Minutes:

- ◆ Professor's feedback of silo site
 - Company identity (colors, styles, etc)
 - Images on landing page
 - Maybe use Flash for landing splash?
 - WPI can develop and give packed animation
- ◆ Discussed ways to solve above issues
 - Changes to live site at Dyn?
 - Obtain copy to put on WPI server for our own testing / development (and trials if can't change Dyn site)
- ◆ Need to send script ASAP

MQP Meeting Notes: December 8, 2010

Attendees: Matt Durazzani (company sponsor), Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss Professor's feedback of silo site / Explain experiment on Monday
 - Company identity (colors, styles, etc)
 - Images on landing page
 - Maybe use Flash for landing splash?
 - WPI can develop and give packed animation
- ◆ Discuss ways to solve above issues
 - Changes to live site at Dyn?
 - Obtain copy to put on WPI server for our own testing / development (and trials if can't change Dyn site)

Minutes:

◆

MQP Meeting Notes: December 9, 2010

Attendees: Professor Djamasbi (advisor), Brandon Grace, Kristen Garza, Will Grudzinski, John Wyatt

Agenda:

- ◆ Discuss upcoming experiment with class
- ◆ Discuss silo website developed by Dyn

Minutes:

- ◆ Adapt SUS to our needs
 - Modify questions
 - Focus on the process, not the system
- ◆ Remove TAM from experiment, too timely and doesn't add enough value
- ◆ There are two aspects to focus on for the information gathering:
 - Is the service useful to the user?
 - The processes (signup process, wizard)
- ◆ Restrict the current website group to homepage only (www.dyndns.com)
- ◆ Some questions to ask:
 - Which step was the hardest?
 - Do you think the process was complex?
 - What did you like/dislike?
 - Aesthetics
 - Wording
 - Interestingness
 - Trust that website provides good service
- ◆ We should send reminders to participants

MQP Meeting Notes: January 14, 2011

Attendees: Soussan Djammasbi (faculty advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ **Welcome back!**
- ◆ **Tentative C-term Timeline**
 - **Week 1:**
finish video conversion
 - **Week 2:**
Develop funnel types for videos and surveys
 - **Week 3:**
Funnel analysis
 - **Week 4:**
Funnel analysis
Findings from data
 - **Week 5:**
Final draft 1 of paper
Draft of final presentation
 - **Week 6:**
Revision
Final changes to Presentation and begin practice
 - **Week 7:**
Final changes
- ◆ **Types of analysis**
- ◆ **Additional advisor topics?**

Minutes:

- ◆ Video conversions
 - Will be completed this weekend
- ◆ Marissa may have run Dyn website in an eye-tracking study
 - Professor to check with her
- ◆ Professor Djammasbi plans to use Dyn in her class this term so if we need another study group we can use Professor Loicono's class
- ◆ Analysis of Data:
 - Run a t-test for SUS of users vs users of existing site
 - Qualitative analysis (interviews)
 - Examine the three root questions with two sub-questions
 - Come up with percentages (i.e. people who say is vs those who didn't like it)
 - Dyn will probably only want to look at the means
- ◆ Examine what people like and don't like
 - i.e. don't like clutter on the webpage
- ◆ Get to analysis ASAP to get to interpretation of data (business value) → MOST IMPORTANT
- ◆ Need to create a poster this term for presentation (focus on business value, how many new customers, etc. – don't focus on technology)
- ◆ Letter of Acknowledgement (part of MQP document)
 - From Jeremy or Cory to Professor
 - Outline project, what it meant to the company, etc.
 - If more than one person wants to write one, not a problem
 - Outline that letter makes us more competitive and helps get Dyn's name out there
 - Can show previous letters if desired
- ◆ Communication will be key this term (to ensure finishing on time)
- ◆ Professor Djammasbi will be on campus on Tuesdays and Fridays this term
- ◆ MQP Docs
- ◆ Document (paper):

- No bulleted lists
 - Instead use tables or figures
 - Tables: captions on top
 - Figures: captions on bottom
 - Be sure to include a table of tables and table of figures
- ◆ Check with Dyn to see if there is any data they do not want disclosed

Deliverables:

- ◆ Videos of trials
- ◆ Answer from Marissa regarding eye-tracking
- ◆ Book a room in the Campus Center for final presentation in C-Term

MQP Meeting Notes: January 19, 2011

Attendees: Kristen Garza, Brandon Grace, Will Grudzinski, Cory

Agenda:

- ◆ **Update on Status of Lab**
- ◆ **Tentative Academic C-term Timeline**
 - **Week 1:**
Video conversion, Transcribing Interviews
 - **Week 2:**
Data aggregation for videos and surveys, T-Test for SUS, Compare interview answers to root questions
 - **Week 3:**
Further analysis, Results inserted into the paper
 - **Week 4:**
Further analysis, Analysis sections inserted into the paper
 - **Week 5:**
Final draft 1 of paper/Revisions
Draft of final presentation
 - **Week 6:**
Final changes to Presentation and begin practice
 - **Week 7:**
Turn in Paper online, CDR, Presentation
- ◆ **Dyn's Expectations**
- ◆ **Is there any information that is private that you do not want to have in the paper?**

Minutes:

- ◆ Will give a reminder on the lab that we completed before break
- ◆ Tentative C-Term Timeline for Dyn
 - **Week 1-2:** Video Conversion, Data Aggregation, SUS T-Test, Initial Findings
 - **Week 3:** Feb 2nd – Group to visit Manchester to present initial findings, meet with design team
 - **Week 4:** Further Analysis, Possible Design Week
 - **Week 5:** Possible Design Week
 - **Week 7:** Final Presentation on March 2nd, 3rd, or 4th
- ◆ We may be able to work with the design team for 1-2 weeks on sprucing up graphics, using subjective feedback from sessions
- ◆ Cory said that the only information that would need to be approved to be put in the paper would be financial numbers.
- ◆ Will be communicating half way: a draft of what the results will look like in the final paper
- ◆ Send an invite about final presentation days ASAP

MQP Meeting Notes: January 21, 2011

Attendees: Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt, Advisor: Professor Djamasbi

Agenda:

- ◆ **MQP Document Updates**
 - ◆ **What do the “????” mean?**
- ◆ **SUS T-Test Analysis**
- ◆ **Transcription of interview questions (in progress)**
- ◆ **Proposed Changes to the Silo**
- ◆ **Meeting/Discussion with Dyn**

Minutes:

◆

MQP Meeting Notes: January 28, 2011

Attendees: Professor Djamasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ **New SUS calculations**
- ◆ **T-test data**
- ◆ **Transcript data**
- ◆ **Silo suggestions**
- ◆ **Quick Takeaways from 12/13 experiment**

Minutes:

- ◆ Professor has been unable to get in contact with Marissa regarding eye-tracking tests due to weather; hopes to find out more this week
- ◆ New SUS
 - Case analysis (look at interviews and figure out why they rated something the way they did)
 - Use these findings to enrich the document report to Dyn
- ◆ T-Test Data
 - Determine power (80 or higher → pretty good chance there is no phenomenon; <80 → Sample size too small)
 - Be sure to look at both interviews and the data
 - “Below standard of usability” or “Room for improvement”
- ◆ Transcriptions
 - [Notes were taken on the printed copies of the Excel data document, clarification to follow]
- ◆ Google: Population calculators (proportion of successes) → Silo vs. current
- ◆ Trust / Appeal papers published by Professor (cite these in the document)
- ◆ Quick Takeaways
 - Needs to have the look and feel of Dyn’s main website
 - Make recommendations that are data driven
 - Can make projections based on these recommendations
 - Need a better path for new users on homepage

MQP Meeting Notes: February 8, 2011

Attendees: Professor Djamasbi (advisor), Kristen Garza, Brandon Grace, Will Grudzinski, John Wyatt

Agenda:

- ◆ **Eye Tracking Analysis and Heat Map**
- ◆ **Review Meeting with Cory on Thursday and Outcomes**
 - **Video Presented to Dyn**
- ◆ **New T-test data**
- ◆ **Finished Charts**
- ◆ **Timeline – On Track!**
 - **Next step is to apply knowledge learned to root questions and start sections of the paper**

Minutes:

- Look at the impact of visual appeal on perceived ease of use
- Compare the visual appeal scores of silo vs. current site
- Silo appears to be easier process, but lacks the visual appeal and trust needed
 - DynDNS site appears much more credible than silo
 - This is crucial for new users to attempt it
- Send Professor the URL to the videos
- We should have 2 CDs of the MQP data:
 - #1: the master key, containing all MQP document, analysis, and raw data
 - #2: no raw data, used for presentation (video DVD)
- SUS scores low, but this means there is lots of room for improvement
- Talk to Cory about the presentation

12.8. MQP Presentation



Dynamic DNS Web Usability for a Target market



Sponsor:

Jeremy Hitchcock, CEO, Dyn Inc.

Cory von Wallenstein, VP Product Management, Dyn Inc.

Advisor:

Professor Djamasbi

Kristen Garza
Brandon Grace
William Grudzinski
John Wyatt

Worcester Polytechnic Institute

- Business Opportunities
- Goals of the Project
- Background Information
- Methodology & Results for:
 - Study I: Google Search Ranking
 - Study II: Silo Implementation and Testing
 - Study III: Eye Tracking Study
- Recommendations
- Questions

2

- Dyn offers services for mail and port forwarding, dynamic IP management
- This market is saturated
- Dyn is trying to reach new target market – non-network savvy people



3

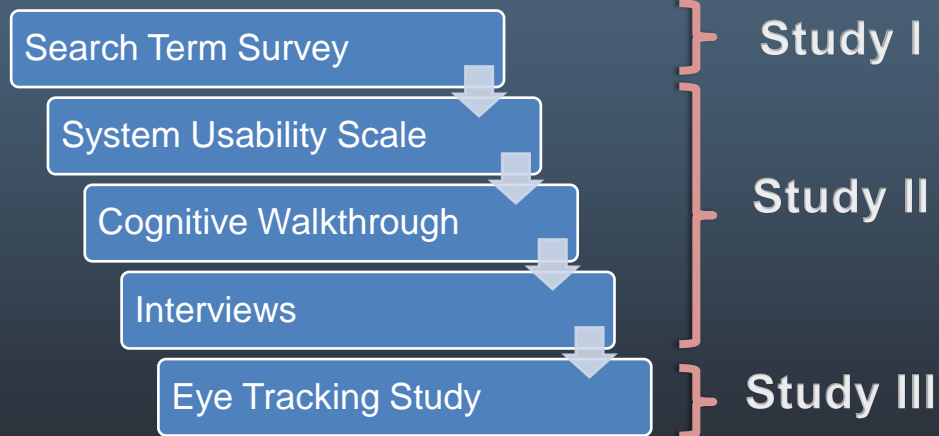
Dyn's Goals

- Achieve a net growth of users by attracting new users to Dyn Inc. services
 - Examine ways to make Dyn's services easier to access, utilize, and understand
 - Increase Dyn's reach to different markets

MQP Research Questions

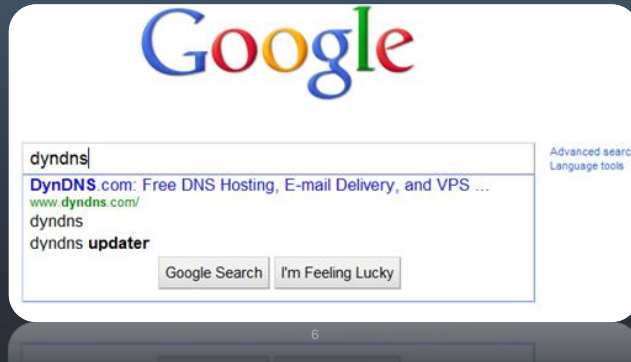
- How can technical sites effectively convey services?
- How can we reach the typical population?
- How can Dyn better direct customers to services?
- How can Dyn encourage paid services?

4



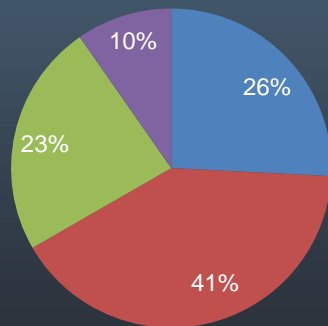
5

- Objective: Understand which terms the different demographics of users are using in searches



Search Terms

- General Terms
- Remote Desktop Keywords
- No Terms Given
- Competitor Services



- Proposed silo website to cater to new users
 - Reach the non-network savvy users
 - Direct customers to individual services
 - Encourage paid services after signup
- Objectives of study:
 - Gauge successfulness of prototype
 - Make recommendations to improve the user experience of DynDNS website and silo

8



DynDNS.com
by Dynamic Network Services Inc.

Learn about what FREE remote access can do for you!

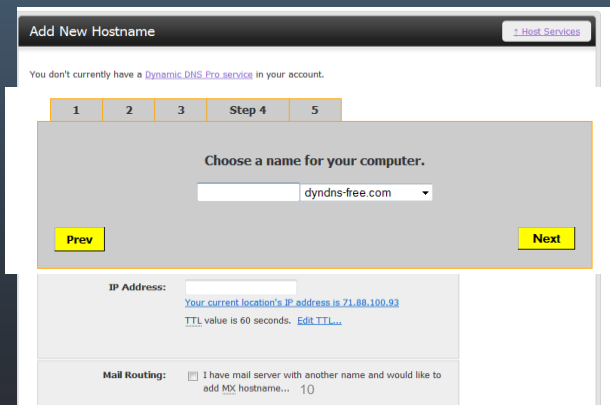
[Get Started!](#)

Access - Remotely use up to three of your computers from anywhere in the world

Easy to use - Interact with your computer remotely as you normally would

Remote Desktop	Share your files	Listen to your music	Get remote assistance	Share your screen
--------------------------------	----------------------------------	--------------------------------------	---------------------------------------	-----------------------------------

- Streamline the signup process
- Simplify the technical steps



- Participants & Design
- Measurements:
 - Cognitive walkthrough
 - System Usability Scale
 - Interviews





Results – Cognitive Walkthrough

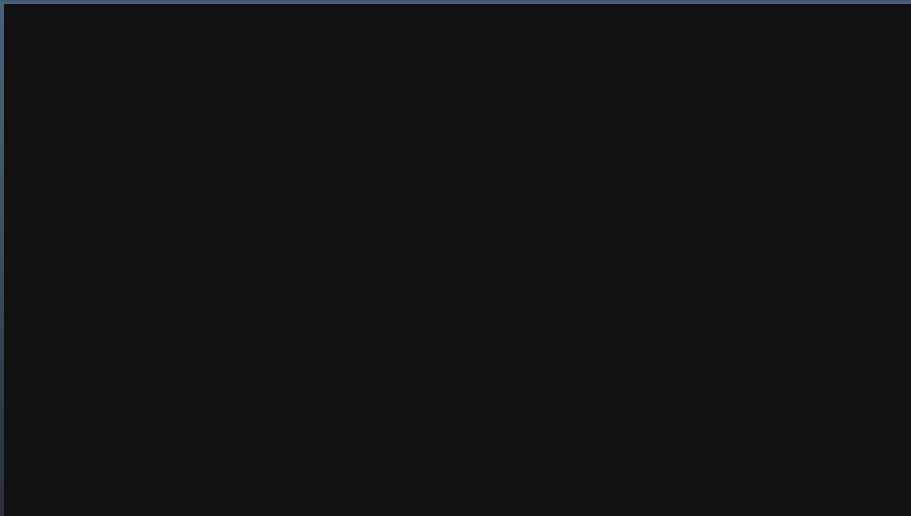
- Identified simple usability issues
- Studied the users' behavior as they completed three tasks
- Assessed the effectiveness of the silo in getting users started with remote access



12



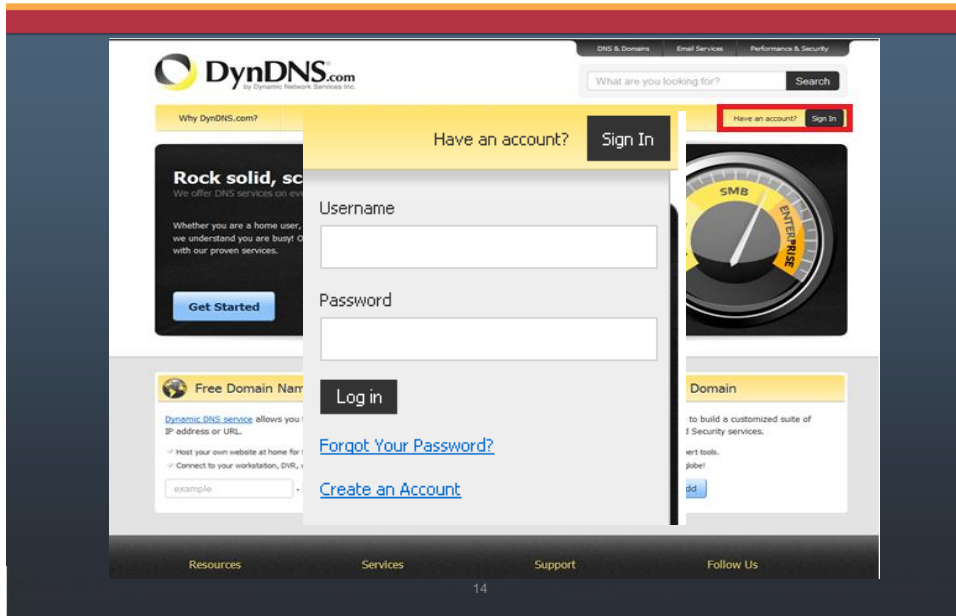
Cognitive Walkthrough Video



13



WPI Usability Opportunities in Website



Results – SUS survey

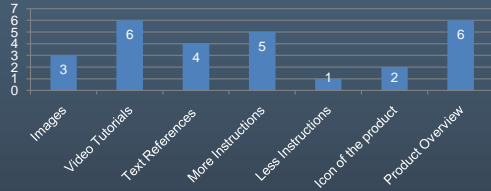
- Average score of silo: 38.5
- Average score of website: 44.1
- Importance of visual appeal & trust



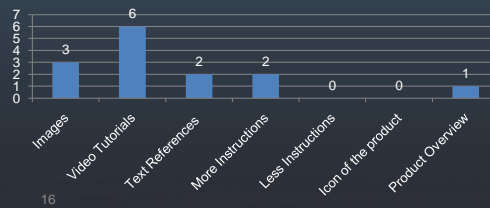


Results - Interview Questions

Question 6: Current Site (What would have improved the experience?)



Question 6: Silo Site (What would have improved the experience?)



Results - Interview Questions

Question 9: Current Site (Would you trust this company to give you good and reliable service?)



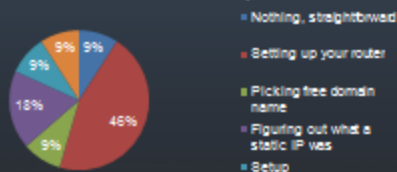
Question 9: Silo Site (Would you trust this company to give you good and reliable service?)



Question 10: Current Site (What was the hardest part while completing the three tasks?)

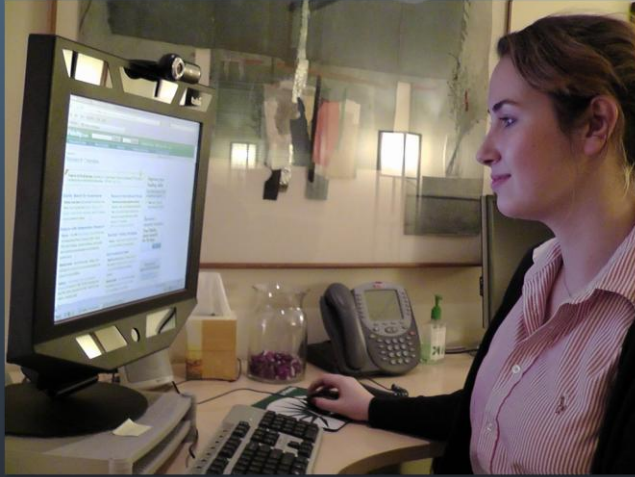


Question 10: Silo Site (What was the hardest part while completing the three tasks?)

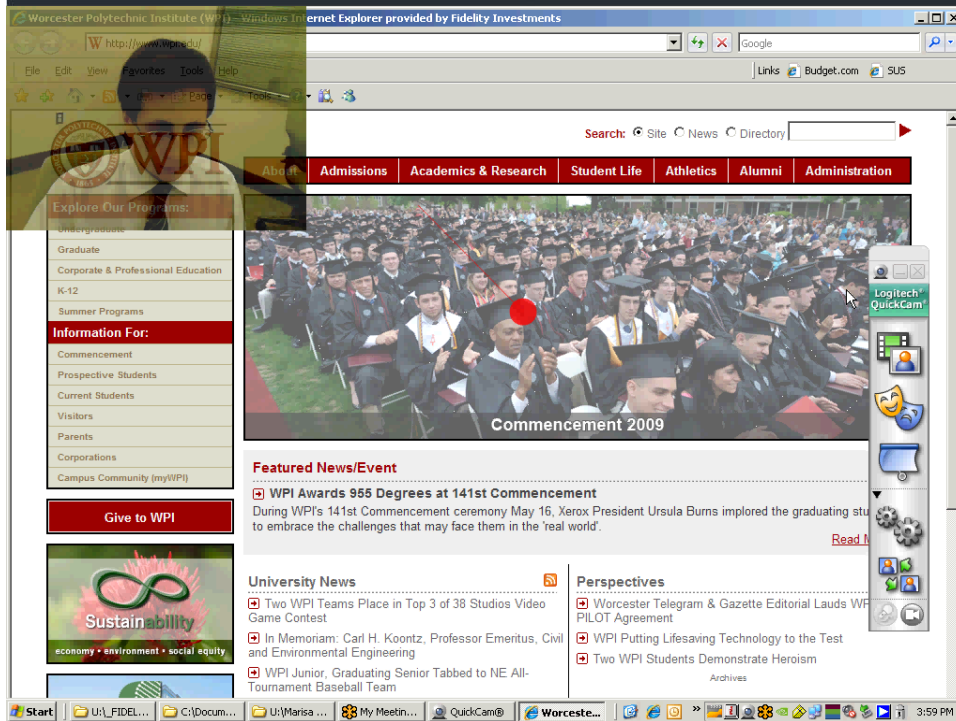


Goals of Study III

- Objective:
 - Perceptions of browsers in regards to visual appeal and ease of use
 - Users' gaze can help better explain which parts of the websites are viewed by users and attract more attention
 - Population change to professionals
- Participants & Design
 - Random assignment to 1 of the 2 websites
 - While browsing eyes were tracked for 10 seconds
 - 2 Survey questions

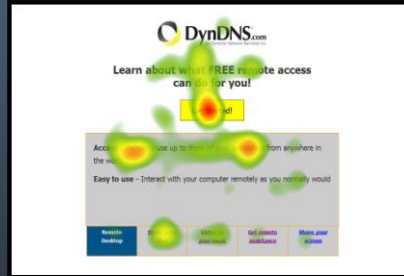


20



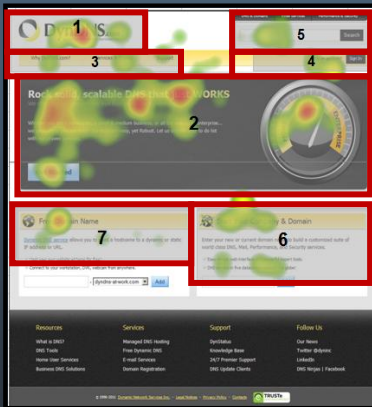
The screenshot shows a Windows Internet Explorer browser window displaying the Worcester Polytechnic Institute (WPI) website. The browser's address bar shows the URL <http://www.wpi.edu/>. The website content includes a navigation menu with links for Admissions, Academics & Research, Student Life, Athletics, Alumni, and Administration. A large banner image for 'Commencement 2009' is visible, with a red dot indicating an eye-tracking point of interest on a student. Below the banner, there is a 'Featured News/Event' section with the headline 'WPI Awards 955 Degrees at 141st Commencement'. The website also features sections for 'University News' and 'Perspectives'. The Windows taskbar at the bottom shows the Start button, several open folders, and the system clock displaying 3:59 PM.

Study III Results - Heat Map



22

Results - Order of Fixation & Fixation Length



23

Results – Fixation Distribution



24

Study III Results - Surveys

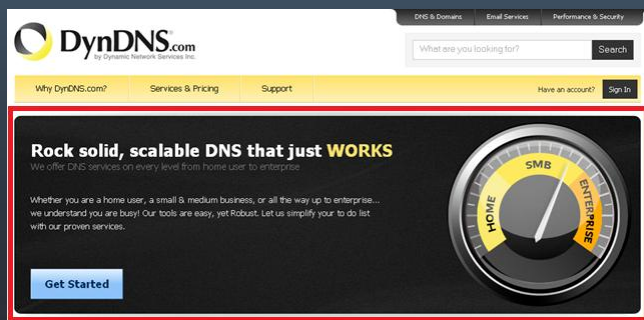
- Users were asked to:
 - Rate the visual appeal of the page
 - Rate how easy/difficult they thought it would be to use
- Outcomes
 - Ease of use rated higher for website
 - Visual appeal rated higher for website
 - Users found the more appealing website easier to use

25

- All aspects of the interaction with website are part of the user experience
- Strategies for attracting typical users to Dyn's services
- Importance of homepage in conveying the services offered and value gained

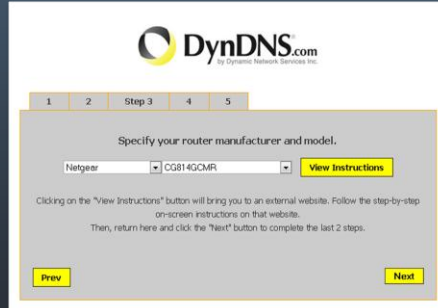
26

- More informative landing page
- Direct path for account creation
- More contextual aid through images, video, descriptive text



Silo Recommendations

- Incorporate visual appeal
- Include all port forwarding info within the silo wizard
- Gain credibility by making silo appearance more like DynDNS.com



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Acknowledgements

Special Thanks to:

Professor Soussan Djamzabi, Faculty Advisor
Marisa Siegel, Fidelity Investments

And everyone we worked with at Dyn!

Jeremy Hitchcock
Cory Von Wallenstein
Matt Durazzani
Alex Sergejev
Ryan Nicholson
Erik Linstad

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12.9. MQP Poster



Dynamic DNS Web Usability for a Target Market

Kristen Garza, Brandon Grace, William Grudzinski, Jr., John Wyatt
Advised By: Professor Soussan Djasasbi



Abstract

This project examined the usability of the DynDNS website and specifically investigated the process of signing up for services. To achieve the company's goal of attracting new users, particularly those who are not experts in networking, the MQP team examined ways to make Dyn's services easier to access, utilize and understand. These examinations were carried out through three laboratory experiments, including an eye tracking study. Through the analysis of the results of these experiments the MQP team provided recommendations to improve the usability of DynDNS' current website as well as recommendations to improve the processes of signing up for services.

Business Opportunity

- Dyn offers services for mail and port forwarding as well as dynamic IP management
- This market has been saturated
- Dyn is trying to reach a new target market: that consisting of non-network savvy people. This will offer the opportunity to increase revenue as more customers sign up for the services.



Project Goals and Objectives

The main goal of Dyn, Inc. is to achieve a net growth of users by attracting new users to Dyn Inc. services. To help Dyn Inc. to achieve this goal we focus on two sub-goals:

Silo Website

The first was to make Dyn Inc's services easier to access, utilize and understand with a silo website. We made it easier for users to find out what each service does, where to sign up, and how the services will solve their problems. This goal streamlined the signup process and adds a valuable introduction to the services offered by Dyn Inc. in regards to remote desktop access. The MQP team proposed several designs for the creation of a silo website. Then, based on the recommendations, Dyn Inc. picked one and developed a silo site for implementation. After this site was completed, the group conducted several studies to examine the usability of the process of the site and compare users' intention to use Dyn Inc's services based on the changes to the site.

Increase Reach to Different Markets

The second sub-goal our research achieved was to increase Dyn Inc's reach to different markets, specifically the non-network savvy population who have specific tasks like setting up a remote desktop connection and file sharing. We appealed to the typical users that might not understand how Dyn Inc. can solve their problems. We approached this goal by conducting studies on non-technical users' Google search patterns for remote desktop needs.



Study I: Google Search Term Survey

Objective: Understand which terms the different demographics of users are using in searches

Design: Users were asked a series of questions and how they would go about searching for answers using an online search engine, such as Google.

Results:



Study II: Cognitive Walkthrough and Interviews

Objectives: To gauge the successfulness of the silo website prototype and to make recommendations to improve the user experience of DynDNS website and silo site

Design: This study consisted of three parts in which users were asked to walk-through tasks on the existing or proposed websites, answer a System Usability Score about the experience, and then interview questions.

Results:

Cognitive Walkthrough	<ul style="list-style-type: none"> - Identified simple usability issues - Studied the users' behavior as they completed tasks - Assessed the effectiveness of the silo in getting users started with remote access
SUS Survey	<ul style="list-style-type: none"> - Average score of silo: 38.5 - Average score of website: 44.1 - Showed the importance of visual appeal and trust
Interview Questions	<ul style="list-style-type: none"> - Many users expressed an interest in tutorial videos - Users of the current website were very trusting of Dyn while those who used the silo were not - Current site does not offer info on company services

Acknowledgements

Special Thanks to:

Professor Soussan Djasasbi, Faculty Advisor
Marisa Siegel, Fidelity Investments

And everyone we worked with at Dyn!

Cory Von Wallenstein
Jeremy Hitchcock
Matt Durazzani
Alex Sergeyev
Ryan Nicholson
Erik Linstad

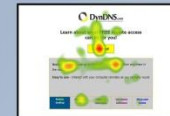


Study III: Eye-Tracking

Objective: Discover the perceptions of browsers in regards to visual appeal and ease of use. Users' gaze can help better explain which parts of the websites are viewed by users and attract more attention. This data supports previous research

Design: This study consisted of a random assignment to one of the two websites. While browsing, eyes were tracked for ten seconds. Users were then asked two survey questions.

Results: Users rated the ease of use and visual appeal higher for the current website. This was because users found the more appealing and professional website to be easier to use, even though the silo process was more streamlined.



Contributions

The practical implications of this project are clear when compared to our goals the project team set out to achieve. The main goal of our research for Dynamic Inc. was to make recommendations to improve the user experience of the DynDNS.com website and the silo website, thereby attracting new users to Dyn Inc. services and leading to increased market share.

- To do this the project team took two steps:
- First was to make Dyn Inc's services easier to access, utilize and understand with a silo website.
 - Second was to understand the reaction of the non-network savvy population to Dyn's website who have certain tasks like setting up a remote desktop connection and file sharing in mind.



Recommendations

Current Website

- More informative landing page
- Direct path for account creation
- More contextual aid through images, video, and descriptive text

Silo Website

- Incorporate visual appeal
- Include all port forwarding information within the silo wizard
- Gain credibility by making silo appearance more like DynDNS.com