Project Code: IQP-BXT-0902

Improving Patient Data Management and Family Reach-out for the R.E.A.C.H. Program

An Interactive Qualifying Project Report
Submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
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Abstract

Our goal was to improve the R.E.A.C.H. program's patient record management and family reach-out using technology. We used an agile development methodology (Scrum) to guide our design and development process. Using Java and the NetBeans development platform, we constructed an application that stores all patient information, keeps track of scheduling, and produces reports in a timely and efficient manner. Now, the staff can focus less on paperwork and more on building solid foundations for successful families.

Acknowledgement

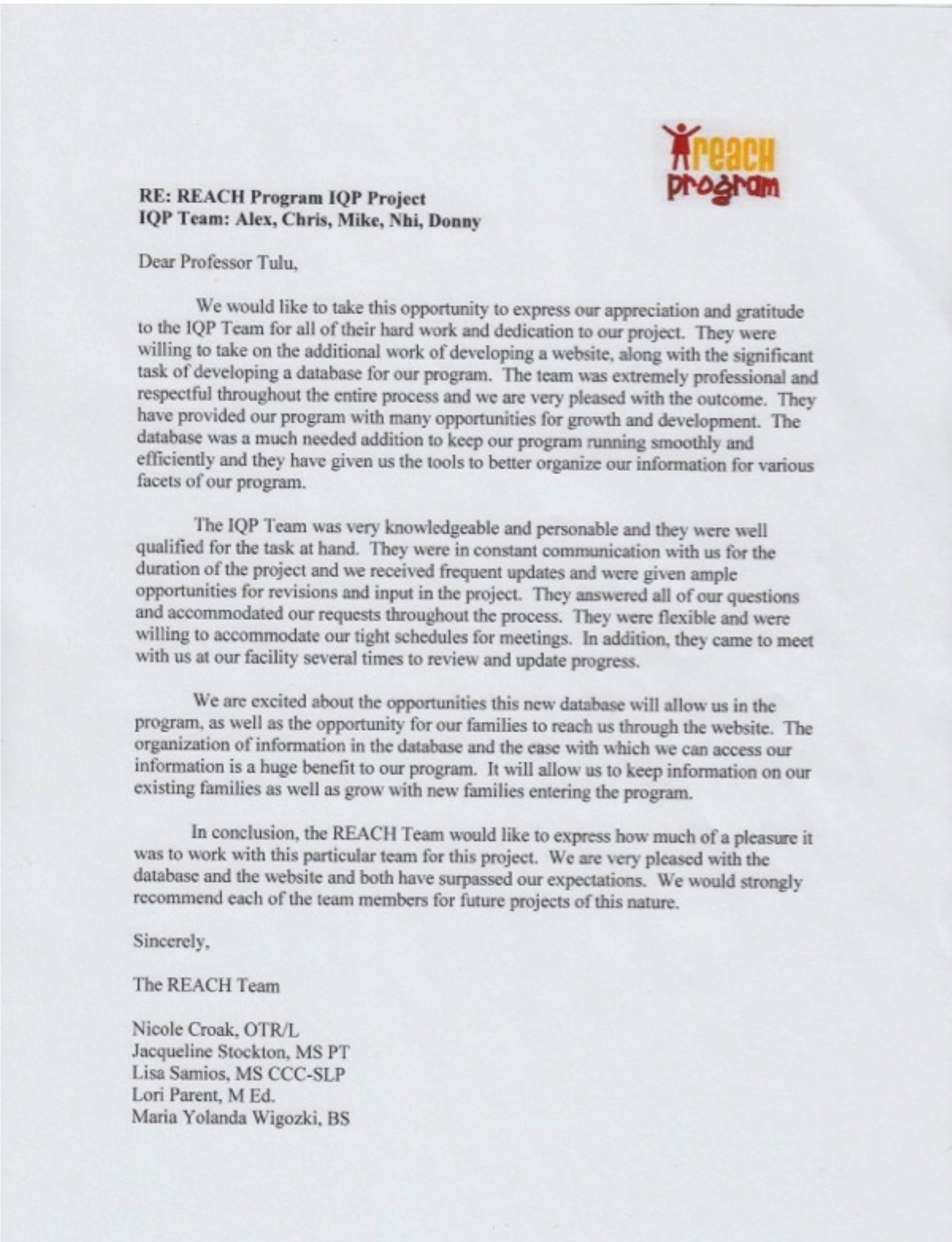
Regarding the Managing Patients' Information R.E.A.C.H. Project, conducting it would not be possible without the help of many people to whom we are extremely thankful. We would like to express our sincere gratitude to the staff of the R.E.A.C.H. Program: Nicole Croak, Jacqueline Stockton, Lisa Samios, Maria Yolando and Lori Parent.

In improving the website design as well as the applications and sprint meetings results, we have received many helpful comments from the staff. They helped us by giving us feedback on where we need to improve during development, and observing issues that they ran into during training and the interview.

We greatly appreciate Jacqueline Stockton (Jacquie) and Lisa Samios, who were our main contacts for the R.E.A.C.H. Program. Jacquie provided us with many great comments on the project application and website. Also, thank you to Lisa and Jacquie for their participation and support; they were always contributing essential information and feedback at every meeting.

The most important person of all people who have helped our team in the early stage of the project is Prof. Bengisu Tulu. Special thanks to Prof. Tulu for her excellent advising from the very first to the final steps in conducting the work leading to this project. She is an excellent project advisor in many aspects and a warm and cheerful supporter. During the process of the research, her pertinent and useful advice has helped us focus on the key issues, sharpen our perspectives, improve the design of the website, and greatly enhance the quality of the analytical teamwork.

Sponsor Support Letter



reach program

RE: REACH Program IQP Project
IQP Team: Alex, Chris, Mike, Nhi, Donny

Dear Professor Tulu,

We would like to take this opportunity to express our appreciation and gratitude to the IQP Team for all of their hard work and dedication to our project. They were willing to take on the additional work of developing a website, along with the significant task of developing a database for our program. The team was extremely professional and respectful throughout the entire process and we are very pleased with the outcome. They have provided our program with many opportunities for growth and development. The database was a much needed addition to keep our program running smoothly and efficiently and they have given us the tools to better organize our information for various facets of our program.

The IQP Team was very knowledgeable and personable and they were well qualified for the task at hand. They were in constant communication with us for the duration of the project and we received frequent updates and were given ample opportunities for revisions and input in the project. They answered all of our questions and accommodated our requests throughout the process. They were flexible and were willing to accommodate our tight schedules for meetings. In addition, they came to meet with us at our facility several times to review and update progress.

We are excited about the opportunities this new database will allow us in the program, as well as the opportunity for our families to reach us through the website. The organization of information in the database and the ease with which we can access our information is a huge benefit to our program. It will allow us to keep information on our existing families as well as grow with new families entering the program.

In conclusion, the REACH Team would like to express how much of a pleasure it was to work with this particular team for this project. We are very pleased with the database and the website and both have surpassed our expectations. We would strongly recommend each of the team members for future projects of this nature.

Sincerely,

The REACH Team

Nicole Croak, OTR/L
Jacqueline Stockton, MS PT
Lisa Samios, MS CCC-SLP
Lori Parent, M Ed.
Maria Yolanda Wigozki, BS

Authorship

Alexander Becker, Michael Gheorghe, Christopher Cullinan, Nhi Vo and Zijian Xia all contributed equally to the research and writing of this report. The following is a breakdown of how the report was written for this project.

Alexander Becker

Alexander Becker (Alex) served as one of the primary website developers for the project. He was the main researcher in the methodology part. He was a Scrum leader and chair to design the sprint plans. He wrote the background, methodology of Scrum and the Sprint results. He contributed to weekly term meetings and meetings with the sponsors. Alex developed application GUI and designed the Java Applet. He worked as one of the main developers of the application. He also contributed to the website design with Chris and Michael. Alex also made the ER Diagram and Relational Model as the primary design elements. He successfully put the final polish on the format of the report and animation of power point. He was the main proof read editor for the final report and eliminated large numbers of grammatical and typographical errors.

Christopher Cullinan

Christopher Cullinan (Chris) contributed to the abstract, summary of background, the plan overview of methodology and mostly constructed the format of reference. He helped Alex and Michael to design the GUI and Java Applet. He contributed to weekly term meetings and meetings with the sponsors. Furthermore, Chris was the primary person who kept track of the product backlog. He also interviewed one of the R.E.A.C.H. staff (Lisa) to train her to use the application skillfully. He contributed to the website design with Michael and Alex.

Michael Gheorghe

Michael Gheorghe coordinated with Alex Becker to design the database. He contributed to the application code with Chris and Alex. He mainly researched in the Drupal; wrote the summary of methodology part; website design, application development in the result and recommendations. Michael was in charge of updating and installing the application on the staff's computer. He contributed to weekly term meetings and meetings with the sponsors.

Nhi Vo

Nhi Vo served as one of the primary writers and editors for this report. She was responsible for the background and literature research and provided edits and formatting of all writing. Nhi wrote the comparison of three examples of non-profit websites, acknowledgement, user manual and results of interviews. She cleverly combined text, figures, and tables in designing each of the chapters. She managed all the documentation and files that need to be uploaded to student sharepoint website. She also made the primary power point and organized the schedules of every sprint meeting from A term to C term. Nhi also interviewed Jacqui and trained her to use the application successfully. She communicated with all teammates and professor and kept contact with sponsors. She attended and contributed to weekly term meetings and meetings with sponsors.

Zijian (Donnie) Xia

Along with Nhi Vo, Donnie was also a primary writer for this report. He researched System Development Life Cycle, Java Applet and Interview Protocol. He wrote the background of executive summary, usability test, user manual and conclusion. Donnie put the final polish on the raw material of the reference. He contributed to weekly meeting and meeting sponsors. He also interviewed the staff and trained them to use the application at the second sprint meeting in C term. He kept track of the project timeline and reminded team members to finish their tasks on time. He improved and developed the resources to write the report.

In addition to writing individual sections of this report, Alex Becker, Michael Gheorghe, Chris Cullinan, Nhi Vo and Zijian (Donnie) Xia as a group established the project objective, determined conclusions and recommendations, and edited the report for content, grammar, and flow.

Executive Summary

R.E.A.C.H., a non-profit organization that helps families with new born children through child development, has had very little technology support in reaching out to families, and managing patient information. Although R.E.A.C.H. program had a website, it required a professional website developer to update the pages. Furthermore, R.E.A.C.H. program staff used hand-written documents to organize and manage patient information, which is not only prone to errors, but it is also extremely difficult to analyze when producing progress reports. To make matters worse, due to the expansion of the program, it was becoming increasingly difficult to maintain data.

Our IQP group was determined to solve these problems by jump starting R.E.A.C.H. program's website, and making data management easier by developing an application that helps administer patient information. In order to determine the most suitable solutions, we had to research common practices used in the professional world and findings of the scholarly literature regarding website design, current tools, and effective methodologies.

Our research concluded that website design needed to have an attractive theme and a simple structure that conveyed the following information easily: mission and goals, contact information, and customer services. Furthermore, of the tools that we researched, we determined that the Drupal platform, a free and expandable website content management system, provided solutions to all of program's website needs. As for the application, we found five effective and modern tools that would help us develop a solution: Java - a well known universal programming language, Netbeans - a developer editor, SourceForge, - a web based software management tool used as a source code repository, Subversion - a project backup manager, and DotProject - an open source project management tool.

We researched various SDLC (Systems Development Life Cycle) methodologies such as Waterfall Development, Rapid Application Development, and Agile Development. Ultimately, we chose a variant of Agile Development called SCRUM. This methodology fit our group well since it was designed for groups of five to nine people that filled certain roles, such as a team leader, and a product owner. The development cycle is split into intervals called sprints, which are normally between one week and one month. SCRUM also requires the team to maintain lists of tasks. The two main types of artifacts are the Product Backlog and the Sprint Backlog. The product backlog is a general list of tasks that are chosen for each sprint in the Sprint Planning Meeting, and those tasks are split into an even more manageable list of tasks called a sprint backlog. Although this is a fantastic methodology, we made certain alterations to make this methodology fit our group's needs better.

Over A and B term, we met with the R.E.A.C.H. staff to gather the requirements for the website and patient manager application. During these meetings we presented the work we did over the sprints, asked staff what they needed from the website and the application, what they liked about the features provided in the application and the website, and if they disliked any of the current functionality. As a result, we designed a new website structure that had simple editing functionality, and we developed a new modular based patient manager application that stores patient information, maintains scheduled appointments, tracks activity attendance, and generates reports.

Once all of the fields in the program functioned properly, we began internal usability testing, and created a user manual as well as some developer documentation describing the structure of the program. Next, we trained the staff on how to use the program and then conducted interviews with the R.E.A.C.H. staff to determine how easy to use and useful the program was. Ultimately, the staff liked the application because it was user friendly and straightforward. We addressed the few minor user interface issues that came up during the interviews in our final version of the application, and released the website and application to the R.E.A.C.H. program.

We hope this new website will attract many more families to the R.E.A.C.H. program and the R.E.A.C.H. Patient Manager application will improve the staff's efficiency at handling patient information and will help them better serve the families in the program. However, these tools can always be improved upon. We developed two recommendations to guide the future development. First, we believe that the website could become more interactive. Adding a forum module or a blog could improve family satisfaction. Second, although the patient manager application is quite stable, it could go through more extensive testing. We recommend that the R.E.A.C.H. staff create a record of issues they have run into as well as a list of new features they would like added, and then find a qualified developer to implement the changes. Despite the room for improvement, we believe that we have significantly improved the R.E.A.C.H. program's methods for reaching out to customers and handling patient information, and expect them to expand even more over time.

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Chapter 1. Introduction

The R.E.A.C.H. Program is a non-profit health organization, based in St. Elizabeth's Medical Center in Boston that provides developmental support services to families with newborns and toddlers. The volunteer staff is dedicated to helping these families by scheduling developmental screenings and play-group sessions, assigning immunization dates, and providing opportunities to newborns to facilitate their normal development. Many families rely on this program to be a vital tool in their child's upbringing. As the program expanded, the budget and time constraints made it increasingly difficult for the staff to keep track of scheduling and patient information while maintaining the ability to communicate with the public and the program's families. This difficulty hindered the program and was not allowing it to rise to its full potential.

Last year, an IQP group from WPI developed a website design for the R.E.A.C.H. program as shown in Appendix A. They wanted to increase communication with more families and allow staff members to more effectively do their job with fewer obstacles. Then it became our task to implement and improve upon this new website design prototype to help this organization with propagating their program and groups while expanding their awareness.

One of the primary obstacles that consumed enormous amounts of time in the staffs schedule was maintaining their notebook of patients' information. The staff would often have to stagger through this large, cumbersome notebook, which is a time-consuming and potentially error-prone process. There were two challenges that faced our team. One was to provide a solution for their completely paper-based patient manager system that is extremely outdated. The other was to increase the program’s effectiveness by changing the way R.E.A.C.H. team handles information and to disseminate relevant information out to both potential newcomers, and existing patients.

Even though these obstacles were no small feat to subjugate, we knew right from the beginning that it was of the utmost importance to overcome them. Too many organizations are losing their stance in their specific market presently due to the increasingly overwhelming surge of technology. It is virtually impossible to keep up with these times unless you either have internal technology expertise, or have the finances to pay someone else to keep you updated. Unfortunately, the R.E.A.C.H program does not fall into either category. We recognized these hardships and realized that our project was not about receiving a good grade, but was about fulfilling our moral duty to help such a selfless, vital program make it through these hard times.

Our first objective for this project was implementing a new website that is user-friendly and practical. This website had to contain the core information that the R.E.A.C.H. Program staff and families need. The website needed to facilitate the communication between families and the staff in the R.E.A.C.H. Program as well as advertise services provided by the program to a wider range of the public.

Our second objective was to design a data-management application that handles patient information, appointments, activities, and report generation. In doing so, we aimed to create an easy-to-use program that suited all the needs of the R.E.A.C.H. staff, and make sure the system was secure and only accessible to them.

In this report, we will continue with the background section where we discuss our research results regarding effective website and application design, comparisons of different web pages and data management systems, and software development methodologies. We will also discuss many flavors of software development methodologies used in System Development Life Cycle, such as waterfall development, rapid application development and agile development. Our methodology section will further explain how we applied Scrum to our project. We will conclude with the project result and our recommendations as the final chapter of our report.

Chapter 2. Background & Literature Review

In this chapter, we present our review results on four main topics, including the effective website design, comparisons of different web pages, data management systems and software development methodologies.

2.1. Effective Website Design

The prevalence of the World Wide Web has led to the widespread availability of healthcare information online. As a result, effective web page design becomes crucial for healthcare organizations and non-profit healthcare organizations in particular, due to the very low (or sometimes non-existing) cost of providing information online.

In the World Dictionary, effective means "productive of or capable of producing a result". The organizations should not only produce, but use the most productive way to generate the largest quantity with the highest quality as well. This is true for all kinds of organizations, which want to get more clients.

In a recent study (Brown, 2007), Brown provides a rhetorical framework for documenting web work by discussing three sets of documents: (1) those that describe the needs of site visitors, (2) those that detail what site visitors will experience, and (3) those that outline the site's functionality and corresponding design.

The first group of documents describes the needs: personae usability-test. The aim of these documents is to capture the design-team's understanding and enlarge their eyesight for the visitors. In searching the website, it would be ideal if users read pages carefully, but they tend to scan for our kinds of information: the pictures they want to see, the place to click to get further on the site or the way out, or the way back (Rodriguez, 2009).

The users follow an F shaped pattern when they are scanning, and their attention is held very shortly on the page, which does not contain the suited information. User testing is the best way to determine whether the web page is good or not (Rodriguez, 2009).

The documents detailing what the visitors will experience provide additional contexts for the final state of the design, such as competitive analysis, concept modeling, and content inventories (Krause, 2008). These documents will help to categorize products or facilitate communication—function and interrelate. Competitive analysis is assessment of strength and weakness of competitors. Concept modeling is a process of making abstract concept into concrete. Content inventories are the lists of all the contents in the website. Not every single web page needs all of these documents (Brown, 2007). For small sites, the concept modeling is not necessary and the design team can decide to skip the session altogether (Brown, 2007).

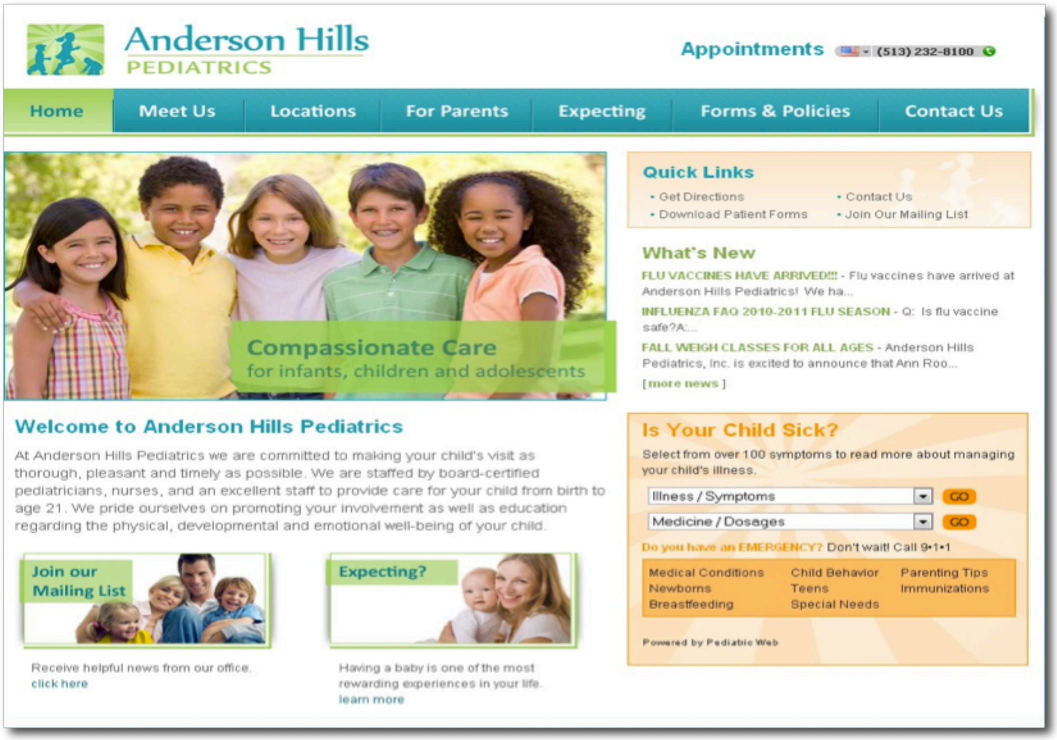
This brings up another issue that the skillful web designers should avoid, namely the problem of over-complexity. The one idea that designers should keep in mind when designing a page is 'Make It Simple'. Nowadays, usability rules the web. Simply stated, if the customer can't find a product, then he or she will not buy it. The web is the ultimate customer empowering environment. The person who clicks the mouse gets to decide everything. It is so easy to go elsewhere; all the competitors in the world are but a mouse-click away (Nielsen, 2000). The aim to update the R.E.A.C.H. program website is to keep the patients well informed and to attract potential new patients. For the R.E.A.C.H. Program, the target users are not particularly technically inclined. People will tend to have trouble finding the information they are looking for if there is far too much information to sort through. Additionally, more information needs more time and energy to keep updated. From a practical standpoint, it was much more difficult to let the R.E.A.C.H. program to utilize the complicated program effectively. A complex design would not be feasible, considering both the target and the Program.

Finally, the last set of documents is about outlining the site's functionality and corresponding design. These are the overall approaches the team intends to take: site maps, flowcharts, and wire frames (Krause, 2008). Site map is the list of website accessible to users or visitors. Flowchart is a diagram that describes how we will solve question step wisely. Wireframes are basic visual guides to suggest the basic structure of the website and relationship between its subpages (ISO/IEC, 2006).

2.2. Three Examples of Non-Profit Websites

As stated in the project objectives, our group was expected to develop an effective website for the R.E.A.C.H. program. We identified similar non-profit organizations and studied their websites in various ways to learn how best to design the R.E.A.C.H. website. Information helped us develop a comprehensive solution including web design and hosting package that makes the task of building a website, managing donors, and marketing R.E.A.C.H. program simple and fun.

First exemplary website belongs to Anderson Hills Pediatrics (http://www.ahpediatrics.com/). This website has a clearly labeled menu tab bar along the top of the page as shown in Figure 1. It has the same layout for all the sub-pages. The “For parents” section is very useful because it has the important educational information such as dosage chart, immunization schedule, etc. The “Meet Us” section has the bios of physicians, which shows detailed staff information. The “Contact Us” has the feedback and evaluation forms, which are very effective for people to see in this section. The “Forms and Policy” section is very good at organizing all the important forms, and it shows parents how to download and fill out these forms. The main page has many quick links to the forms, directions, and emergency needs, etc. Photos are shown at the top of each page, and great multimedia content is on the site in general.



What's New

FLU VACCINES HAVE ARRIVED!!! - Flu vaccines have arrived at Anderson Hills Pediatrics! We ha...

INFLUENZA FAQ 2010-2011 FLU SEASON - Q: Is flu vaccine safe?A:...

FALL WEIGH CLASSES FOR ALL AGES - Anderson Hills Pediatrics, Inc. is excited to announce that Ann Roo...

[more news]

Welcome to Anderson Hills Pediatrics

At Anderson Hills Pediatrics we are committed to making your child's visit as thorough, pleasant and timely as possible. We are staffed by board-certified pediatricians, nurses, and an excellent staff to provide care for your child from birth to age 21. We pride ourselves on promoting your involvement as well as education regarding the physical, developmental and emotional well-being of your child.

Is Your Child Sick?

Select from over 100 symptoms to read more about managing your child's illness.

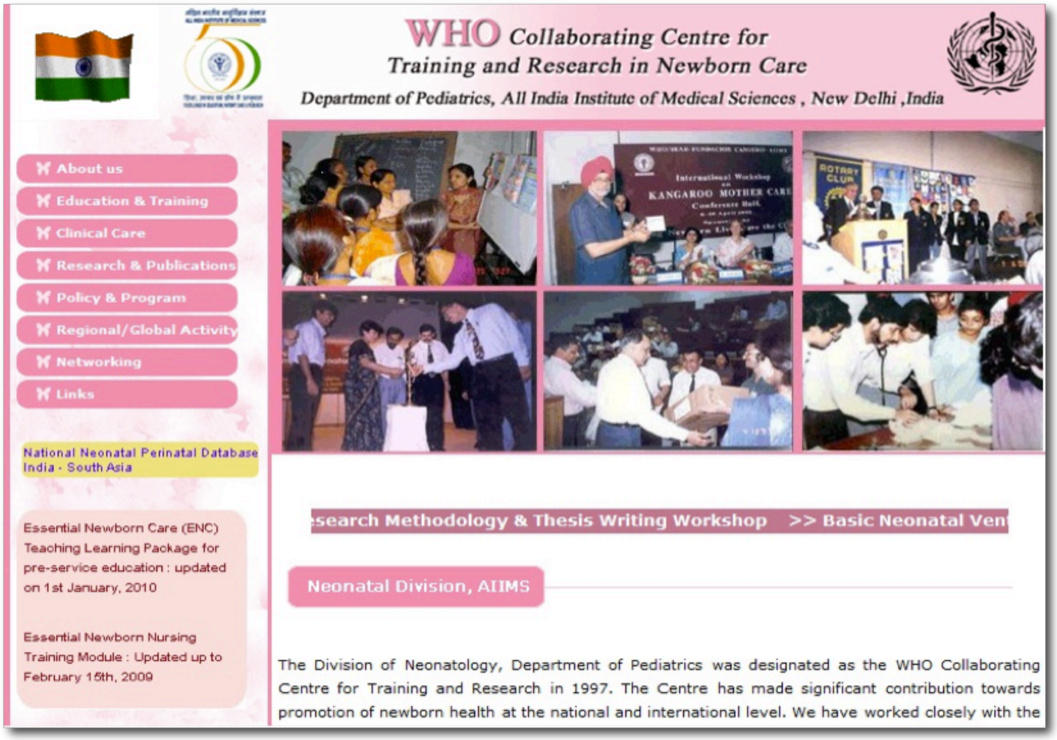
Do you have an EMERGENCY? Don't wait! Call 9•1•1

Receive helpful news from our office.

Having a baby is one of the most rewarding experiences in your life.

Figure 1 - Anderson HIlls Pediatrics' Homepage

Second exemplary website belongs to World Health Organization (WHO) Collaborating Centre for Training and Research in Newborn Care (http://www.newbornwhocc.org/). This website has the tab menu on the left side of the homepage. It offers a great main page that includes a lot of information of good quality without looking cluttered. Links about the “Foundation Goal, Research Programs, and How To Help” are included prominently in the middle of the page. A donation link is also included in the top navigation. News about this foundation is also featured prominently on the home page. Flash contents that used as multimedia platform to add animation and video are very attractive to users because they are fun and interesting. The “Clinical Care” section provides a lot of good information for users. Each page follows a similar layout and has limited text and menu options, which do not distract users. A multi-media slideshow is featured prominently on the home page, showcasing featured content. Links for “More Information, Issues the Organization, and Join or Take Action” are all featured prominently in the top navigation and elsewhere on the home page. The site also includes a very interesting blog for users to post and edit their stories (featured on the home page) as shown in Figure 2.



WHO Collaborating Centre for
Training and Research in Newborn Care
Department of Pediatrics, All India Institute of Medical Sciences , New Delhi ,India

National Neonatal Perinatal Database India - South Asia

Essential Newborn Care (ENC) Teaching Learning Package for pre-service education : updated on 1st January, 2010

Essential Newborn Nursing Training Module : Updated up to February 15th, 2009

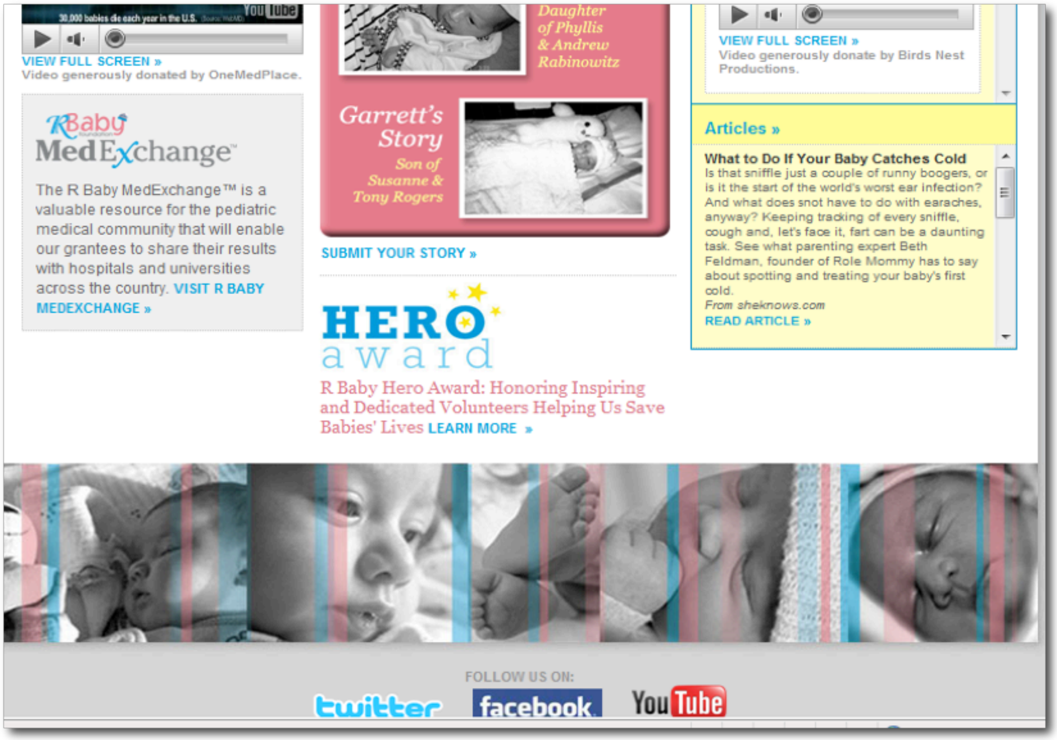
search Methodology & Thesis Writing Workshop >> Basic Neonatal Ven

Neonatal Division, AIIMS

The Division of Neonatology, Department of Pediatrics was designated as the WHO Collaborating Centre for Training and Research in 1997. The Centre has made significant contribution towards promotion of newborn health at the national and international level. We have worked closely with the

Figure 2 - WHO Collaborating for Training and Research in Newborn Care's Homepage

Third exemplary website belongs to R-Baby Foundation (http://www.rbabyfoundation.org). This website has the menu along the top of the homepage. It also has quick links to Facebook, Twitter and Youtube pages on the main page as shown in Figure 3. Its layout is well organized and easy to use because a lot of the content is broken up by colored headings. “R-Baby Stories” section is a good menu tab because it includes many incredible thoughtful stories that are posted by users. “About Us” section has several sub-categories including “About Us, Our Story, Mission & Vision, Sponsors & Partners, Board Members, Volunteer and Contact Us” in the same category. It is effective to combine these categories under the “About us” section, but it is better if they have the Contact us as a separate menu tab because most users want to find the address of the foundation quickly to get the direction.



30,000 babies die each year in the U.S. (Source: WebMD)

VIEW FULL SCREEN »
Video generously donated by OneMedPlace.

RBaby foundation MedExchange™

The R Baby MedExchange™ is a valuable resource for the pediatric medical community that will enable our grantees to share their results with hospitals and universities across the country. VISIT R BABY MEDEXCHANGE »

Daughter of Phyllis & Andrew Rabinowitz

Garrett's Story

Son of Susanne & Tony Rogers

SUBMIT YOUR STORY »

HERO award

R Baby Hero Award: Honoring Inspiring and Dedicated Volunteers Helping Us Save Babies' Lives LEARN MORE »

VIEW FULL SCREEN »
Video generously donate by Birds Nest Productions.

Articles »

What to Do If Your Baby Catches Cold
Is that sniffle just a couple of runny boogers, or is it the start of the world's worst ear infection? And what does snot have to do with earaches, anyway? Keeping tracking of every sniffle, cough and, let's face it, fart can be a daunting task. See what parenting expert Beth Feldman, founder of Role Mommy has to say about spotting and treating your baby's first cold.
From sheknows.com
READ ARTICLE »

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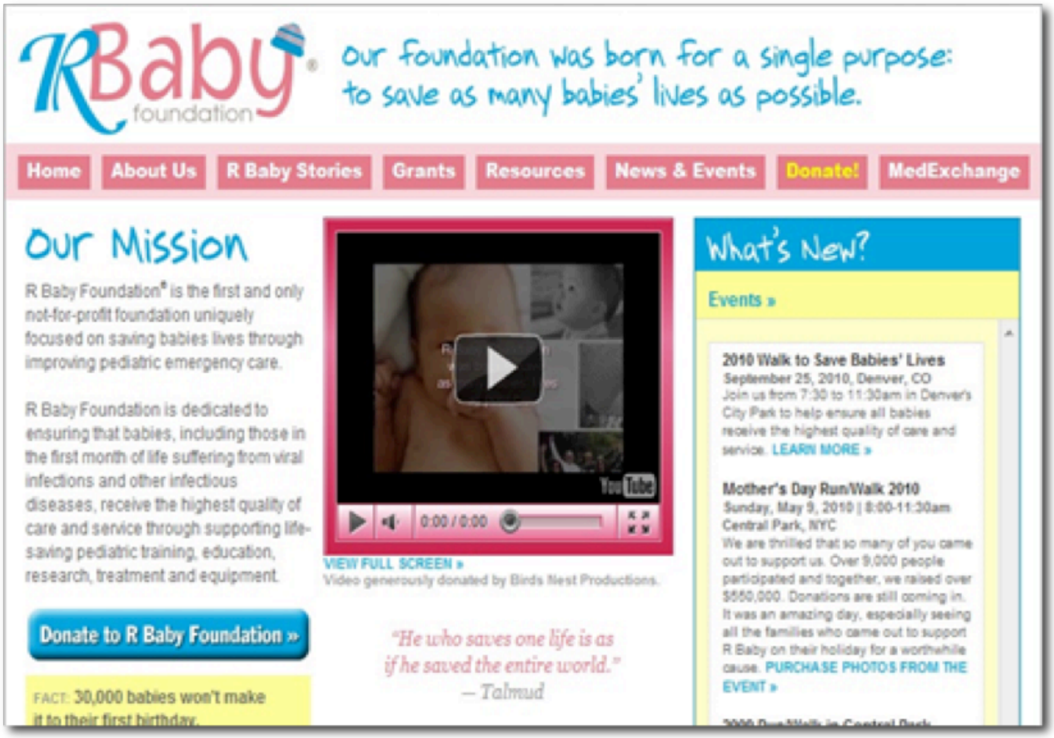
Figure 3 - R-Baby Foundation's Homepage (2)

R-Baby Foundation's website also has a well-designed section called "Donate!" that encourages users to make online donation securely or paying by check to the specific address that is provided in this section as shown in Figure 4. The website has the built-in ability to process credit card payment securely online for donation. Our group thinks this application could be helpful to increase the donations for the R.E.A.C.H. Program.



our foundation was born for a single purpose: to save as many babies' lives as possible.

Our Mission

R Baby Foundation® is the first and only not-for-profit foundation uniquely focused on saving babies lives through improving pediatric emergency care.

R Baby Foundation is dedicated to ensuring that babies, including those in the first month of life suffering from viral infections and other infectious diseases, receive the highest quality of care and service through supporting life-saving pediatric training, education, research, treatment and equipment.

FACT: 30,000 babies won't make it to their first birthday.

Video generously donated by Birds Nest Productions.

"He who saves one life is as if he saved the entire world."
— Talmud

What's New?

2010 Walk to Save Babies' Lives
September 25, 2010, Denver, CO
Join us from 7:30 to 11:30am in Denver's City Park to help ensure all babies receive the highest quality of care and service.

Mother's Day Run/Walk 2010
Sunday, May 9, 2010 | 8:00-11:30am
Central Park, NYC
We are thrilled that so many of you came out to support us. Over 9,000 people participated and together, we raised over $550,000. Donations are still coming in. It was an amazing day, especially seeing all the families who came out to support R Baby on their holiday for a worthwhile cause.

Figure 4 - R-Baby Foundation's Homepage (1)

In the three program websites, there are several similarities in content and design. All web pages are using similar color schemes; bolded font for titles and subtitles, including search box and contact information at the page.

On each website, three main pieces of information were consistently observed:

- Organization's mission and goals
- Contact information (address, phone number and email address)
- Description of healthcare service provided by the organization

After examining the three websites, we agreed on the following elements as critical components of our design:

- **Page Layout** should have a clearly labeled menu tab bar along the top of the page. It should have the same visual layout for all the sub-pages.
- **Mission and Goals** should include descriptions of programs and services that are offered by the R.E.A.C.H. program.
- **Staff Information** should include all the R.E.A.C.H. program's staff that is currently working.
- **Registration Forms** should be uploaded in the Form section.
- **Feedback** should provide a fillable evaluation PDF form that users can download easily at home and send to the R.E.A.C.H. program's address.
- **News and Media Gallery** should show videos and photo slideshows of the R.E.A.C.H. program. In addition to, news and articles should be posted on this page of the website to attract users to read topics about newborn and infant care.

2.3. Website Development Platform

For our project, we choose Drupal platform as the software to design the website. Drupal is a content management system written in PHP, which was used as a back-end system for 1% of the websites all around the world (W3techs, 2010). Drupal is also described as a web application framework, as it meets the generally accepted feature requirements for such frameworks.

The standard release and essential part of Drupal, also known as Drupal core, can be contributed by users and be made accessible to web visitors by a variety of selectable criteria. Drupal core also includes a hierarchical taxonomy system, which allows content to be categorized or tagged with key words for easier access (Drupal Features, 2010). Core Drupal distribution provides a lot of features, including:

- Access statistics and logging
- Advanced search
- Blogs, books, comments, forums, and polls
- Caching and feature throttling for improved performance
- Descriptive URLs
- Multiple-level menu system
- Multiple-site support
- Multiple-user content creation and editing
- Open ID support
- RSS Feed and Feed Aggregator
- Security/new release update notification
- User profiles
- Various access control restrictions (user roles, IP addresses, email)
- Workflow tools (Triggers and Actions)

Also, Drupal allows the administrator to select the theme for the website, which customizes the “look and feel” of the site (Buytaert, 1999).

The common criteria of determining the success or failure of any system are profitability, application to major problems, quality of performance and user satisfaction (Ein-Dor, & Segev, 1978). To determine potential issues Drupal platform can raise, we researched the usability studies that focused on Drupal.

In the Drupal Usability Research Report (Scollan, 2008) by Scollan, participants who took the test with the Drupal Program began with the welcome page, and had a relatively easy time adding content. However, when the participants began to focus on posting and managing the content they had created, they all became confused and disoriented. The reason is that Drupal does not provide the visual feedback of the designed website and the other reason is that the administrative function overlaps the website itself. By this test, we could see the problem of managing content using Drupal, which would be a big concern if this program were not user-friendly.

Another area of concern related to Drupal is backward compatibility and performance. Drupal Designers have decided that backward compatibility might be sacrificed with each major revision (Buytaert, 1999).   As a result, the coding done in the new version of Drupal might fail to function in older versions. Besides, there persists a popular view that Drupal is slow, although performance tests in 2008 have demonstrated that Drupal's website is "significant faster" than those of Joomla (Peach, 2008). It is true that Drupal is likely to be slower in configuring for a narrow usage compared to the applications designed specifically for that usage. To improve this performance, Drupal offers caching to store various elements of pages, which increase the speed of Drupal dramatically.

We carefully considered usability, compatibility and performance concerns regarding Drupal and still chose Drupal as the platform due to the following advantages, we identified:

- No programming skills are required for basic website installation and administration.
- Built in components of Drupal allow faster website development compared to custom design.
- Gives users ability to change the website content quickly without worrying about design.

2.4. Data Management Platform

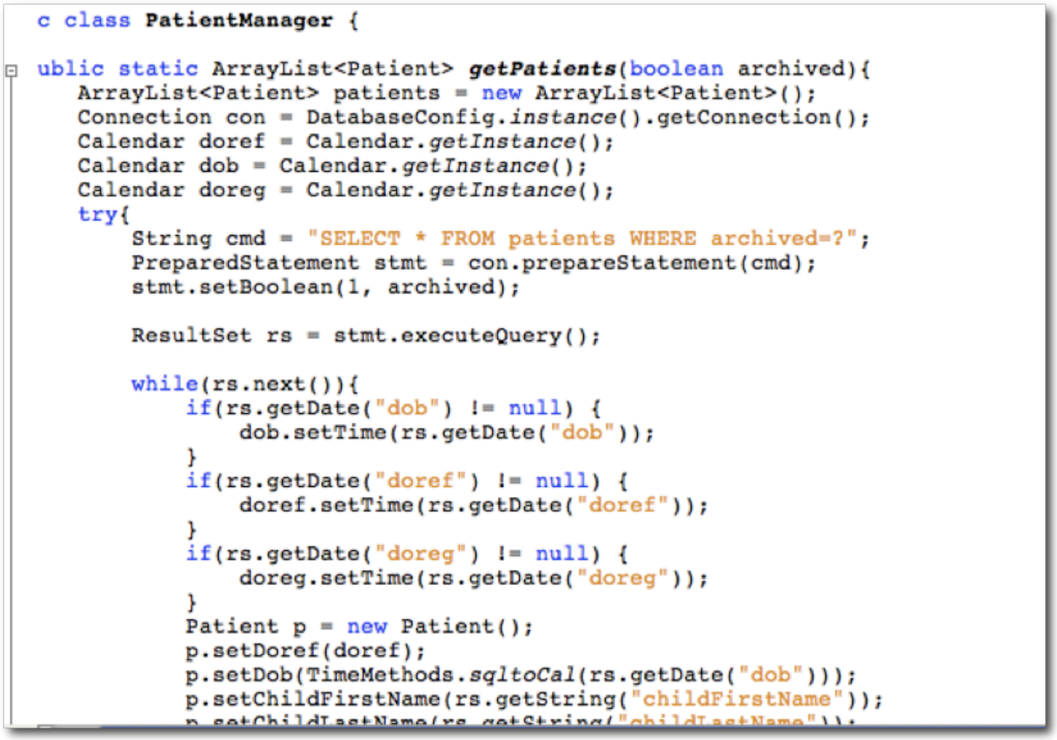
Based on the functionality and structure of the system our project focused on, we define data management system as a “system for collecting, sorting, receiving and processing the information which is used or desired, by one or more managers, in their performance of their duties” (Ein-Dor, & Segev, 1978). A data management system contains all of the information about the activities that are planned or executed.

The domain of management information systems requires a multi-disciplinary approach to studying the range of socio-technical phenomena, which determine their development, use and effects in organizations and society. According to Professor Allen Lee, management information system “is more than technological system, or just social system, or even the two side by side; in addition, it investigates the phenomena that emerges when two interact” (Lee, 2001).

There are four tools that we are using in this project to create a Data Management Platform: Java, NetBeans, Sourceforge and Subversion as shown in Figure 5:

Figure 5 - Design Elements Logo of: Java (a), NetBeans (b), SourceForge (c), and Subversion (d)

Java is a programming language that can accomplish specific and simple tasks (McGraw, & Felten, 1999). It is supported by almost all operating systems and web browsers, and is widely used by large numbers of websites on the World Wide Web. In Figure 6, we present a snapshot of our own code as an example of Java:



```
c class PatientManager {

ublic static ArrayList<Patient> getPatients(boolean archived){
   ArrayList<Patient> patients = new ArrayList<Patient>();
   Connection con = DatabaseConfig.instance().getConnection();
   Calendar doref = Calendar.getInstance();
   Calendar dob = Calendar.getInstance();
   Calendar doreg = Calendar.getInstance();
   try{
       String cmd = "SELECT * FROM patients WHERE archived=?";
       PreparedStatement stmt = con.prepareStatement(cmd);
       stmt.setBoolean(1, archived);

       ResultSet rs = stmt.executeQuery();

       while(rs.next()){
           if(rs.getDate("dob") != null) {
               dob.setTime(rs.getDate("dob"));
           }
           if(rs.getDate("doref") != null) {
               doref.setTime(rs.getDate("doref"));
           }
           if(rs.getDate("doreg") != null) {
               doreg.setTime(rs.getDate("doreg"));
           }
           Patient p = new Patient();
           p.setDoref(doref);
           p.setDob(TimeMethods.sqltoCal(rs.getDate("dob")));
           p.setChildFirstName(rs.getString("childFirstName"));
           p.setChildLastName(rs.getString("childLastName"));
```

Figure 6 - Code in Java Applet

Furthermore, Java can be easily embedded into web pages by additional coding in the form of a Java Applet. This property of a Java Applet was very appealing to us since we were trying to develop a data management system that can easily be integrated into the R.E.A.C.H.

program website to provide a single platform for users. However, we first considered advantages and drawbacks of Java Applet before making our decision. The points below are our summary of both the pros and cons of the Java Applet.

Advantages:

1. Almost all web browsers support Java Applet.
2. Java's byte code is platform independent. Therefore, the applet can be executed by all kinds of platforms, such as Microsoft Windows, Unix, Mac OX and Linux.
3. The same Java Applet can work on all versions of Java at the same time.
4. It allows multiple users or clients to work on the same applet.
5. The Java Applets are fast loading. Java improves with use: after the first applet is run, the Java applet is already running and starts quickly. It can even have similar performance to native installed software. Java Applet allows security management. The authentication and the access-control mechanism were introduced to the Java at 1997 (Oracle, 1995).

Disadvantages:

1. The Java Applet requires Java plug-in to be installed on the operating system. Some organizations only allow software installed by the administrators. Thus, users under this condition must contact their administrators to install the Java plug-in.
2. With the client-side scripting, security restrictions might make it almost impossible for an untrusted applet to achieve the desire goals.

3. Some Applets require a specific Java Runtime Environment (known as JRE). If a specific or a newer version of JRE is needed, users have to wait for so long a time to get the JRE downloaded (Oracle, 2007).

From the comparison in the previous paragraphs, we can see that the Java Applet can be versatile. We don't have to worry about the compatibility between the designers and users' computers. And the security of Java Applet lets the users manage patient information more safely. The fast loading characteristic makes the Java Applet more competitive against C++ or JavaScript, which we could also use. Our application design required no need for the newer or specific versions of the JRE. Although there could be some potential problem due to Java runtime dependency, we decided to use the Java Applet as our development platform in this project to develop the data management component.

We decided to use Netbeans as our development environment. Choosing the right environment for a project is important because the IDE will have an impact on both the speed of development and the quality of the final product. There were three main factors in choosing Netbeans as our IDE. The primary factor in our decision was that we were already familiar with Netbeans, and would not have to spend additional time learning the features of the program. Another important factor in our decision was Netbeans' integrated GUI builder. The GUI builder is a powerful application design tool that allows you to lay out components of the application visually, by dragging and dropping components into place. This allowed us to greatly accelerate the application development, because we did not have to spend any time coding the GUI ourselves, which is a very time consuming process done manually. The last major factor in choosing Netbeans was its ability to connect to an SVN code repository without any additional plugins. This was important because we chose to use an SVN code repository to share the project amongst the team.

In order to work together and share the code base amongst the team, we used SourceForge in conjunction with a Subversion based code repository. SourceForge is a project collaboration base that provides access to various revision control systems, issue-tracking and task management, and communication forums. We registered a project on WPI's SourceForge page, and then created a Subversion repository for our code base.

Subversion is a revision control system that is used to allow multiple people to work on the same code simultaneously. Each member can connect to the repository, download a copy of the latest version of the code, work on it, and then commit the changes back to the database. Subversion also keeps a history of all the changes made to the code, which allows the users to go back to any point in time and undo any changes if necessary, or branch the code so that there are two concurrent versions of the code. Subversion was a very important part of keeping our project synchronized, as any member of the project could make a change whenever they needed to, and make it immediately available to everyone else.

2.5. System Development Life Cycle

System Development Life Cycle (SDLC) is the process of creating systems and the models or methodologies people use to develop these systems (Dennis, Wixom, & Roth, 2009). Any SDLC should result in a high quality system that satisfies or exceeds customers' expectation, reaches completion within time and cost estimates, works effectively and is inexpensive to maintain and cost-effective to enhance (The department of justice, 2003). The phases in SDLC are similar to the phrases of problem solving in the real world (Dennis, Wixom, & Roth, 2009): planning, analysis, design and implementation.

The four steps in SDLC require different technologies and deliverables. Besides, the deliverables in every step can be used as the instruction for the next step. Thus, the steps in SDLC are based on the previous step and make foundation to the next step.

Planning phase is the first and the fundamental phase where the construction of a project starts. It contains two steps:

1. Determining the value of the project by conducting feasibility analysis.
2. Preparing a project plan proposal to direct and guide the team members to work on this project.

Analysis phase is the researching phase. The group investigates the current technology and defines the new system by analyzing the current system and comparing it to the proposed system, and gathering the requirements and developing a new concept for the new system.

Design phase determines exactly how the system will operate. Project teams focus on designing the information system according to the requirement, identified in the analysis phase.

Implementation phase is the final phase of the SDLC. During this step, the project teams will install and make the project available to all users. The deliverables in this phase are the final project documentation, support and maintenance documentation and implementations plans.

SDLC has a number of methodologies, which differs in the approaches, the time-span and others things. There are three different approaches to SDLC methodologies:

Waterfall Development

With waterfall development, analyst and users proceed four phases sequentially. Once the work produced in one phase is approved, this phase ends and the next phase begins. While it is possible for waterfall methodology to go backward, often it is not quite easy (Dennis, Wixom, & Roth, 2009)

Waterfall development methodologies have the advantage of identifying requirements before the program starts and limiting changes to the requirements as the project progresses. The key disadvantage of this methodology is that there is a long time gap between the completion of the proposal and the delivery of system (Dennis, Wixom, & Roth, 2009).

Rapid Application Development (RAD)

RAD is a collection of methodologies, which emerged in response to the weakness of waterfall development. RAD-based methodologies, adjusts the SDLC phases to get some part of the system developed quickly and into the hands of the users (Dennis, Wixom, & Roth, 2009).

Users can better understand the system and suggest revisions that bring the system closer to what is needed (Makhbal, 2008).

Because the RAD methodologies utilize the computer and software to simplify the task in the SDLC, this methodology improves the speed and the quality of the system development in most instances. On the contrary, as the system develops more rapidly, users' expectations can dramatically increase during the project (known as scope creep) (Dennis, Wixom, & Roth, 2009). An example for RAD methodology is presented in Figure 7.

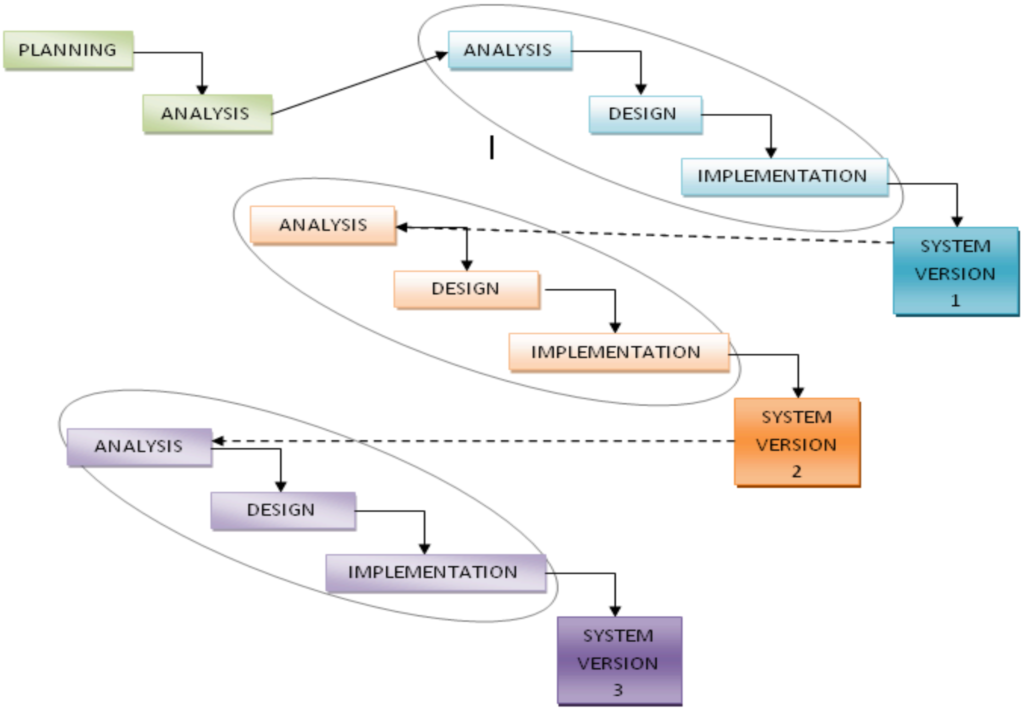


Figure 7 - Iterative Development – Rapid Application Development (RAD) (Dennis, Wixom and Roth 48)

AGILE DEVELOPMENT

Agile development is a group of programming-centric methodologies that focus on streamlining the SDLC by eliminating much of modeling and documentation (Dennis, Wixom, &

Roth, 2009). The Agile Development methodology emphasizes simple, iterative application development. Examples of this methodology include: extreme programming, SCRUM, and the Dynamic System Development Method (Makhbal, 2008). An example for Agile Development methodology is presented in Figure 8.

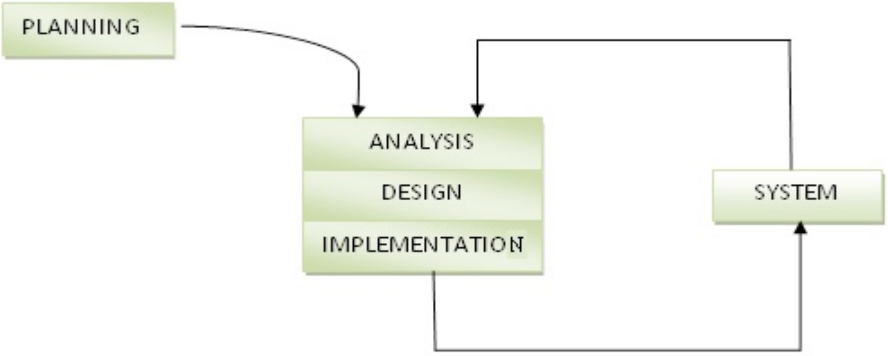


Figure 8 - An Extreme Programming-based Methodology (Dennis, Wixom and Roth, 2009)

In Table 1, we compare the different methodologies for SDLC:

Table 1 – Comparison of Methodology Approaches (Anderson, 2005)

	SDLC	RAD	Open Source	Objects	JAD	Prototyping	End User
Control	Formal	MIS	Weak	Standard	Joint	User	User
Time Frame	Long	Short	Medium	Any	Medium	Short	Short
Users	Many	Few	Few	Varies	Few	One or two	One
MIS Staff	Many	Few	Hundreds	Split	Few	One or two	None
Transaction/DSS	Transaction	Both	Both	Both	DSS	DSS	DSS
Interface	Minimal	Minimal	Weak	Windows	Crucial	Crucial	Crucial
Documentation and Training	Vital	Limited	Internal	In Objects	Limited	Weak	None
Integrity and security	Vital	Vital	Unknown	In Objects	Limited	Weak	Weak
Reusability	Limited	Some	Maybe	Vital	Limited	Weak	None

Since software and standards are constantly changing, we need a development process that is cyclical due to the limited time we have to integrate the data management and the uncertainty of requirements. We did not choose the waterfall development methodology. Rapid application development and agile methods enable the iterative development cycle, which fits better when the requirements are either ambiguous or change constantly.

2.6. SCRUM

Furthermore, SCRUM is a unique form of agile methodology, because it minimizes guessing, which has the potential to destroy a project by producing a system that does not fit the real needs of the customer. SCRUM has a life cycle in the form of iterations or in SCRUM terminology, **sprints**. Sprints are weekly to monthly intervals where the team works on features of the project that have been broken down into testable tasks, which are managed by logs, in SCRUM terminology, **artifacts**. The structure of the team is broken into **roles**, and the roles interact with each other through meetings, or in SCRUM terms, **ceremonies**. The ultimate goal of SCRUM is to micro manage small tangible tasks by a team through sprints, and then assemble the pieces together into a finished product (Scrum Alliance, 2010). Figure 9 presents a diagram of SCRUM structure.

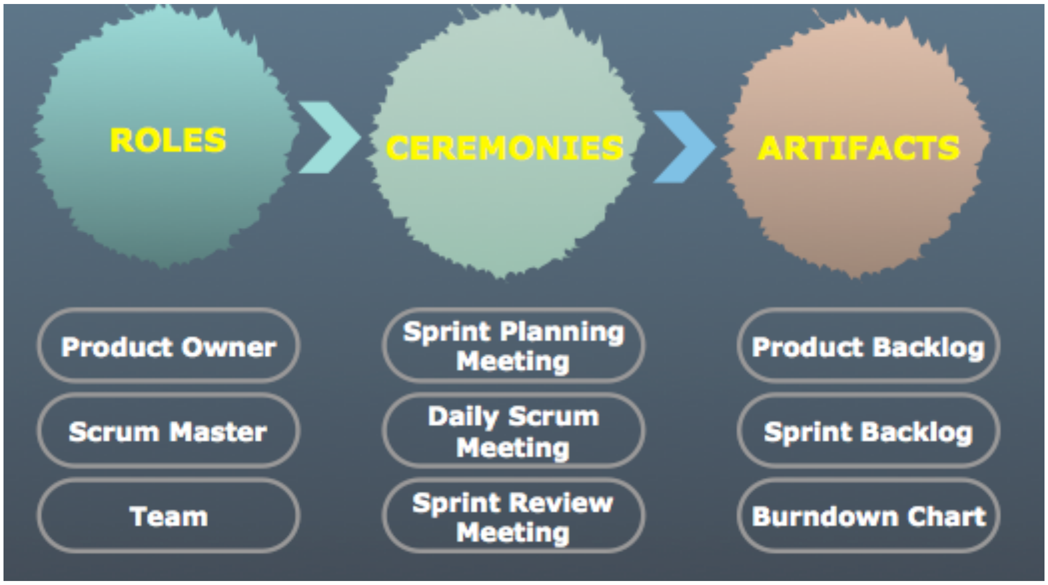


Figure 9 – SCRUM structure summary

Roles

The three roles defined in SCRUM are product owner, SCRUM master and the team.

The product owner plays a key role in the development cycle of the product and represents the uses of the system. He or she has the responsibility of making this product profitable and the power to define the results of the project, prioritize features, accept or reject the project's outcomes, and set the release dates (Scrum Alliance, 2010). Furthermore, due to the nature of SCRUM, the product owner can change any of the features of the project, if necessary, at any time. This may put some pressure on the team, but since sprints are relatively short, the costs of failure or changes are minimized.

The SCRUM master is essentially the team leader who is responsible for facilitating the development process by ensuring the team adheres to its chosen process and removes any obstacles that impede the progression of the team. This means the SCRUM master must make sure the process is followed, which includes, scheduling the Ceremonies, guarding the team from external interferences, encouraging close cooperation, and facilitating Daily SCRUM Meetings (Scrum Alliance, 2010).

Moreover, the SCRUM master must keep track of all types of tasks, such as completed, started, and newly discovered tasks. This information must be kept up to date to maintain the burndown chart, a chart of tasks showing cumulative work remaining, normally on a day-by-day basis (Scrum Alliance, 2010). In addition, he or she must ensure that the number of tasks in progress is minimized to maximize productivity. The SCRUM master must also keep track of all impediments slowing or even blocking the progress of the team. He or she is also, in charge of creating a remediation plan for these issues. Since the SCRUM master must ensure maximum productivity, he or she must be aware of all problems including personal ones. This is a well-known issue, which impedes progress and it is the SCRUM master's responsibility to remedy the issue.

The team is in charge of selecting the sprint goal and providing the results. Ideally a SCRUM team consists of between five to nine members and those people can do whatever it takes within the boundaries of the project to reach the sprint goal. However, the team must remain organized and must present a team plan to the product owner as well as customers that are interested (Scrum Alliance, 2010).

Ceremonies

There are three types of meetings in SCRUM, which are called Ceremonies. The sprint-planning meeting is a meeting that occurs right before a sprint. However, the Product Backlog must be defined first (Scrum Alliance, 2010). In a normal sprint planning meeting, the meeting would begin with the product owner reviewing the planned outcome of the project, showing the release plan and announcing the product backlog to the SCRUM Team. It is up to the Team to decide how much they can get done within the span of the Sprint and pick tasks from the backlog that they are sure they can complete. The team should almost always pick higher priority tasks. Once the team is committed, it then breaks down the selected tasks into sprint tasks. These are the tasks that must be developed to implement the feature.

The daily SCRUM meeting is a fifteen-minute meeting that takes place every day. This meeting is a way to clarify the state of the sprint or SCRUM (Scrum Alliance, 2010). During this meeting, the members answer three questions: What did I do since last meeting, what have I done today, and what got in my way? The goal is to keep everyone on track by creating a snapshot of the SCRUM and discovering any new dependencies.

Once the sprint is complete, a sprint review meeting is held. The first half of the meeting is dedicated to presenting what was accomplished during this sprint. The product owner leads this half of the meeting. However, the second half is dedicated to reflection on how the team performed during the sprint. This includes strategies that worked, and what aspect of team communication needs improvement. The cycle repeats after this meeting (Scrum Alliance, 2010).

Artifacts

To keep track of these meetings and tasks, SCRUM uses three artifacts, or task lists. The product backlog is a list of all high-level features of the product that can be viewed by the customer. The backlog should also include requirements to setup the product. These features are prioritized by value. However, the features that require long-term development must be broken down into sizable and testable tasks.

The sprint backlog is a list of features listed in the product backlog that has been broken down into development tasks required to implement a feature. Given the difficulty in predicting how long a feature should take to implement, the sprint backlog should also include predicted time spent and actual time spent on completing the task. This way the product owner can negotiate the right amount of work next time, increasing probability of successful completion.

The burndown chart keeps track of the cumulative work remaining in a sprint on a day-by-day basis. The SCRUM master is in charge of recalculating the remaining work and decreases the sprint backlog (Scrum Alliance, 2010). At the end of a sprint, if a sprint backlog is zero, then the sprint is successful. It is necessary to keep a dynamically changing chart recording the sprint backlog because the amount of tasks is subject to change for several reasons. For one, the team may realize more tasks may be needed to achieve one of the goals later on during the sprint. The team could also add fixing a defect in the product as a task.

2.7. Summary Background

This chapter was devoted to discussing the background and literature review of our project. We covered effective website design as well as examined three examples of other non-profit websites. We also talked about content management systems and why we have chosen Drupal as the platform to build the R.E.A.C.H. program website on. We described in detail the tools that we used to develop the application and the database. Next we discussed system development life cycle (SDLC) process and described several methodologies that can be used such as waterfall development, rapid application development, and agile development. Finally, we went into more depth in talking about a unique form of agile methodologies called SCRUM. Now that we have covered the background and literature review for our project, the next chapter is devoted to going into further detail on methodology.

Chapter 3. Methodology

3.1. Our SCRUM Approach

After analyzing the benefits and disadvantages of some development processes, we decided to follow the SCRUM methodology with a few exceptions. First of all, since the product owner cannot meet regularly, we concluded that it was best to distribute the privileges of this role amongst the team with the exception of making features in the product backlog, which the R.E.A.C.H. staff has power over. Second of all, due to time constraints, we merged both the sprint review meetings and sprint planning meetings into one meeting so the R.E.A.C.H. staff can be present. The last issue we faced was our own team schedule conflicts. It was inevitable that we couldn't meet every day for a daily SCRUM meeting. However, we met at least once a week and we stayed connected through email, assigning tasks and collaborating on finished work. Although these exceptions might go against the core of SCRUM methodology, it still serves as a great guideline for software development, which has been proven to be successful on many occasions.

Since artifacts are the backbone of this methodology, we had to maintain a well-detailed product backlog, the sprint backlogs, and the burndown charts. We found a user-friendly web-based project management tool called DotProject, which helped us in managing our project and tasks. In our case, we created two types of projects, the product backlog, and sprint backlogs. The product backlog contained all high level features of the overall project including the website, project proposal, and this report.

3.2. Plan Overview

As for the work plan, we proposed to provide a functional data management system and website by March 4, 2011, which is the end of C-term. We broke our project into weekly sprints. The beginning of the project and the four sprints in A term of the project were structured around reviewing relevant literature, researching the necessary development tools, deciding which tools to use, producing a project proposal, and establishing the project website.

The relevant literature was focused around areas such as how to develop websites, how to integrate data management into web pages, and the analysis of websites hosted by similar organizations by focusing on their similarities and differences. We needed to have an understanding of what was already out there and even more important, what was effective.

Next, we had to research the most effective website development tools and best hosting options that would incorporate all the elements we needed such as FTP access, shell access, and Drupal support at a relatively low in cost. After a number of comparisons between different hosting services, we chose GoDaddy.com as the hosting platform for this initial sprint because it supports Drupal as well as DotProject, while offering many necessary web oriented services such as FTP service, shell access, and MySQL database. We were able to purchase all of these features at a very low cost by using GoDaddy.com, which is beneficial to the R.E.A.C.H. program, which runs on a very limited budget.

With all the information we absorbed through these initial planning phases, we began the write up of our project proposal. This proposal comprised of topics including the background of the R.E.A.C.H Program, what we learned from reading relevant literature, and the Methodology we chose. Once written, the proposal was presented to the R.E.A.C.H Program staff to give them an understanding of what exactly we intended to do with this project.

The last 2 sprints of A term were dedicated to designing and building the website along with the project proposal. By using what we learned from researching and studying many tutorials, we were able to develop a working website running on the Drupal platform that contains most of the basic information about the R.E.A.C.H. program. We included a FAQ section, staff information, a list of group sessions, a policies section, and details on ways to give back.

Sprints 5 through 9 shifted away from the website and more towards the development of an offline, stand-alone program that linked to a database to help R.E.A.C.H. staff manage patient information, appointments, activities, and report generation. Before we started the design of this program though, we had to research what programming languages could be used for this task, and then chose one that would suit our needs the best. Through this research, we compared the many languages out there and decided to use the Java programming language for its versatility, portability, and its vast capabilities towards application development.

Next, we had to begin the design process of the application. With the help of code references and feedback received during periodic R.E.A.C.H. Program staff meetings, we began the development of a program that could do all the tasks previously mentioned in an efficient and effective manner. Though the development proved to be tedious at first, we were able to complete the patient and appointment modules, as well as a user interface mockup for both the activity and report modules.

The final 5 sprints (10 – 14) of this project were dedicated to finishing the activities and report generation modules. By sprint 13, these two module prototypes were finished and the application prototype was ready for testing. The remaining tasks left were fine-tuning the program, touching up the website, and finishing the final report.

Our first meeting with the R.E.A.C.H staff in sprint 12 was dedicated to getting comments and suggestions on our functional prototype. With their comments, we were able to continue adjusting the program to fit their needs while debugging minor issues with the program. In parallel with these adjustments, we made little changes to the website that included small aesthetic modifications and the addition of editable patient information PDFs that patients could print out and bring with them to appointments. In addition, we developed a user manual for the staff as well as an interview protocol to evaluate usability of our program once they were taught to use it.

In Sprint 14, we taught them how to use the program and then used our interview protocol to test their ability in using the application as well as to gather their final comments. Towards the end of this sprint, we finalized the program and website, and dedicated the rest of our time to properly documenting our project in the final report. During this last sprint, we also interviewed the staff and trained them how to use the application. Here is the Interview Protocol that we used for our interview day with the R.E.A.C.H. staff.

INTERVIEW PROTOCOL

INTRODUCTION (approximately 5 minutes):

Good morning everyone. We have designed the application to simplify the task of data management. We have used your feedback to design the application that fits your needs. Today, this interview involves two parts. First, we will give you a brief tutorial on how to use the application. Second, each one of us will sit down with you and go through some simple tasks to give you a chance to experience the application individually. Each one of you will be using one of our computers. We will observe how you perform the task to get a better understanding of our applications usability. Once you are all done, we will ask you a few questions to collect your individual feedback. . I would like you to feel comfortable with saying what you really think and how you really feel. You can ask any questions that you might have during the practice. We are here to answer your questions, clarify the use of the application and leave you confident enough to utilize this system in the future. Thank you for your time.

PART 1 - APPLICATION TUTORIAL (approximately 15 minutes):

One of our teammates will show a brief tutorial how to use the application. Other teammates will hand out the User Manual to the staff. An example of User Manual is shown in Appendix B.

PART 2 - INTERVIEW (approximately 30 minutes):

1. Two team members will go with one staff to the office to install the new application. After that, he/she will perform task and one teammate will interview him/her.
2. Two other team members will interview each other two staffs.
3. Team members will record time and comments in the observation worksheet from interviews.
4. There are four main tasks that the staff will perform:

Task 1 (approximately 5 minutes): Now we will add three new patients using the Patient tab in the main screen:

New Patient 1: *Name: Smith, Tyler* *Gender: Male* *Date of Birth: 01/08/2010* *Ethnicity: Spanish* *Email: tyler@yahoo.com* *Referral Source: Framingham* *Post Code: 02016* *Telephone: 774-222-2222* *Address: West Street 108*	*New Patient 2:* *Name: Ofcarcik, Debra* *Gender: Male* *Date of Birth: 08/10/2009* *Ethnicity: African American* *Email: Debra@gmail.com* *Referral Source: Boston* *Post Code: 32156* *Telephone: 654-123-7896* *Address: East Street 200*	*New Patient 3:* *Name: Rulfs, Jill* *Gender: Female* *Date of Birth: 11/11/2008* *Ethnicity: Portuguese* *Email: Jill@gmail.com* *Referral Source: Worcester* *Post Code: 01608* *Telephone: 508-888-8655* *Address: South Street 350*

Task 2 (approximately 5 minutes): Now we will add two new activities using the Activity tab in the main screen:

New Activity 1: Type: Baby Group. Date: 03/08/2011 12:00 pm Patient Attendance: Please randomly pick three Staff Attendance: All current staffs Duration: 1 hour	New Activity 2: Type: New Beginnings Playgroup Date: 05/20/2011 9:40 am Patient Attendance: Please Randomly Pick Three Staff Attendance: All Current staffs Duration: 2 hour	New Activity 2: Type: Movin' & Groovin' Date: 02/20/2011 2:00 pm Patient Attendance: Please Randomly Pick Three Staff Attendance: All Current staffs Duration: 1 hour

Task 3 (approximately 5 minutes): Now we will add one new appointment using the Appointment tab in the main screen:

New Appointment 1: Type: Initial Patient: Smith, Tyler Staff: Randomly pick one Date: 03/08/2011 1:00 pm Duration: 30 minutes Location: Office	New Appointment 2: Type: Initial Patient: Ofcarcik, Debra Staff: Randomly pick one Date: 03/08/2011 1:00 pm Duration: 1 hour Location: Office	New Appointment 3: Type: Initial Patient: Rulfs, Jill Staff: Randomly pick one Date: 03/08/2011 1:00 pm Duration: 30 minutes Location: Office

Task 4 (approximately 5 minutes): Now we will pull out two reports from the Report tab in the main screen:

New Report 1: Please pull out the report from 01/01/2010 to 05/30/2011	New Report 2: Please extract the report from 01/30/2009 to 05/15/2011	New Report 3: Please extract the report from 12/30/208 to 05/15/2012

QUESTIONS (approximately 10 minutes): Now, we will ask you a few questions to collect your individual feedback. I would like you to feel comfortable with saying what you really think and how you really feel.

Question 1: What do you think about the application?

Question 2: What do you like most?

Question 3: What do you like least?

Question 4: How can we make the application more easy to use?

Question 5: Which part is the easiest for you?

Question 6: How can we make the application more useful?

Question 7: Are there any questions that you want ask or any comments you would like to add?

CONCLUSION (approximately 5 minutes): We appreciate your comments! We recorded all your answers and feedback. We will improve the application and present the complete application to you by the final presentation in two more weeks. Thanks everyone for coming! Have a great day!

OUTCOME:

1. Each member submits summary of interviews/observations to the team leader.
2. The team leader will integrate all summaries and produces final result of the report.
3. In Table 2, we made the time schedule for the interview day:

Table 2 - Time Schedule for Interview

Time	Introduction	Application Tutorial	Install Application	Interview 1	Interview 2	Interview 3
11:15-11:20am	Member 1					
11:25-11:40am		Member 2				
11:45-12:15pm			Member 3	Member 4	Member 5	Member 1 and 2
12:20-12:25pm	Team Debrief					

4. In Table 3, a sample of observation worksheet was also made for recording the comments and time:

Table 3 - Sample Observation Worksheet

		Start Time	End Time	Comments
Task 1	New Patient 1			
	New Patient 2			
	New Patient 3			
Task 2	New Activity 1			
	New Activity 2			
	New Activity 3			
Task 3	New Appointment 1			
	New Appointment 2			
	New Appointment 3			
Task 4	New Report 1			
	New Report 2			
	New Report 3			

3.3. Sprint Results

After proposing the plan overview, as a group we decided to combine our weekly advisor meetings with our sprints transforming those meetings into sprint review/sprint planning meetings. In other words, we'd present what we accomplished and we would determine what have to do next. This method enables us to not only show progress, but to constantly change the requirements of the project. Since the program was built from scratch, the overall style of each sprint fluctuated. There were sprints where we would focus on the underlying structure of the program, whereas there would be sprints focusing more on a specific module. This is not surprising since each module is very unique. In other words, almost every feature of each module was a learning experience. However, each sprint, except for the last one, added more functionality.

Sprint 1: September 20, 2010 – September 27, 2010

By this time we had already set up the website and we had been working on the proposal for quite some time. Alex expanded more on the methodology section, Christopher wrote the General Method section, and Nhi and Donnie expanded on the Literature Review. In addition Alex, Michael, and Chris, were searching for Drupal modules to help with the patient manager system.

Sprint 2: September 27, 2010 – October 4, 2010

This week was dedicated to more work on the proposal and website. While Nhi and Donnie worked on the proposal, Alex, Mike, and Chris focused on improving the site. Regarding the website, we found a method managing database tables, which would help us in creating patient forms as well as a managing page.

Sprint 3: October 4, 2010 – October 11, 2010

In this sprint, we focused on finalizing the report. Nhi and Mike focused on the effective web page design section, Donnie worked on SDLC as well as citations, Chris improved on the background section, and Alex worked on the Scrum methodology section as well as the work plan section. Furthermore, Donnie and Nhi made the structure of the PowerPoint, which we then discussed and improved over the week in meetings. By the end of this sprint, we realized that the only way to create a patient manager system that was robust and secure enough to handle such data, we needed a standalone application. So, we chose Java as our language due to our experience with it and its versatility.

Sprint 4: October 25 – November 1, 2010

This sprint focused on preparing for the project proposal presentation, which was on October 30, 2010. We focused on modifying the methodology, fixing the presentation slides, and discussing how we should present. We concluded that Chris should introduce us and discuss the results, Donnie should discuss website design and SDLC, Mike should describe what a content management system is as well as Drupal, and Alex should present the SCRUM methodology and the work plan. As for presentation day, the R.E.A.C.H staff seemed pleased to hear all of the work we plan to do over B and C term.

Sprint 5: November 1 – November 8, 2010

The first term was dedicated to designing the foundation of the program and developing the patient and appointment module. In the first sprint, we researched what tools we needed to use, such as java (universal programming language), Netbeans (IDE – integrated development environment), WPI's SourceForge server, and subversion to keep track of changes. Furthermore, we designed the user interface for the patient module.

Sprint 6: November 8 – November 15, 2010

During the second week, we designed and implemented a rudimentary framework for connecting to the database. This includes creating a database manager for, and an entity manager for retrieving and saving information to the database. We also experimented with date fields since java and the SQL driver (handles requests between the computer and the database) handle them differently. Furthermore, on Saturday, November 13th, we met in with the R.E.A.C.H. staff to show them the current functionality of the program as well as discuss what we should do regarding the website. Since the site still used the reachprogram.us domain, the site isn't known on many search engines. So we discussed transferring this site to their current domain, reachfoundation.net, which was down because the hosting service expired. We ultimately decided to postpone this decision because the site is still experimental.

Sprint 7: November 15 – November 22, 2010

For the third week, we focused on modularizing the program to reduce dependencies in other modules (a module is an independent section of the program that is dedicated to performing one task, such as managing patient information or appointments). We also created a module controller, which initializes and handles each module. To finish up the week, we started on the appointment module, by creating a non-functional user interface.

Sprint 8: November 29 – December 6, 2010

As for the fourth week, we decided to finalize the patient module. In other words, we made all of the fields functional and kept the layout. This took quite a while since the patient entity contains the most fields and we needed to verify that all fields functioned properly within the program.

Next, we began work on the appointment module, which was quite a daunting task since there are many components of the interface that require synchronization. For example, the day selected on the main calendar has to be represented on the miniature calendar. Furthermore, when selecting an appointment, the previous selected appointment needs to be deselected from one list in order to select an appointment in another list. Maintaining this synchronicity was quite difficult at the time, especially since we had not experienced implementing such a heavily nested structure.

Sprint 9: December 6 – December 13 or 16, 2010

As for the final week of the term, we improved upon the two modules by adding the features that the R.E.A.C.H staff requested and created a GUI mockup of the activity module we planned to implement in the next term. In addition, we fixed various bugs with the modules so that the program wouldn't glitch during presentation day (Saturday, December 11, 2010).

Sprint 10: January 14 – January 21, 2010

The first sprint of C-Term focused on creating the activity module and the report module for the program. Alex was in charge of creating the activity module while Michael was in charge of creating the report module. The report module was by the end of the week, while the activity module lacked certain features such as creating a new activity properly and selecting the appropriate activity entity. Furthermore, Alex began refactoring the structure synchronization feature of the database. This element is crucial to the program since it verifies the integrity of the database. If there were an issue, such as an update to the program, the application would automatically add or change the necessary fields in the database.

Sprint 11: January 21 – January 28, 2010

The second sprint of C term involved Finishing up the activity module such as adding the ability to add and remove types, and enabling sorting of the columns in a table, which fixes the entity selection issue. Alex also made several changes to the appointment module as well as the core of the program. Now that all of the modules are functional, the program was ready to be presented to the R.E.A.C.H staff.

The second sprint of C term involved Finishing up the activity module such as adding the ability to add and remove types, and enabling sorting of the columns in a table, which fixes the entity selection issue. Alex also made several changes to the appointment module as well as the core of the program. Now that all of the modules are functional, the program was ready to be presented to the R.E.A.C.H staff.

Sprint 12: January 28 – February 4, 2011

On Saturday, January 29, we met with Jacqueline and Lisa to discuss the installation of MySQL on the local computer, demonstrate the activity and report module, as well as the requested features of the appointment module. Overall, they thought the program was easy to use and a time saver. However, we still needed some information from them, such as a list of referral sources and what the list of durations should be for activities and appointments. In addition, we discussed who should attend the final two meetings – the interview and final presentation. Finally, at the end of the meeting we successfully installed the MySQL and the program on the machine.

The rest of the week was devoted to improving the patient, appointment, and activity modules and adding more requested features, such as adding statuses to appointments including adding a color code within the calendar. Alex also added the ability to add and remove activity types, enabling the staff to schedule new activity groups. Furthermore, he added more functionality to the core of the program, such as making menu items in the menu bar appear and disappear according to the active module.

Sprint 13: February 4 – February 11, 2011

This sprint focused on finishing the database integrity checker, and improving elements of the user interface. About halfway through the week Alex finished the checker and began work on refining the patient form within the patient module. The main element that changed was the phone number field. Previously, the user had to either tab or click through boxes separating the codes within a phone number. The new method makes it all one text field while forcing it maintain a certain format. This significantly reduced the complexity of the patient form since there are four areas to input phone numbers.

Sprint 14: February 11 – February 18, 2011

Right before the day of the interview session, Alex added some more features to the program such as enabling automatic login, and user creation, while Michael tweaked the patient module by removing the old method to input referral sources and adding a simpler field.

On Saturday, February 12th, we went to Boston to interview the R.E.A.C.H. staff. After Donnie formally introduced us and described the agenda, we began testing the usability of the program. Unfortunately, there was an unknown Windows bug that caused certain aspects of the program to malfunction when running on a local database. For some reason the MySQL server for Windows creates tables with lowercase names, yet doesn't it doesn't accept queries of tables where the cases don't match. On Linux and Mac OS, this issue doesn't exist. Although this error caused issues such as the inability to save referral sources and activity types, the interview process was still a success since the staff members were able to perform most of the tasks assigned to them. The Interview section has more detailed results of the interview process.

Afterwards, Alex fixed the Windows bug, and various user interface hiccups. Making all functions query a lowercase version of the table name solved the windows issue. Furthermore, he fixed an issue where the activity settings window would freeze after creating a new activity. In addition to the fixes, he added the ability to edit date fields by keyboard, which requested by Nicole Croak.

3.4. Summary Methodology

In this chapter, we took a multi-faceted approach to solving the needs of the R.E.A.C.H. program. The first step in our approach was to choose a project development methodology. We considered several different methodologies, but ultimately decided to use the SCRUM methodology. One of the more common methodologies, such as Waterfall Development, would not have been well suited to our problem. In Waterfall Development, the development process is sequential, and never revisits a previous point in the process. This is fine for projects where the requirements are very clearly known from the start, and do not change. What we needed was an iterative development process that could handle changing requirements easily, which is why we settled on SCRUM. At the outset of the project, we knew that the project goals were not clearly defined and subject to change, so we chose the best methodology to handle that.

Due to the nature of our project, we could not directly implement the SCRUM methodology, so we made a few necessary modifications. The role of the product owner is not clearly defined for our task, so we decided to divide the role amongst the five of us, and spread out the responsibilities of that role to each team member. We also decided to merge the sprint review meetings, and the sprint planning meetings, due to time constraints. The last modification we made was to the daily SCRUM meetings. Since we were unable to meet every day, we decided to just meet when absolutely necessary, and maintained constant communication via email instead.

In order to maintain good documentation for our project, we adhered to the Javadoc standards. Javadoc allowed us to quickly generate developer documentation without requiring us to spend any time writing the HTML ourselves. With our limited time budget, that made Javadoc even more attractive.

Our interview protocol was developed so that we could best show the R.E.A.C.H. staff how to use the R.E.A.C.H. Patient Manager in the least amount of time. The protocol consists of a list of test patient data, along with test appointment and activity data. The R.E.A.C.H. staff was then asked to input the data, and perform common tasks (such as generating the report for a given period of time). This interactive approach to teaching the staff how to use the program is the best way we can utilize our time.

Chapter 4. Results

4.1. Website Design

We had three primary goals to keep in mind when designing the R.E.A.C.H. program website. The first was to develop a site that would allow new families to learn about the R.E.A.C.H. program, and easily find the information they need to register with the program. The second goal was to develop a site that would make it easy for current families to find out information about different activities, or any other important news about the R.E.A.C.H. program. The third goal was to develop a site that was easy for the R.E.A.C.H. staff to update and manage on their own. With these three goals in mind, we developed a website utilizing a Content Management System known as Drupal, and trained the R.E.A.C.H. staff in its use.

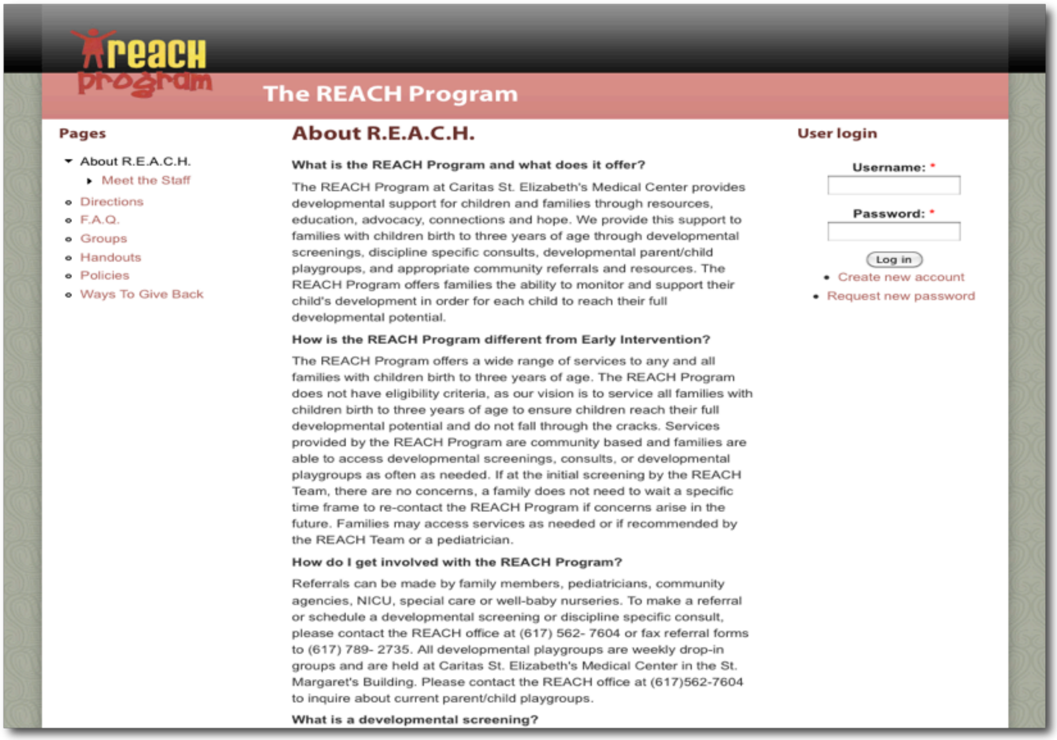
The first two goals are design issues, and do not really depend on the underlying system. Ultimately, what we wanted was for the users of the site to quickly find whatever information they are searching for. Users that cannot quickly find what they are looking for tend to quit looking instead of spending more of their time on the task. When designing the website, we opted for a simple layout, with the navigational links on the left hand side, and the page content on the right. We wanted all of the navigational links to be visible at all times, which meant that we also had to keep the number of pages to a minimum, to ensure that the list of links did not extend beyond the bottom of the browser window.

A content management system is a server-side program that allows for easy changes to the website through the website itself, instead of having to connect to the server and manually update files. We decided that this would be the best way for the R.E.A.C.H. staff to update their website, since it would require the least amount of technical expertise to operate. The requirements we had for choosing a content management system were that it had to be compatible with GoDaddy.com's web hosting service, that it allowed for easy modification as necessary, and that it could be easily upgraded in the future. With these requirements in mind, we chose Drupal as our content management system, and upgraded it with custom modules that allow for easy updating, and easy page editing similar to using a word processor. Due to the ease of use of the Drupal system, and of the custom modules developed by the Drupal community, training the R.E.A.C.H. staff on how to update their website was a simple task. Now, the R.E.A.C.H. program has a clean, efficient website which they can use to provide important information to the current and future families of the R.E.A.C.H. program.

Our next task was to choose a website design, and color scheme. Because we chose Drupal, we did not have to manually design the website using traditional methods such as writing CSS style sheets, we could instead just find and upload an appropriate theme, and let Drupal do the heavy lifting. The Drupal community has made thousands of themes available for people to choose from.

We wanted a theme that was both simple and professional. Many of the available themes were overly flashy, or difficult to navigate, or both. The theme we chose is called "Simply Modern", and we chose it because it resembles the design of the former website, and also because all the links in the navigation column are always visible. When choosing a color scheme, we wanted to keep the scheme similar to what the previous website was using, to make sure the website would be easily recognizable. We chose light colors to make the page easy to read, and went with a light-pink color scheme to match that of the program itself as shown in Figure 11. The R.E.A.C.H. program services a wide variety of families, many of whom may not be very technically proficient, so we put a high priority on usability, and the Simply Modern theme addresses that concern. The user never has to search for a link, which we felt was a very important design choice. Here is the new website design as shown in Figure 10, 11, 12, 13, and 14. In Figure 14, you can see the graphical page editor which allows the staff to make changes to the website without having any coding knowledge. It uses an interface similar to Microsoft Word.

Another element we added to the website is an editable PDF version of the Patient Intake Form. This form allows people to type their information into the form and print it, and give it to the R.E.A.C.H. staff who can then add the patient to the Patient Manager. The layout of the PDF matches the fields in the Patient Manager, to make the process easy and straightforward for the staff.



About R.E.A.C.H.

What is the REACH Program and what does it offer?

The REACH Program at Caritas St. Elizabeth's Medical Center provides developmental support for children and families through resources, education, advocacy, connections and hope. We provide this support to families with children birth to three years of age through developmental screenings, discipline specific consults, developmental parent/child playgroups, and appropriate community referrals and resources. The REACH Program offers families the ability to monitor and support their child's development in order for each child to reach their full developmental potential.

How is the REACH Program different from Early Intervention?

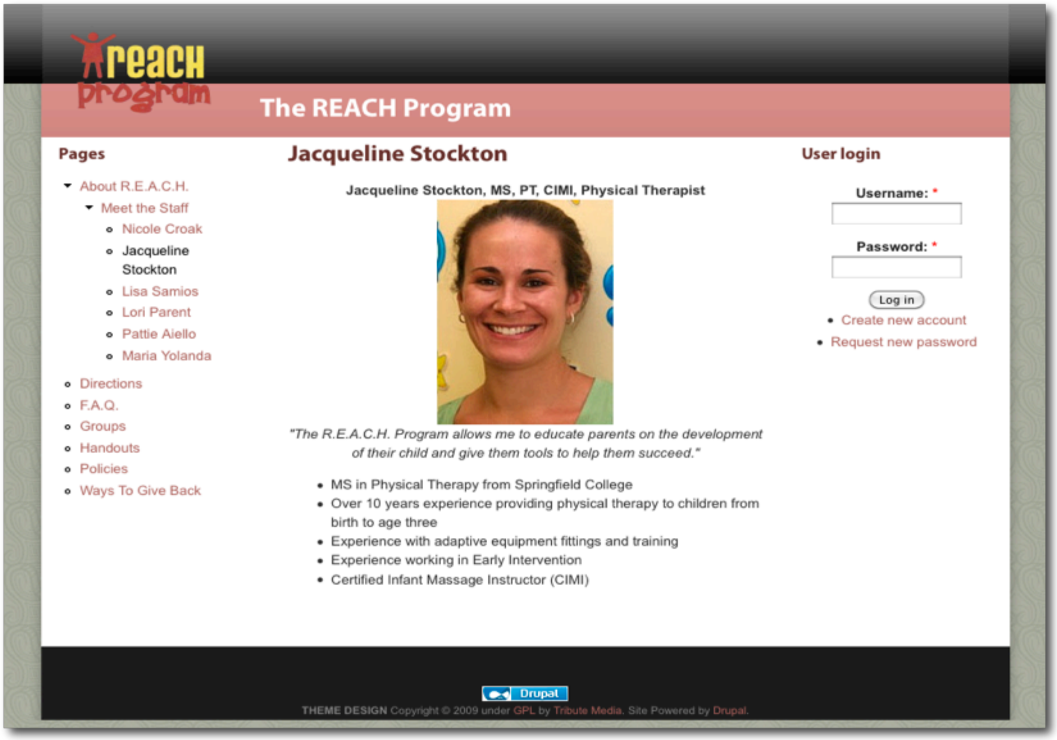
The REACH Program offers a wide range of services to any and all families with children birth to three years of age. The REACH Program does not have eligibility criteria, as our vision is to service all families with children birth to three years of age to ensure children reach their full developmental potential and do not fall through the cracks. Services provided by the REACH Program are community based and families are able to access developmental screenings, consults, or developmental playgroups as often as needed. If at the initial screening by the REACH Team, there are no concerns, a family does not need to wait a specific time frame to re-contact the REACH Program if concerns arise in the future. Families may access services as needed or if recommended by the REACH Team or a pediatrician.

How do I get involved with the REACH Program?

Referrals can be made by family members, pediatricians, community agencies, NICU, special care or well-baby nurseries. To make a referral or schedule a developmental screening or discipline specific consult, please contact the REACH office at (617) 562- 7604 or fax referral forms to (617) 789- 2735. All developmental playgroups are weekly drop-in groups and are held at Caritas St. Elizabeth's Medical Center in the St. Margaret's Building. Please contact the REACH office at (617)562-7604 to inquire about current parent/child playgroups.

What is a developmental screening?

Figure 10 – New Website 1



Jacqueline Stockton

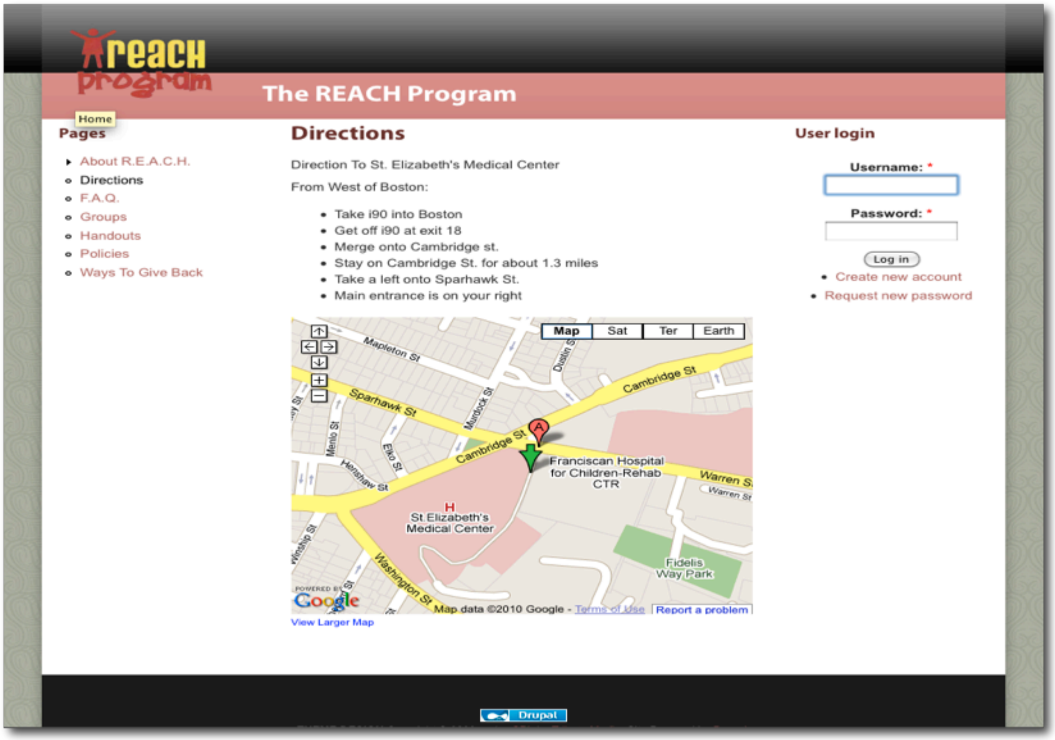
Jacqueline Stockton, MS, PT, CIMI, Physical Therapist

"The R.E.A.C.H. Program allows me to educate parents on the development of their child and give them tools to help them succeed."

- MS in Physical Therapy from Springfield College
- Over 10 years experience providing physical therapy to children from birth to age three
- Experience with adaptive equipment fittings and training
- Experience working in Early Intervention
- Certified Infant Massage Instructor (CIMI)

THEME DESIGN Copyright © 2009 under GPL by Tribute Media. Site Powered by Drupal.

Figure 11 – New Website 2



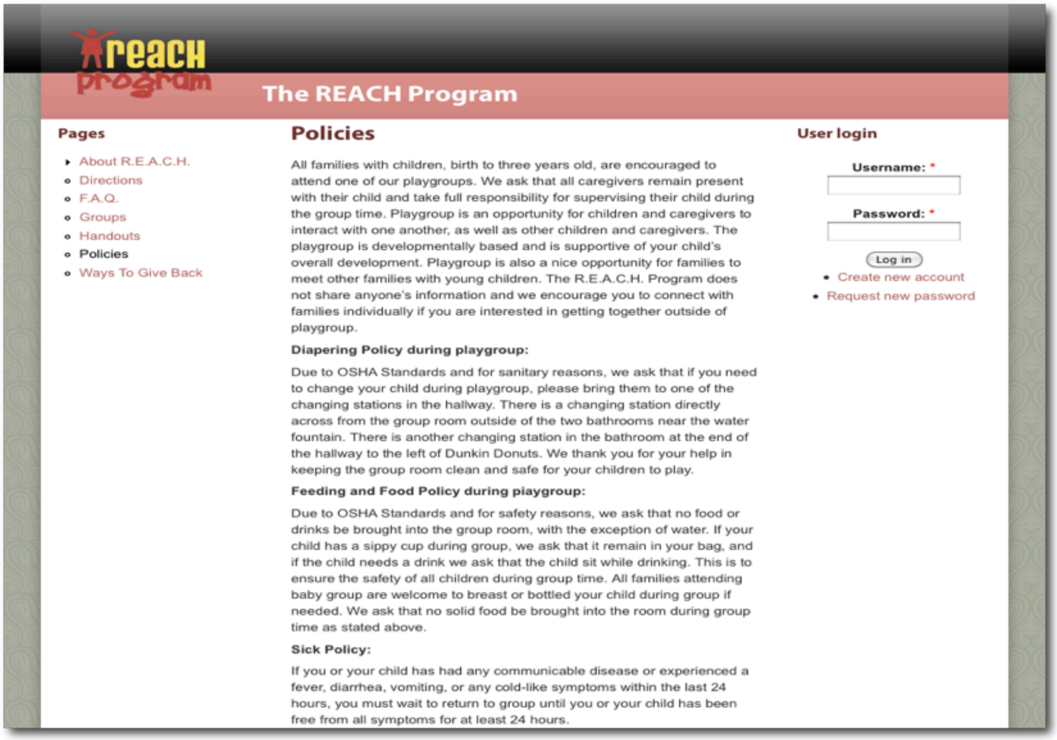
Directions

Direction To St. Elizabeth's Medical Center

From West of Boston:

- Take i90 into Boston
- Get off i90 at exit 18
- Merge onto Cambridge st.
- Stay on Cambridge St. for about 1.3 miles
- Take a left onto Sparhawk St.
- Main entrance is on your right

Figure 12 – New Website 3



Policies

All families with children, birth to three years old, are encouraged to attend one of our playgroups. We ask that all caregivers remain present with their child and take full responsibility for supervising their child during the group time. Playgroup is an opportunity for children and caregivers to interact with one another, as well as other children and caregivers. The playgroup is developmentally based and is supportive of your child's overall development. Playgroup is also a nice opportunity for families to meet other families with young children. The R.E.A.C.H. Program does not share anyone's information and we encourage you to connect with families individually if you are interested in getting together outside of playgroup.

Diapering Policy during playgroup:

Due to OSHA Standards and for sanitary reasons, we ask that if you need to change your child during playgroup, please bring them to one of the changing stations in the hallway. There is a changing station directly across from the group room outside of the two bathrooms near the water fountain. There is another changing station in the bathroom at the end of the hallway to the left of Dunkin Donuts. We thank you for your help in keeping the group room clean and safe for your children to play.

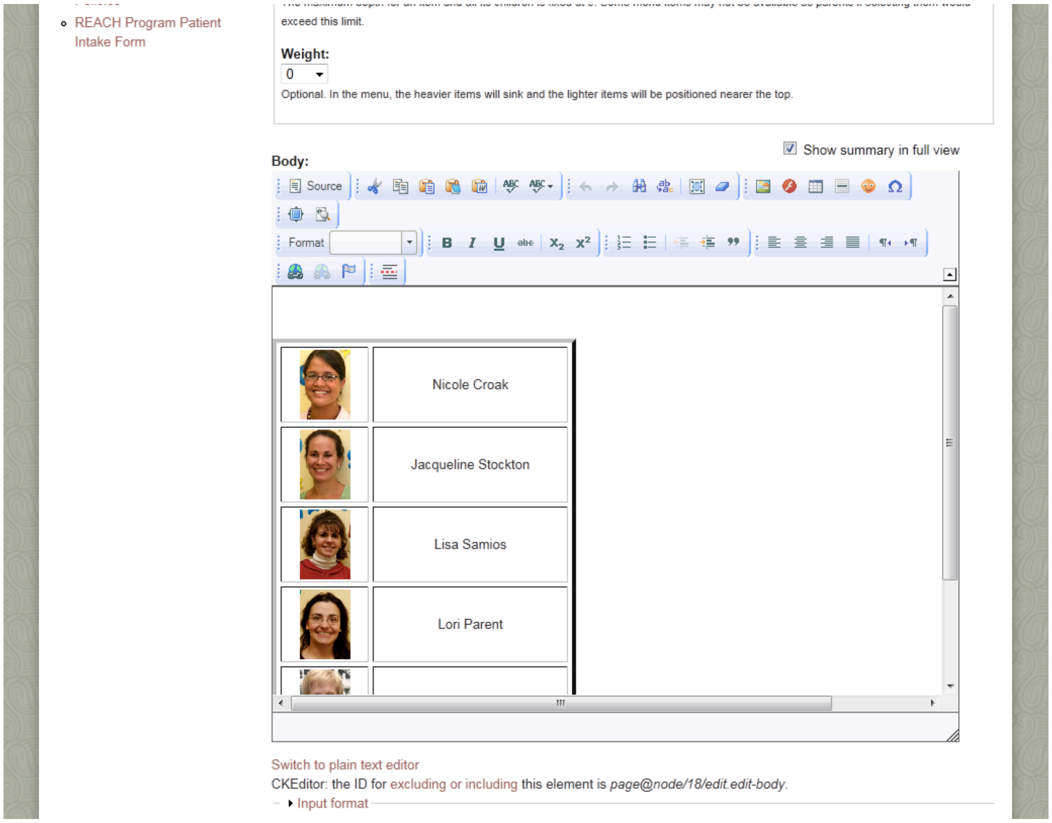
Feeding and Food Policy during piaygroup:

Due to OSHA Standards and for safety reasons, we ask that no food or drinks be brought into the group room, with the exception of water. If your child has a sippy cup during group, we ask that it remain in your bag, and if the child needs a drink we ask that the child sit while drinking. This is to ensure the safety of all children during group time. All families attending baby group are welcome to breast or bottled your child during group if needed. We ask that no solid food be brought into the room during group time as stated above.

Sick Policy:

If you or your child has had any communicable disease or experienced a fever, diarrhea, vomiting, or any cold-like symptoms within the last 24 hours, you must wait to return to group until you or your child has been free from all symptoms for at least 24 hours.

Figure 13 – New Website 4



- REACH Program Patient Intake Form

exceed this limit.

Weight:
0

Optional. In the menu, the heavier items will sink and the lighter items will be positioned nearer the top.

☑ Show summary in full view

Body:

	Nicole Croak
	Jacqueline Stockton
	Lisa Samios
	Lori Parent

Switch to plain text editor

CKEditor: the ID for excluding or including this element is *page@node/18/edit.edit-body.*

Input format

Figure 14 – New Website (Editing Page)

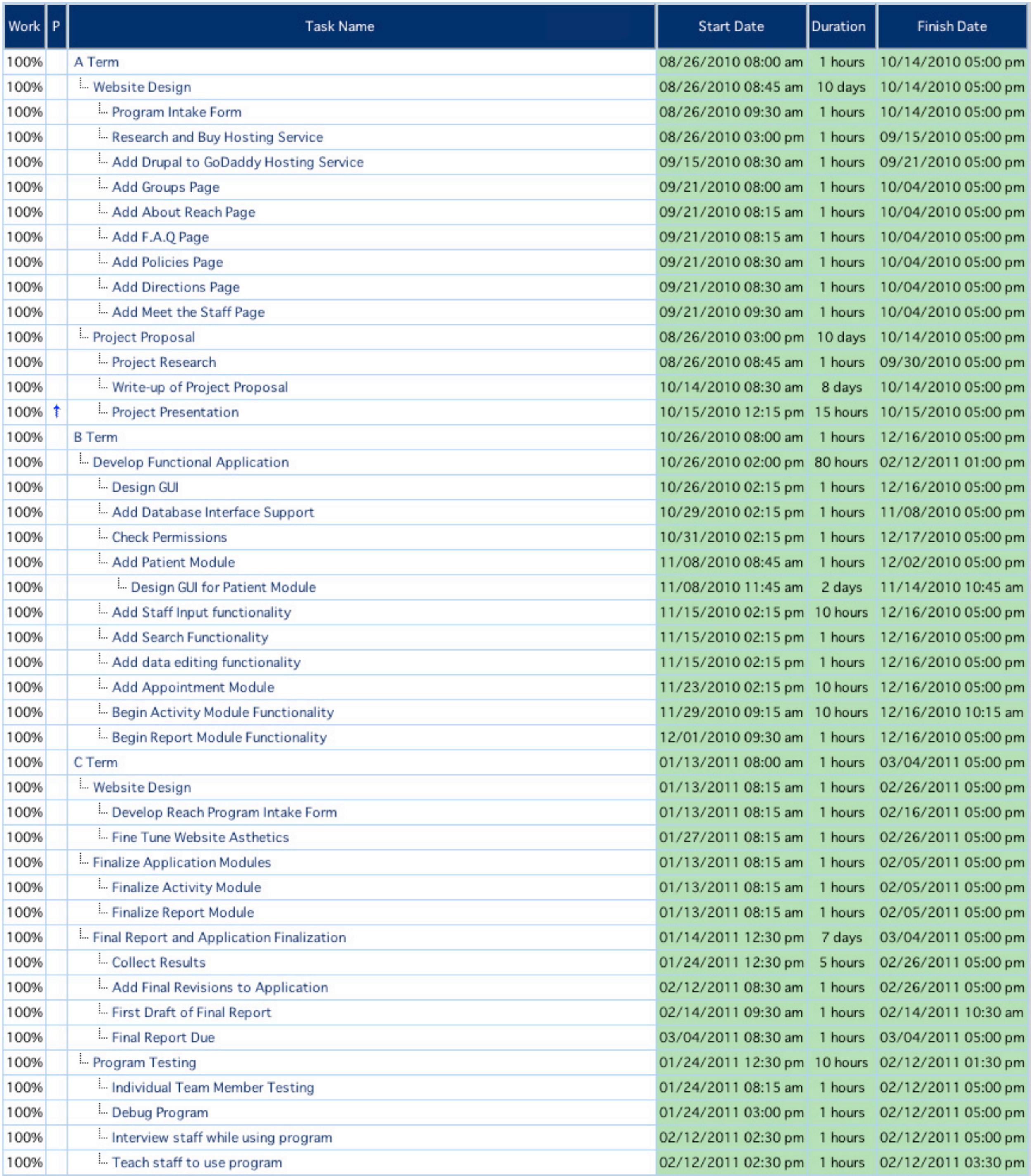
4.2. Patient Manager Application Development

4.2.1. PRODUCT BACKLOG

Our product backlog was recorded using a task manager system known as DotProject. By using this tool, we were able to log all of our tasks and goals and set strict deadlines for each to make sure we stayed on track. In Figure 15, you can see how our product backlog is composed. There are four main columns that were vital in keeping us on track throughout the report called Task Name, Work (percentage complete), Start Date, and Finish Date. Under Task Name, there are three main 'parent' elements corresponding to the A, B, and C terms we worked over during the course of this project. All the dependent tasks that fall under the parent task are indicated ninety degree, dotted lines underneath their parent element.

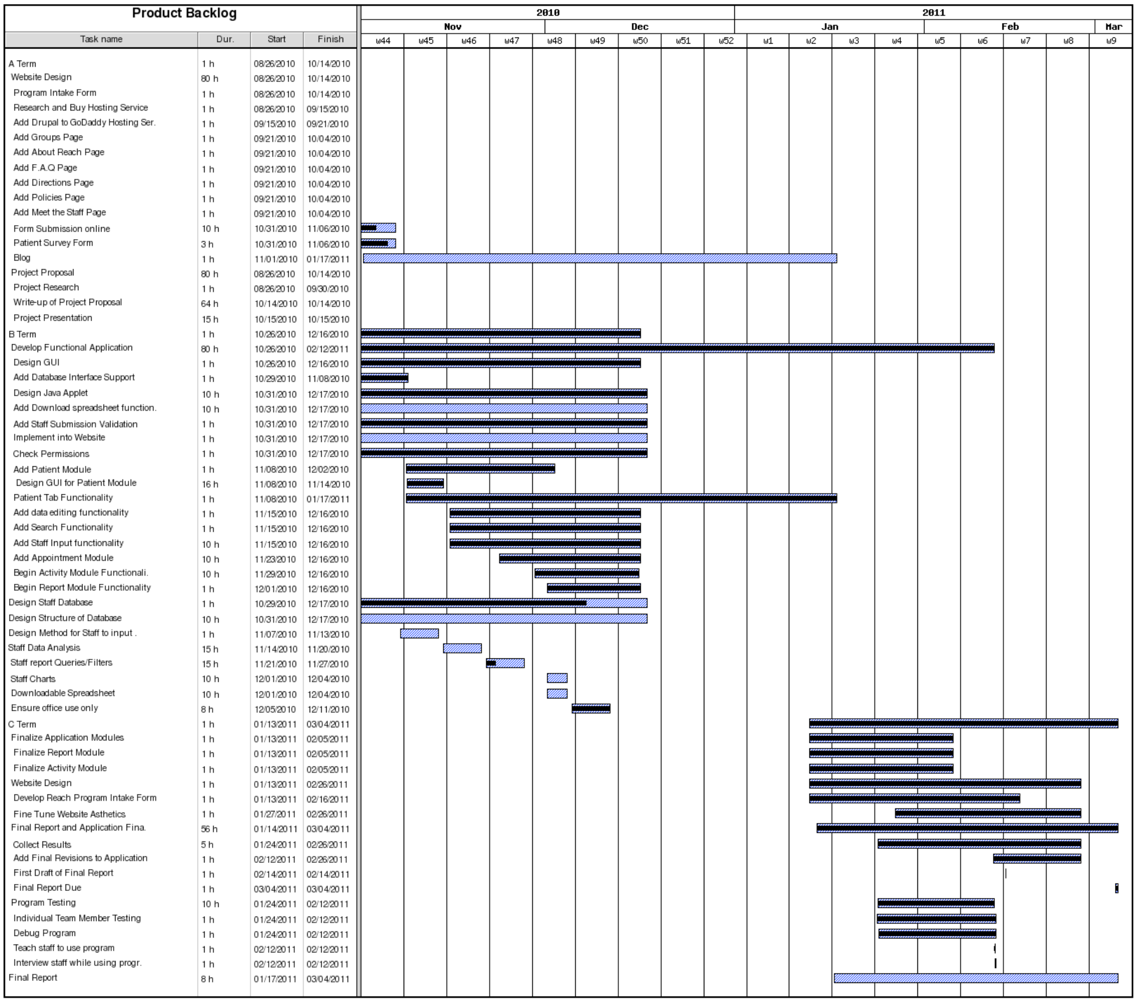
The first set in the plan was comprised mostly of the project proposal and website design. The second set of sprints shifted away from the website and focused solely on the creation of an application to handle patient information, appointments, program activities, and report generation. Lastly, the final set of sprints were a combination between testing, debugging, and adding the final touches to the application as well as completing the final report.

As an added bonus, DotProject can automatically create Gantt charts for us. A Gantt chart is a type of bar chart that illustrates a project schedule. Gantt charts illustrate the start and finish dates of tasks and summary elements of a project. Figure 16 shows the Gantt chart that DotProject produced for all of our tasks. Overall, DotProject was a very efficient and effective choice to manage all the tasks we had to do for this project.



Work	P	Task Name	Start Date	Duration	Finish Date
100%		A Term	08/26/2010 08:00 am	1 hours	10/14/2010 05:00 pm
100%		└ Website Design	08/26/2010 08:45 am	10 days	10/14/2010 05:00 pm
100%		└ Program Intake Form	08/26/2010 09:30 am	1 hours	10/14/2010 05:00 pm
100%		└ Research and Buy Hosting Service	08/26/2010 03:00 pm	1 hours	09/15/2010 05:00 pm
100%		└ Add Drupal to GoDaddy Hosting Service	09/15/2010 08:30 am	1 hours	09/21/2010 05:00 pm
100%		└ Add Groups Page	09/21/2010 08:00 am	1 hours	10/04/2010 05:00 pm
100%		└ Add About Reach Page	09/21/2010 08:15 am	1 hours	10/04/2010 05:00 pm
100%		└ Add F.A.Q Page	09/21/2010 08:15 am	1 hours	10/04/2010 05:00 pm
100%		└ Add Policies Page	09/21/2010 08:30 am	1 hours	10/04/2010 05:00 pm
100%		└ Add Directions Page	09/21/2010 08:30 am	1 hours	10/04/2010 05:00 pm
100%		└ Add Meet the Staff Page	09/21/2010 09:30 am	1 hours	10/04/2010 05:00 pm
100%		└ Project Proposal	08/26/2010 03:00 pm	10 days	10/14/2010 05:00 pm
100%		└ Project Research	08/26/2010 08:45 am	1 hours	09/30/2010 05:00 pm
100%		└ Write-up of Project Proposal	10/14/2010 08:30 am	8 days	10/14/2010 05:00 pm
100%	↑	└ Project Presentation	10/15/2010 12:15 pm	15 hours	10/15/2010 05:00 pm
100%		B Term	10/26/2010 08:00 am	1 hours	12/16/2010 05:00 pm
100%		└ Develop Functional Application	10/26/2010 02:00 pm	80 hours	02/12/2011 01:00 pm
100%		└ Design GUI	10/26/2010 02:15 pm	1 hours	12/16/2010 05:00 pm
100%		└ Add Database Interface Support	10/29/2010 02:15 pm	1 hours	11/08/2010 05:00 pm
100%		└ Check Permissions	10/31/2010 02:15 pm	1 hours	12/17/2010 05:00 pm
100%		└ Add Patient Module	11/08/2010 08:45 am	1 hours	12/02/2010 05:00 pm
100%		└ Design GUI for Patient Module	11/08/2010 11:45 am	2 days	11/14/2010 10:45 am
100%		└ Add Staff Input functionality	11/15/2010 02:15 pm	10 hours	12/16/2010 05:00 pm
100%		└ Add Search Functionality	11/15/2010 02:15 pm	1 hours	12/16/2010 05:00 pm
100%		└ Add data editing functionality	11/15/2010 02:15 pm	1 hours	12/16/2010 05:00 pm
100%		└ Add Appointment Module	11/23/2010 02:15 pm	10 hours	12/16/2010 05:00 pm
100%		└ Begin Activity Module Functionality	11/29/2010 09:15 am	10 hours	12/16/2010 10:15 am
100%		└ Begin Report Module Functionality	12/01/2010 09:30 am	1 hours	12/16/2010 05:00 pm
100%		C Term	01/13/2011 08:00 am	1 hours	03/04/2011 05:00 pm
100%		└ Website Design	01/13/2011 08:15 am	1 hours	02/26/2011 05:00 pm
100%		└ Develop Reach Program Intake Form	01/13/2011 08:15 am	1 hours	02/16/2011 05:00 pm
100%		└ Fine Tune Website Asthetics	01/27/2011 08:15 am	1 hours	02/26/2011 05:00 pm
100%		└ Finalize Application Modules	01/13/2011 08:15 am	1 hours	02/05/2011 05:00 pm
100%		└ Finalize Activity Module	01/13/2011 08:15 am	1 hours	02/05/2011 05:00 pm
100%		└ Finalize Report Module	01/13/2011 08:15 am	1 hours	02/05/2011 05:00 pm
100%		└ Final Report and Application Finalization	01/14/2011 12:30 pm	7 days	03/04/2011 05:00 pm
100%		└ Collect Results	01/24/2011 12:30 pm	5 hours	02/26/2011 05:00 pm
100%		└ Add Final Revisions to Application	02/12/2011 08:30 am	1 hours	02/26/2011 05:00 pm
100%		└ First Draft of Final Report	02/14/2011 09:30 am	1 hours	02/14/2011 10:30 am
100%		└ Final Report Due	03/04/2011 08:30 am	1 hours	03/04/2011 05:00 pm
100%		└ Program Testing	01/24/2011 12:30 pm	10 hours	02/12/2011 01:30 pm
100%		└ Individual Team Member Testing	01/24/2011 08:15 am	1 hours	02/12/2011 05:00 pm
100%		└ Debug Program	01/24/2011 03:00 pm	1 hours	02/12/2011 05:00 pm
100%		└ Interview staff while using program	02/12/2011 02:30 pm	1 hours	02/12/2011 05:00 pm
100%		└ Teach staff to use program	02/12/2011 02:30 pm	1 hours	02/12/2011 03:30 pm

Figure 15 - Product Backlog



Product Backlog

Task name	Dur.	Start	Finish
A Term	1 h	08/26/2010	10/14/2010
Website Design	80 h	08/26/2010	10/14/2010
Program Intake Form	1 h	08/26/2010	10/14/2010
Research and Buy Hosting Service	1 h	08/26/2010	09/15/2010
Add Drupal to GoDaddy Hosting Ser.	1 h	09/15/2010	09/21/2010
Add Groups Page	1 h	09/21/2010	10/04/2010
Add About Reach Page	1 h	09/21/2010	10/04/2010
Add F.A.Q Page	1 h	09/21/2010	10/04/2010
Add Directions Page	1 h	09/21/2010	10/04/2010
Add Policies Page	1 h	09/21/2010	10/04/2010
Add Meet the Staff Page	1 h	09/21/2010	10/04/2010
Form Submission online	10 h	10/31/2010	11/06/2010
Patient Survey Form	3 h	10/31/2010	11/06/2010
Blog	1 h	11/01/2010	01/17/2011
Project Proposal	80 h	08/26/2010	10/14/2010
Project Research	1 h	08/26/2010	09/30/2010
Write-up of Project Proposal	64 h	10/14/2010	10/14/2010
Project Presentation	15 h	10/15/2010	10/15/2010
B Term	1 h	10/26/2010	12/16/2010
Develop Functional Application	80 h	10/26/2010	02/12/2011
Design GUI	1 h	10/26/2010	12/16/2010
Add Database Interface Support	1 h	10/29/2010	11/08/2010
Design Java Applet	10 h	10/31/2010	12/17/2010
Add Download spreadsheet function.	10 h	10/31/2010	12/17/2010
Add Staff Submission Validation	1 h	10/31/2010	12/17/2010
Implement into Website	1 h	10/31/2010	12/17/2010
Check Permissions	1 h	10/31/2010	12/17/2010
Add Patient Module	1 h	11/08/2010	12/02/2010
Design GUI for Patient Module	16 h	11/08/2010	11/14/2010
Patient Tab Functionality	1 h	11/08/2010	01/17/2011
Add data editing functionality	1 h	11/15/2010	12/16/2010
Add Search Functionality	1 h	11/15/2010	12/16/2010
Add Staff Input functionality	10 h	11/15/2010	12/16/2010
Add Appointment Module	10 h	11/23/2010	12/16/2010
Begin Activity Module Functionali.	10 h	11/29/2010	12/16/2010
Begin Report Module Functionality	1 h	12/01/2010	12/16/2010
Design Staff Database	1 h	10/29/2010	12/17/2010
Design Structure of Database	10 h	10/31/2010	12/17/2010
Design Method for Staff to input .	1 h	11/07/2010	11/13/2010
Staff Data Analysis	15 h	11/14/2010	11/20/2010
Staff report Queries/Filters	15 h	11/21/2010	11/27/2010
Staff Charts	10 h	12/01/2010	12/04/2010
Downloadable Spreadsheet	10 h	12/01/2010	12/04/2010
Ensure office use only	8 h	12/05/2010	12/11/2010
C Term	1 h	01/13/2011	03/04/2011
Finalize Application Modules	1 h	01/13/2011	02/05/2011
Finalize Report Module	1 h	01/13/2011	02/05/2011
Finalize Activity Module	1 h	01/13/2011	02/05/2011
Website Design	1 h	01/13/2011	02/26/2011
Develop Reach Program Intake Form	1 h	01/13/2011	02/16/2011
Fine Tune Website Asthetics	1 h	01/27/2011	02/26/2011
Final Report and Application Fina.	56 h	01/14/2011	03/04/2011
Collect Results	5 h	01/24/2011	02/26/2011
Add Final Revisions to Application	1 h	02/12/2011	02/26/2011
First Draft of Final Report	1 h	02/14/2011	02/14/2011
Final Report Due	1 h	03/04/2011	03/04/2011
Program Testing	10 h	01/24/2011	02/12/2011
Individual Team Member Testing	1 h	01/24/2011	02/12/2011
Debug Program	1 h	01/24/2011	02/12/2011
Teach staff to use program	1 h	02/12/2011	02/12/2011
Interview staff while using progr.	1 h	02/12/2011	02/12/2011
Final Report	8 h	01/17/2011	03/04/2011

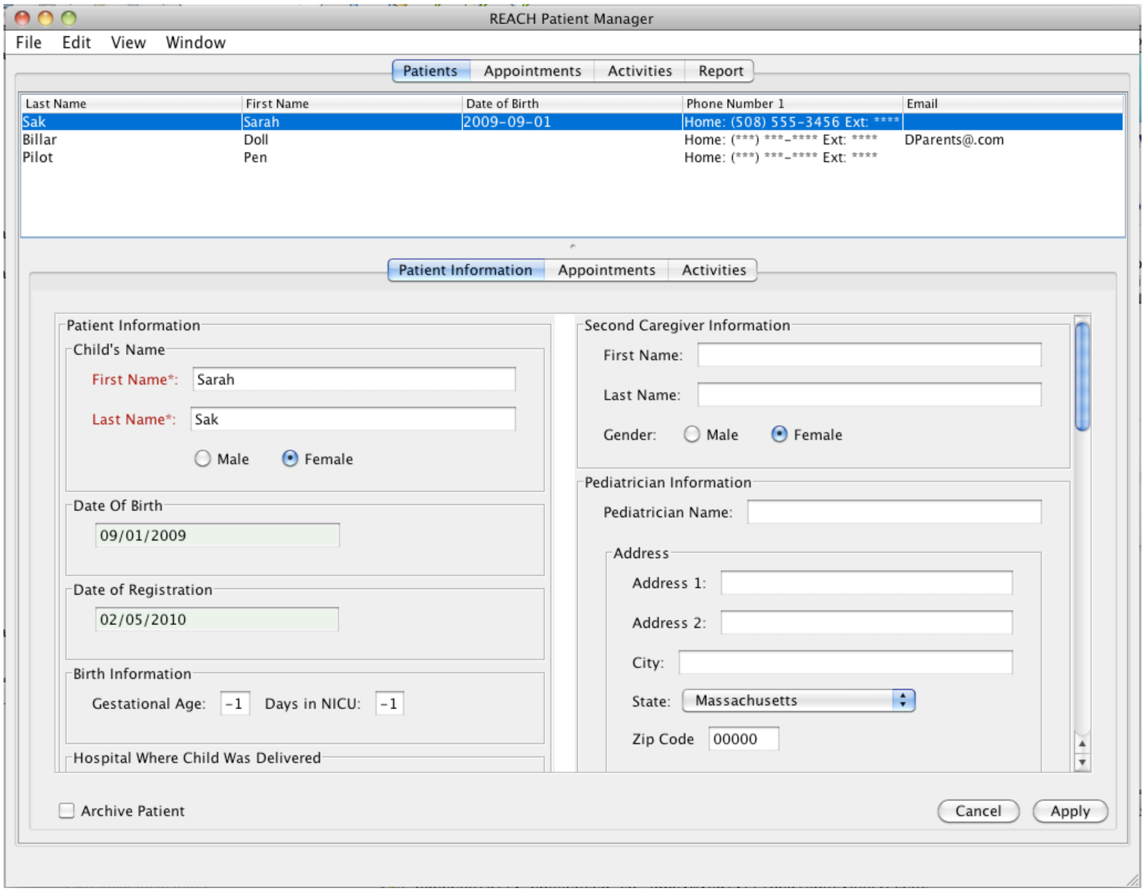
Figure 16 - Product Backlog (Gantt Chart)

4.2.2. Designing the GUI

When designing the user interface for the R.E.A.C.H. Patient Manager, we decided to take a modular approach. The main program window is split into two parts, the menu bar, and the module pane. The advantages to choosing this approach is two-fold; one advantage is that the entire application is kept in the same main window, and the other is that the program can be very quickly and easily upgraded simply by adding another module.

Each module is displayed in its own tabbed pane in the main program window. By keeping everything in the same window, the program is simpler to use, and any part of the application is readily accessible. By splitting the program up into multiple modules, we were also able to accelerate the development process by working on multiple modules simultaneously.

The layout of the patient module, shown in Figure 17, consists of a table of all the currently registered patients, followed by a collapsible pane consisting of editable fields for more detailed patient information. By using the menu bar, you can switch between viewing archived patients, or unachieved patients.



Last Name	First Name	Date of Birth	Phone Number 1	Email
Sak	Sarah	2009-09-01	Home: (508) 555-3456 Ext: ****	
Billar	Doll		Home: (***) ***-**** Ext: ****	DParents@.com
Pilot	Pen		Home: (***) ***-**** Ext: ****	

Patient Information

Child's Name

First Name*: Sarah

Last Name*: Sak

○ Male ● Female

Date Of Birth

09/01/2009

Date of Registration

02/05/2010

Birth Information

Gestational Age: -1 Days in NICU: -1

Hospital Where Child Was Delivered

Second Caregiver Information

First Name:

Last Name:

Gender: ○ Male ● Female

Pediatrician Information

Pediatrician Name:

Address

Address 1:

Address 2:

City:

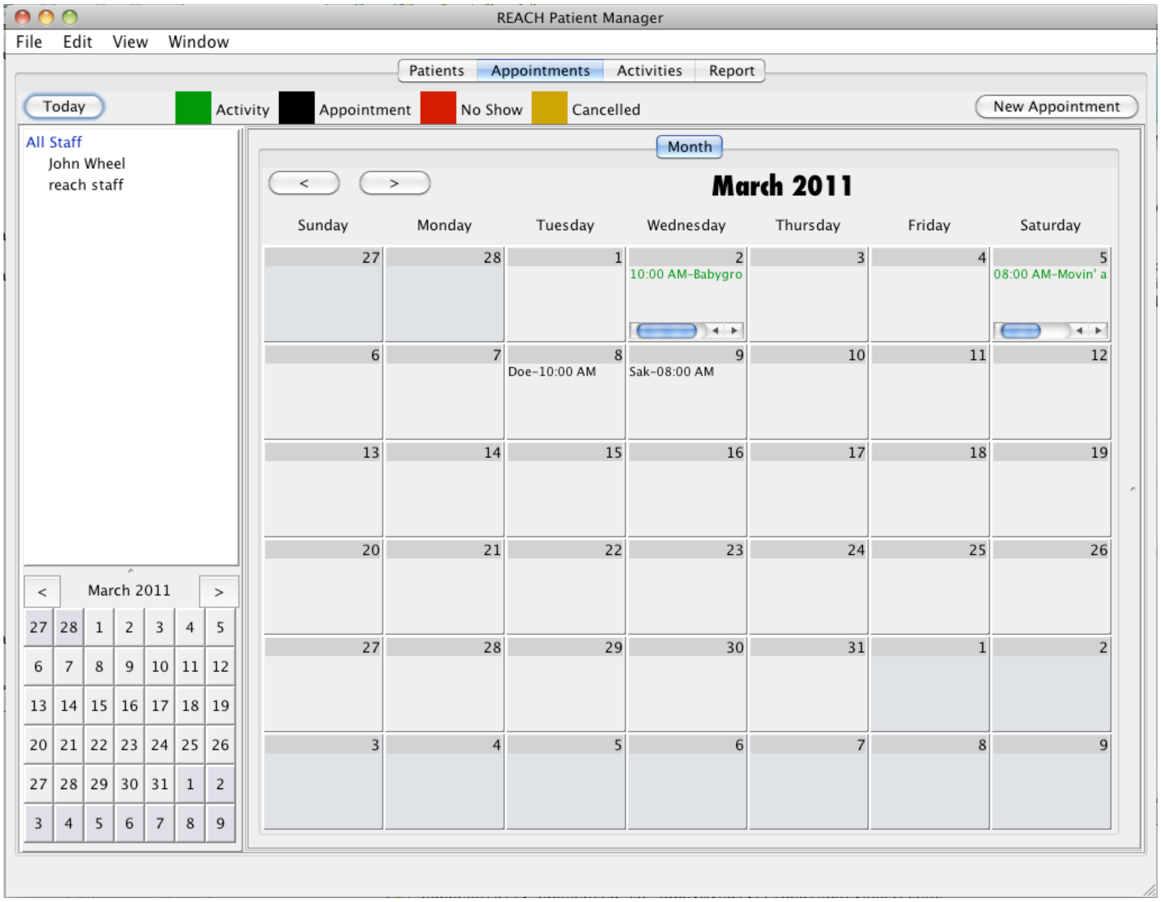
State: Massachusetts

Zip Code 00000

□ Archive Patient

Figure 17 - Patient Module in REACHPM Application

The appointments module, shown in Figure 18, consists of three main columns. The left column has a list of all the staff members, which allows the user to filter appointments by staff, and underneath that is a mini calendar for quick navigation. The centered column consists of the appointment calendar. Each calendar day is clickable, allowing for the easy addition of new appointments. The right column is collapsible, and consists of the appointment editor. The appointment editor provides various fields for storing appointment information, along with a quick summary of patient information.

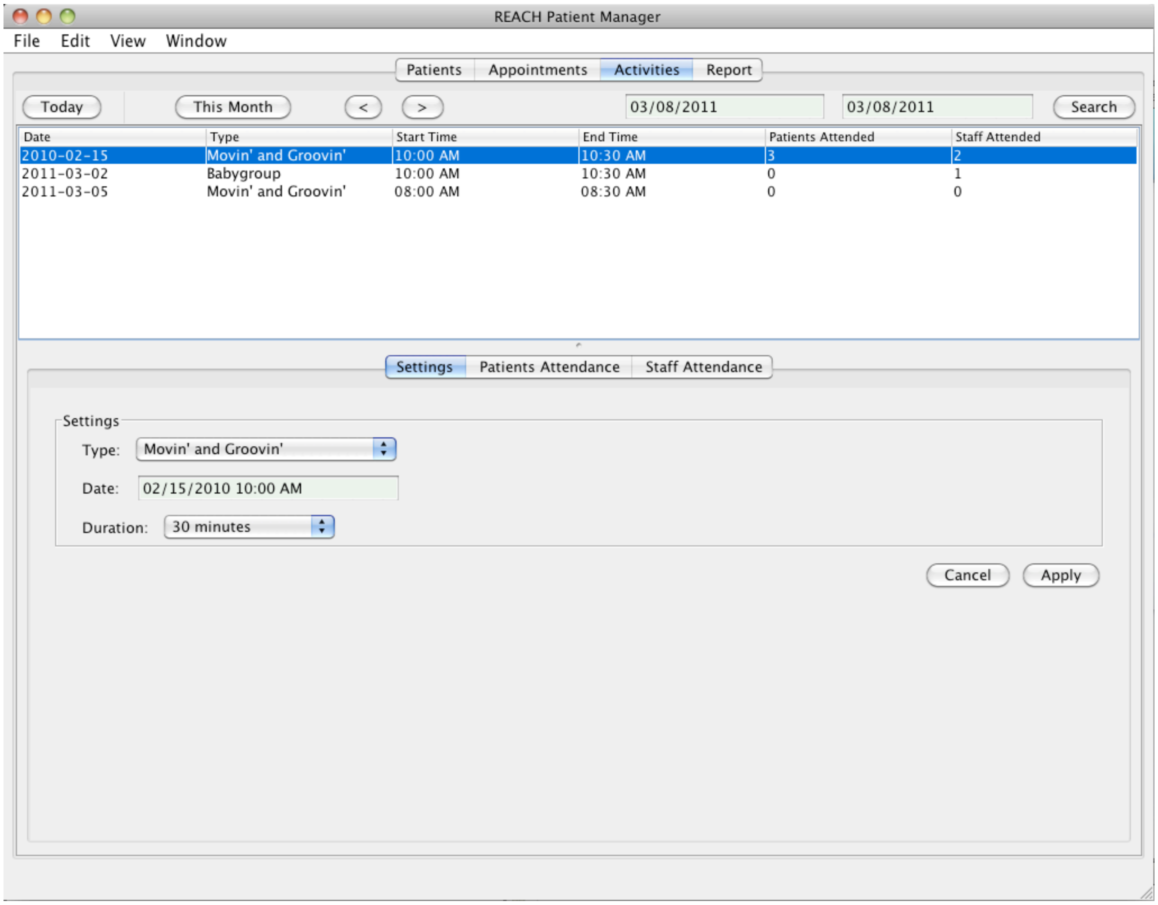


<			March 2011			>
27	28	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	1	2 10:00 AM-Babygro	3	4	5 08:00 AM-Movin' a
6	7	8 Doe-10:00 AM	9 Sak-08:00 AM	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9

Figure 18 - Appointment Module in REACHPM Application

The activities module in Figure 19 is similar in layout to the patient module, where the top section is a table that displays activities, and the bottom half consists of an activity editor.



03/08/2011 03/08/2011

Date	Type	Start Time	End Time	Patients Attended	Staff Attended
2010-02-15	Movin' and Groovin'	10:00 AM	10:30 AM	3	2
2011-03-02	Babygroup	10:00 AM	10:30 AM	0	1
2011-03-05	Movin' and Groovin'	08:00 AM	08:30 AM	0	0

Settings

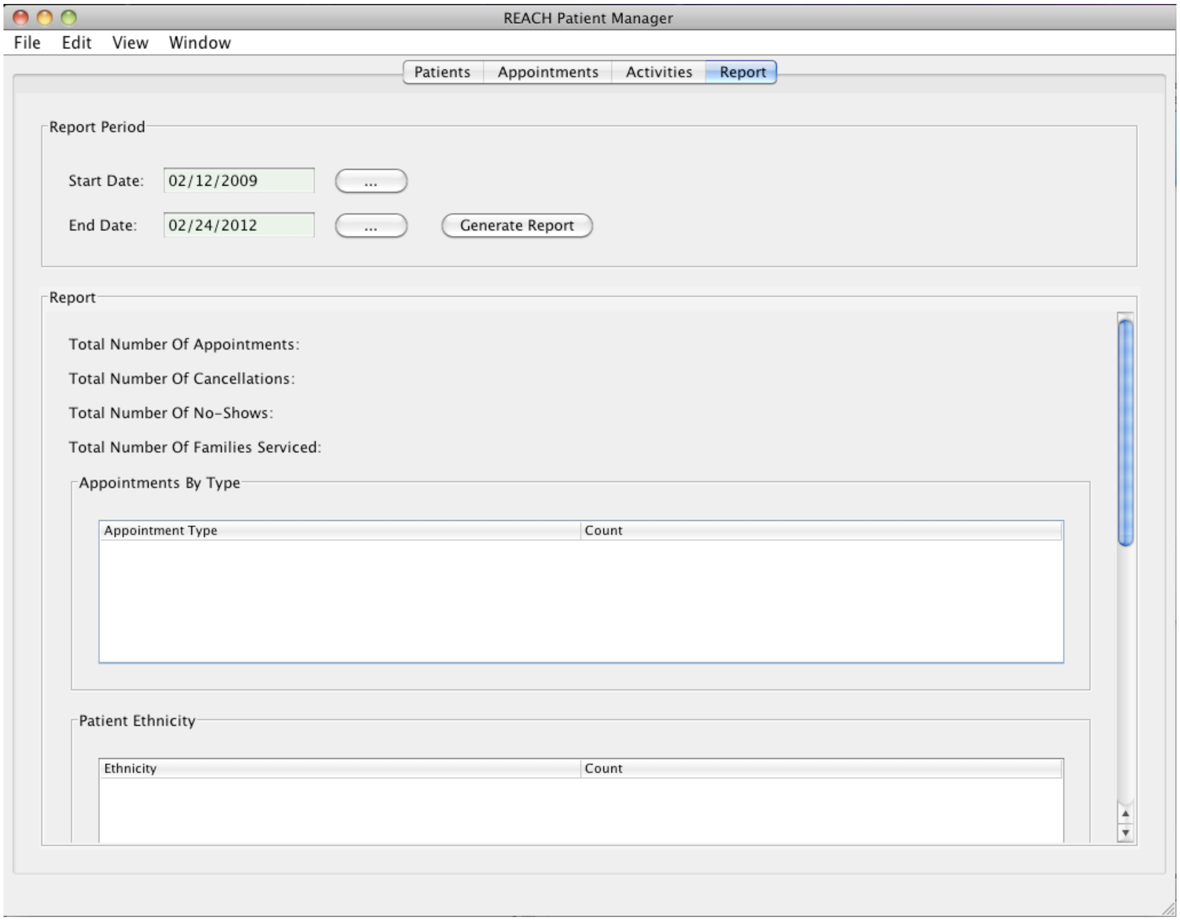
Type: Movin' and Groovin'

Date: 02/15/2010 10:00 AM

Duration: 30 minutes

Figure 19 - Activity Module in REACHPM Application

The final module in Figure 20, the report module, has two sections. In the top section, there are two fields to set the start and end date for the reporting period, and a button to generate the report for that period. Beneath that is the actual report, made up of text fields and tables summarizing patient and appointment data for the given period.



Report Period

Start Date: 02/12/2009

End Date: 02/24/2012

Report

Total Number Of Appointments:

Total Number Of Cancellations:

Total Number Of No-Shows:

Total Number Of Families Serviced:

Appointments By Type

Appointment Type	Count

Patient Ethnicity

Ethnicity	Count

Figure 20 - Report Module in REACHPM Application

4.2.2. Design Elements

One of the key steps in software development is laying out, in advance, what the database structure is. This step allows the developers to create the necessary associated classes, and also plan out their remaining development in a logical flow. One of the most commonly used tools for this is the Entity-Relationship Diagram. The ER Diagram allows you to organize data into logical entities and the relationships between them (Oracle, 1995). Another advantage of the ER Diagram is that it translates very easily into a database schema for a relational database. The ER Diagram for the R.E.A.C.H. Patient Manager consists of six entities, and eight relationships as shown in Figure 21.

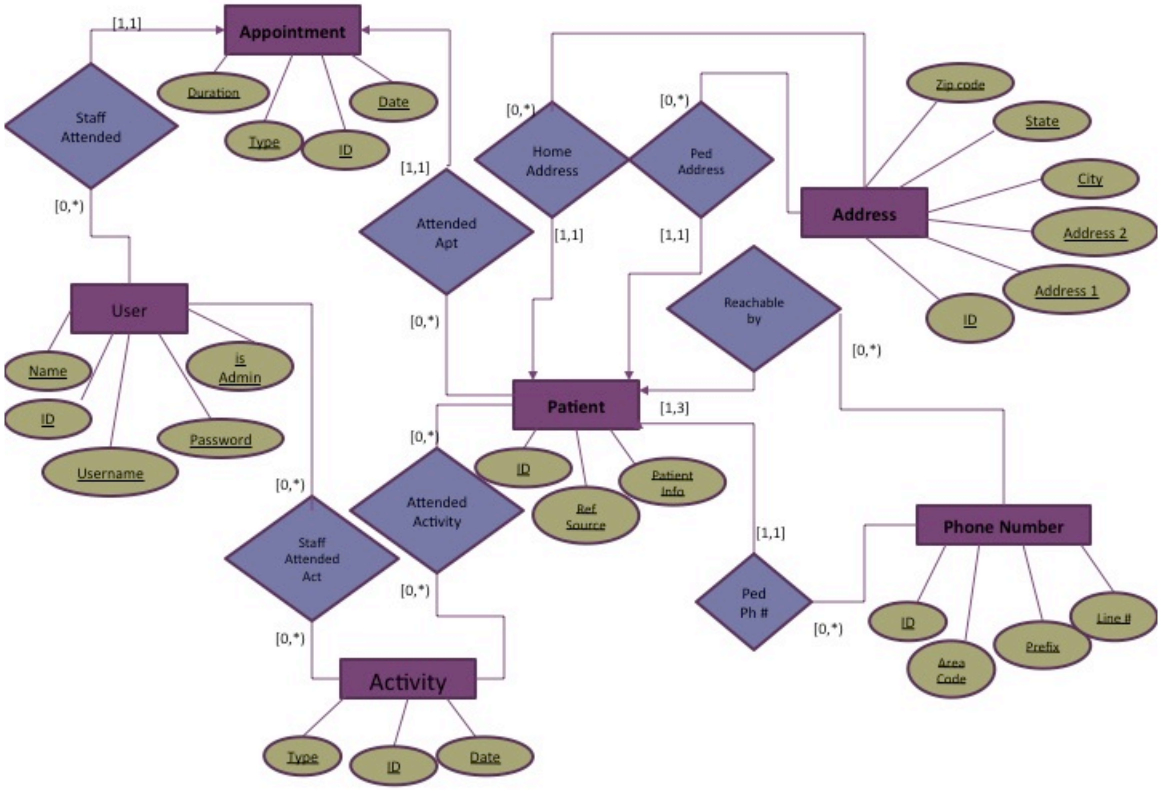
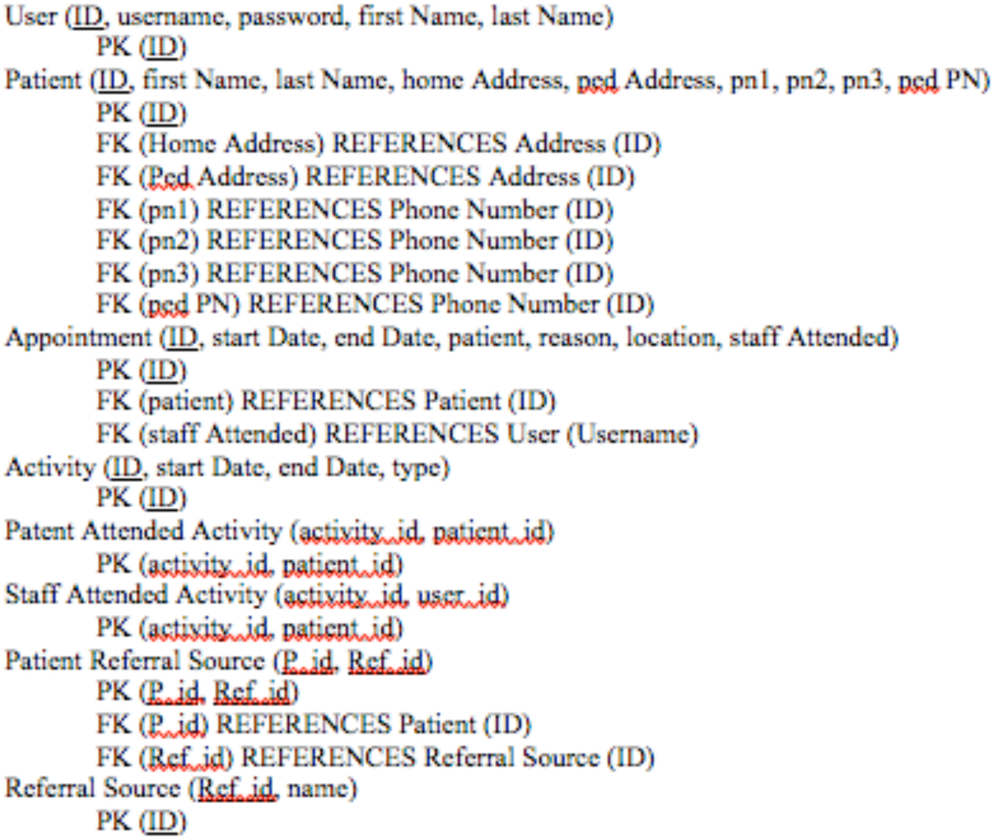


Figure 21 - ER Diagram

The ER Diagram translates directly into a relational model by simply taking every entity, and every relationship, and making them tables in the database. Primary keys and foreign keys are used to maintain database integrity, and ensure that data is not unnecessarily duplicated.

Next, one of the most important design elements is relational model. A relational model is a more direct representation of the database structure than the ER diagram. While the ER Diagram is used primarily to make understanding the data structure easier, the relational model is better for actually implementing the structure in the database itself. The relational model is a listing of every single table in the database, and all of their respective fields, including primary and foreign keys. The ER Diagram translates directly into a relational model by simply taking every entity, and every relationship, and making them tables in the database. Primary keys and foreign keys are used to maintain database integrity, and ensure that data is not unnecessarily duplicated. An example of our relational model is shown in Figure 22.



User (ID, username, password, first Name, last Name)
    PK (ID)
Patient (ID, first Name, last Name, home Address, ped Address, pn1, pn2, pn3, ped PN)
    PK (ID)
    FK (Home Address) REFERENCES Address (ID)
    FK (Ped Address) REFERENCES Address (ID)
    FK (pn1) REFERENCES Phone Number (ID)
    FK (pn2) REFERENCES Phone Number (ID)
    FK (pn3) REFERENCES Phone Number (ID)
    FK (ped PN) REFERENCES Phone Number (ID)
Appointment (ID, start Date, end Date, patient, reason, location, staff Attended)
    PK (ID)
    FK (patient) REFERENCES Patient (ID)
    FK (staff Attended) REFERENCES User (Username)
Activity (ID, start Date, end Date, type)
    PK (ID)
Patent Attended Activity (activity_id, patient_id)
    PK (activity_id, patient_id)
Staff Attended Activity (activity_id, user_id)
    PK (activity_id, patient_id)
Patient Referral Source (P_id, Ref_id)
    PK (P_id, Ref_id)
    FK (P_id) REFERENCES Patient (ID)
    FK (Ref_id) REFERENCES Referral Source (ID)
Referral Source (Ref_id, name)
    PK (ID)

Figure 22 - Relational Model

The last design element is application-programming interface (API). API is a set of functions written in the code that provide access to certain common functionalities within the program. The API provides a clean, easy to use interface to the internal mechanisms of the program, which allow for rapid program development as well as ease of upgrading. An API can either be accessible through an external interface, which is commonly done when the program is designed to allow other programs to communicate with it, or be entirely internal, which is better for security purposes. The API we developed for the R.E.A.C.H. Patient Manager is an internal API.

The program structure heavily influences API design, allowing the programmers to encapsulate functionality within specific classes. This ensures that all common functions are performed in the same, standard way. The R.E.A.C.H. Program Manager is comprised of several different modules, which contain a set of GUI elements, and event behavior for those elements that stores and/or retrieves data from the database. The modules interact with a set of managers, which encapsulate patient information, appointment information, address information, and activity information. These modules, in turn, communicate with the database manager class, which communicates directly with the SQL database via SQL queries. The system architecture can be seen in Figure 23. By defining an API, and sectioning off the program in this way, we were able to work on all three major groups of components independently of each other. Another advantage of this design is that by making sure all communication with the database happens only indirectly via the database manager, we were able to ensure that the SQL queries were valid, and would always contain valid data.

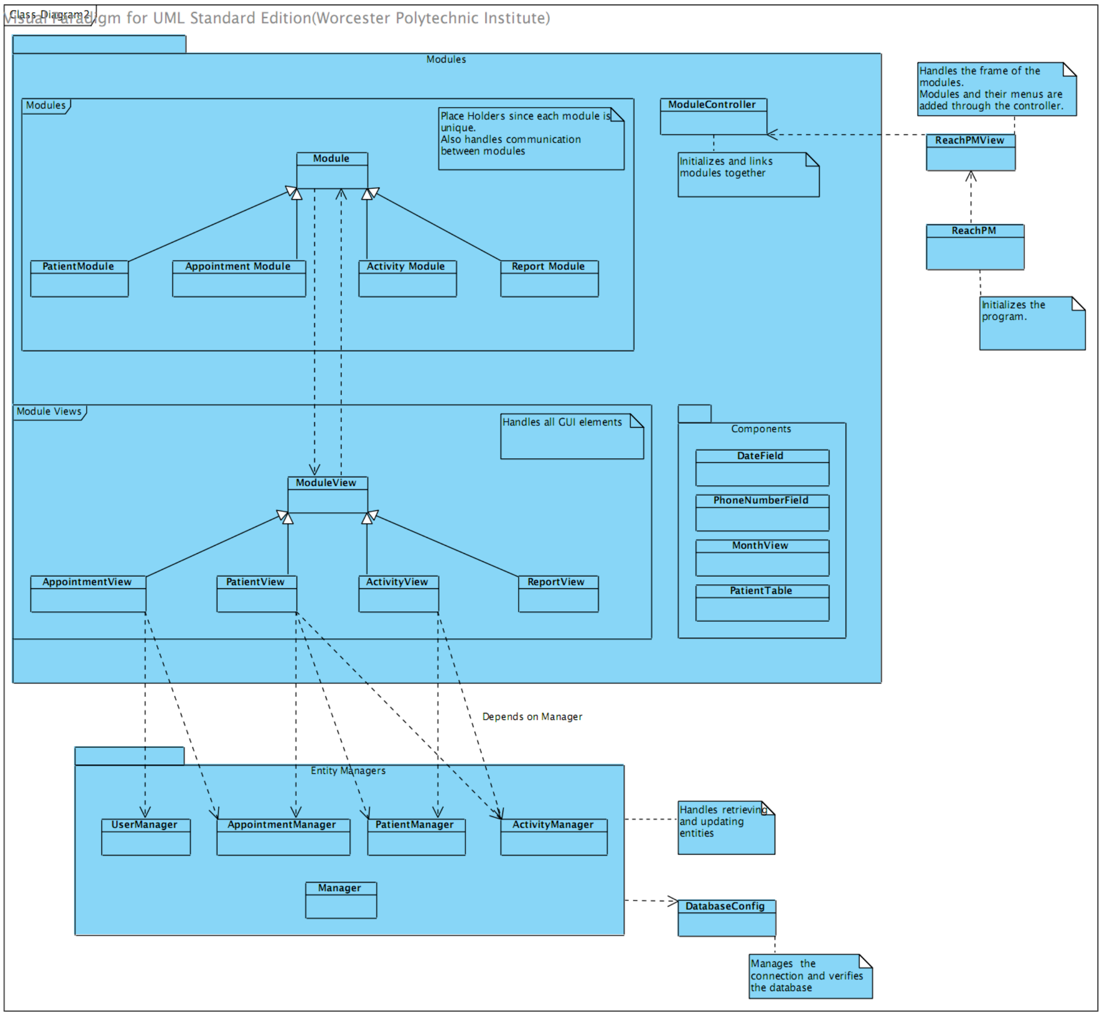


Figure 23 - System Architecture Diagram

4.2.3. Developer Documentation

Developer documentation is absolutely necessary for any software development project. Proper documentation facilitates debugging, future development, and new programmer integration, as well as code attribution. Code documentation is primarily achieved through the Javadoc standard. The Javadoc standard is a unified way of writing class and function comments, which are then parsed by the Javadoc tool, producing a clean set of preformatted HTML documentation for your code.

Writing Javadoc comments for our code is straightforward, due to the nature of Javadoc. Every function is preceded by a block comment, delineated by /** and */, and each block comment includes the function name, information about the parameters the function requires, information about the return value of the function, as well as any additional information about what the function does. Each class should also have a Javadoc comment that follows a similar structure, except that there should be no parameter information in a class comment, and the class comment should include the authors of that section of code as well as the version information.

Inline comments are also used to document the code, but they are generally less important than the Javadoc comments. Inline comments have no specific format, and exist only in the project code. These comments are added to explain sections of code that would be otherwise difficult to understand. We placed less of an emphasis on inline commenting in our project simply because much of the code is very simple to understand, and the code is already commented using the Javadoc comments. The end result of these decisions is a clean, easy to understand code base that comes with HTML documentation, at very little extra effort on the part of the developers.

4.2.4. Usability Test and Training

During the application development process, we continuously tested the application. Testing was divided into three parts: functionality testing, layout testing and performance testing.

First, we tested the basic functionality of the application. We installed the application individually and completed the tasks such as adding a new patient, etc. We documented the bugs and communicated with the developers. Most of the major bugs were identified and fixed during our testing period.

Second, we tested the application layout and basic organization. We did the test in groups of three. We tested the patient form in order not to confuse the users by ambiguous notation or organization. As a result of our testing, we reorganized the information modules' layout and made these modules user-friendly for the R.E.A.C.H program staff to easily manage.

Last, we tested the performance of our application in two ways: reinstalling the latest version in our own laptops and interviewing the R.E.A.C.H program staff members. We tested the time it takes to install and open the application, to complete daily tasks using the application and to refresh tables in the application.

Before the interview process, we have trained the R.E.A.C.H. staff for several times in the sprint meetings in the B term as we went along with the design process. The purpose of the final meeting was to train the staff, to test usability of the application, and to gather staff comments through individual interviews to improve our application development. We also utilized this last meeting to determine the performance of our application running in the R.E.A.C.H. program office desktop.

The final meeting was divided into three parts. First, one of our teammates conducted a brief tutorial to show the R.E.A.C.H. staff how to use the application. After that, we divided into 3 groups for observations and interviews. Each group contained of one staff member and one or two of our team members. Staff members completed a number of tasks provided to them in paper (see Interview Protocol section in Chapter 3 for detailed task information) while team members were observing their interactions with the system. Once a staff member completed the listed tasks, the team members asked predefined interview questions to get user feedback and answer any questions staff members may have thought about during the completion of training tasks. Table 4 illustrates a summary of the feedback we received from staff members and how long each staff member took to complete the predefined tasks on the new system.

Table 4 – Summary of Interview Observation

Group	Task	Start Time	End Time	Comments
1	1. New Patient 1	12:02pm	12:10pm	Easy, friendly. Data fields can delete values. Change "Spanish" to "Hispanic".
	2. New Activity 1	12:12pm	12:15pm	Easy, straight forward.
	3. New Appointment 1	12:16pm	12:18pm	Not having to type much. Layout is great.
	4. New Report 1	12:20pm	12:22pm	Nice and quick report.
2	1. New Patient 2a	11:40am	11:50am	Was fixing database bugs.
	New Patient 2b	11:56am	11:59am	Fix spelling of 'Portuguese' under Ethnicity selection.
	2. New Activity 2	12:02pm	12:06pm	Easy, friendly
	3. New Appointment 2	12:10pm	12:15pm	The dropdown option is great.
	4. New Report 2	12:17pm	12:18pm	Great and accurate
3	1. New Patient 3	11:45am	11:50am	Phone number: make sure selection starts at beginning. Add Pediatrician to title border. Fix birth.
	2. New Activity 3	11:52am	11:56am	Fix "add new activity type".
	3. New Appointment 3	12:00pm	12:05pm	Good.
	4. New Report 3	12:06pm	12:10pm	Report layout is perfect

Overall, we received positive comments about our application. In general, staff members noted that they loved the appointment and report layout. "The visual organization is great", one staff member said. They thought that the calendar in activities module made things easier for the staff to manage all activities and appointments. The staff also noted that the application was wonderful because it added more functionality and increased efficiency of managing the patient information. There were few minor bugs staff members came across while completing their tasks in the new activity type and patient module, which were later fixed by the development team.

4.3. Summary Results

After three terms working in this project, our IQP group created a website for the R.E.A.C.H. program, uploaded the patient form into the website, and designed the patient manager application to simplify patient information management task for the R.E.A.C.H. staff.

We divided the entire process into 14 sprints. Our group spent the first couple of sprints digging into the background and literature, and developing the Drupal software to create the website. After we finished the website for the R.E.A.C.H. program, we moved into the second sprint plan, which was an essential part of our project. We put most of our efforts into the patient manager application development, held several meetings with our sponsors - R.E.A.C.H. program staff - to figure out their information needs, and conducted various tests to make sure the application we developed responded to the information needs identified by the staff. During the final 4 sprints, we finished application testing, debugging, tutoring, training and finalizing our presentation. Although there still might be some small bugs, we did our best to track and fix them.

Chapter 5. Conclusion and Recommendations

By the end of C term of 2011, we have accomplished all of our higher priority goals and most of our lower priority goals.

We designed and implemented a new website for the R.E.A.C.H. Program, as described in chapter 4. This new website contained most of the features we originally intended on. First, it had all the vital content, specifically the About R.E.A.C.H, Directions, F.A.Q., Groups, Patient Information, Policies, and R.E.A.C.H Program Patient Intake Form webpages. Second, it was easily manageable and updatable through the Drupal interface. In terms of publication, we expect the website will be published with journals, be reported as a part of a forthcoming website on globalization in baby healthcare, and be widely posted on the project Internet site and general media.

Along with the website, we developed a new Java application to aid the R.E.A.C.H staff in patient manager. We taught the R.E.A.C.H staff how to use each module, tested this application internally, and interviewed the staff to get their feedback on the program. We integrated the feedback we got during testing and interviews to improve the application. We provided a user manual for the staff to use the patient manager application comfortably. With this user manual and through the training meeting, the staff should be able to handle all the tools this application includes, and successfully integrate them into their everyday processes. Even though we were very careful about addressing all the bugs in the application, we cannot promise that the application is bug free.

Our original vision for the website was much more interactive. Due to time constraints, we were unable to implement no more than a basic, informational website. One of our recommendations regarding the website is to add online patient registration system that submits patient information to a secondary database. By keeping the database separate from the R.E.A.C.H. Patient Manager database, any potential security issues can be avoided. It is very important to maintain strong security when dealing with confidential patient information, so if a registration page is added, we strongly recommend keeping the two databases separate.

Our second recommendation regarding the website would be to add a forum for families to discuss anything related to the group. It would provide a great way to communicate with the families and get feedback on activities. Forums could be used for polls, too. The Drupal community has already developed several forum modules, so integrating a forum into the website should be fairly simple, with the added benefit of the forum keeping the same theme as the website.

The R.E.A.C.H. Patient Manager should also be further developed. Our next recommendation is related to our first, and it is to add a module to the R.E.A.C.H. Patient Manager that would connect to the website's database and pull all the information from newly registered patients into a list. This would allow the R.E.A.C.H. staff to very easily review new patient registrations and accept them with the press of a button. Also, this would further simplify the process of new patient registration.

Our last recommendation would be to do a thorough debugging of the R.E.A.C.H. Patient Manager. Due to time constraints, our own debugging of the program has not been completely formalized. This would involve developing a complete set of use-cases, and going through them one by one and making sure the program works.

Chapter 6. Learning Statements

In this chapter, team members will review and evaluate experiences individually from learning in this IQP project, and how these experiences could reflect to the future.

Alexander Becker

I feel so privileged to have participated in such a fun and valuable project. Very few people receive such an opportunity to meet with a client and produce a product from which people would benefit. Not only was this project an experience in developing a functional system, but it was a great taste of what my future holds in store as well. This future requires the ability to work well with others, clearly explain complicated topics, and program effectively. Overall, this project helped me improve my abilities and revealed some skills that I need to improve on.

As for teamwork, I have learned that constant collaboration with both the team and the client produced the best results. In other words, if we had not scheduled regular meetings with both team members and the R.E.A.C.H. staff, this product would have been discarded immediately after release. This comes to show that a quick iterative process is key to creating a successful product. Unfortunately, as for my other abilities, I believe I still need to improve my Presentation skills as well as my ability to convert computer jargon into something that any person would understand. This can only be improved through experience.

On the other hand, my skill in creating software has improved significantly. I have learned countless methods, solved many problems, and improved my ability to detect issues. Furthermore, my ability to design and link graphical user interfaces has improved drastically. For example, in this project, we had to design custom components that would contain specific types of data. The most notable are the date fields, phone number fields, and tables. These components were very time consuming to implement since java's tools do not fully describe certain aspects of the components, and there were no solutions available on the Internet. In other words, it was all trial and error. In fact, this can be said for the entire program.

In addition, this project helped me further improve my skills in creating reports. This is the largest report I have ever contributed to and it was quite a learning experience because not only is the amount of information sometimes mind boggling, but also having to collaborate with others is quite a difficult task. The most notable problem we faced is combining writing styles. Unfortunately, this issue is inevitable and probably cannot be avoided due to the size of this project. However, my experience led to understanding ways on how to improve such complications.

Overall, this IQP has proven to be a highly valuable experience. I plan to apply these new skills and improve on my shortcomings in future projects.

Christopher Cullinan

For the past three terms, I have learned a great deal of valuable knowledge that I will be able to carry on and use for the rest of my life. Probably the most important aspect of this project was learning to apply effective and efficient teamwork in order to complete our tasks. Being a member of ROTC, teamwork was not a new word in my vocabulary but from this project, I was able to strengthen my understanding of effective teamwork to accomplish a mission. There was never a time throughout the long twenty-one-week period of working on this report that we didn’t constantly look for new ways to improve our teamwork strategies.

The second most important piece of knowledge I learned throughout the entirety of this project was how to better my methods of time management. Once again, my understanding of time management has a solid foundation due to ROTC, but this project revealed to me where some of the faults of my ways are and gave me the opportunity to fix them. My time management as it relates to members of my group also improved during this project. What I mean by this is that the classic thought of managing time is based on your own schedule whereas during this project, I also had to manage time for a group rather than just myself. All of the knowledge I received while participating in this project was valuable lessons that I will carry with me after my college career.

Michael Gheorghe

This project has been a great experience, which has taught me a great deal about real-world software development and applications. Over the course of this project, we’ve gone through several iterations of not just software design, but problem solving in general. We started with a simple problem: design and build some kind of patient and group management system. Our regular meetings with the R.E.A.C.H. staff allowed us to evolve our project goals to better suit their needs, and that is a lesson I found to be very important.

Our project vision was substantially different during the onset of our project. We had first envisioned an online database that the R.E.A.C.H. staff could use to manage patients and appointments, and that patients could use to register with the program and communicate with the staff. As the first term progressed, we were able to better consider all the implications of having the database exposed to the Internet, as well as with having the patients interact with the system. The next iteration of our project vision was to have a more static website, and build a patient and appointment database that would run entirely on a local machine, and would not be exposed to the Internet. Further meetings with the R.E.A.C.H. staff would allow us to better refine the feature set of the application.

The experience I received in participating in this IQP was unlike anything I had experienced before. In a classroom environment, even if you are tasked with a large group software development project, the project requirements and final goals are usually already well thought out, and don’t change during the course of the project. Since we were able to both iterate the project design and the project goals, I was able to gain a valuable insight into real-world software development, and I consider that to be a priceless bit of knowledge.

Nhi Vo

While doing this project with my IQP team and R.E.A.C.H. staff, I had an amazing experience. I discovered that it could be very rewarding to work on the first project in college. The primary reason I wanted to choose this project was to expand my experience education, acquire knowledge in a different field and continue learning in general. I learned how to research, to combine data, to divide work, to manage documentations and to write properly with other teammates.

Before doing the project, I had not known the opportunities of experiential learning I would be afforded by being apart of a R.E.A.C.H. project team. I have outlined some categories of my project goals that I had before attending this IQP and those that I have also adopted after finishing the project. Together, all my responsibility in this project are bound by the fact that I want to come out of the final report with more practical learning experiences as well as a somewhat specified team experience.

Zijian (Donnie) Xia

As an undergraduate student of WPI, I learned a lot in the Interactive Qualifying Project. The task of this project was to redesign the website of the R.E.A.C.H. program, and to complete an application of database to help them record patient information.

Majoring in chemistry, I did not have any computer science before and knew nothing about the database development. I even lacked group working, decision-making, writing and the researching skills, an IQP demands. Thus, the first term of the IQP was a nightmare for me. Even though I spent a lot of time on it, the progress of the IQP was not satisfying. However, the first term was a great learning experience. During that one term, my project skills improved significantly, namely my communication and teamwork abilities. This was a great experience, and it will have a great influence on my work and most especially my MQP. I learned how to prepare, how to present, and research more efficiently.

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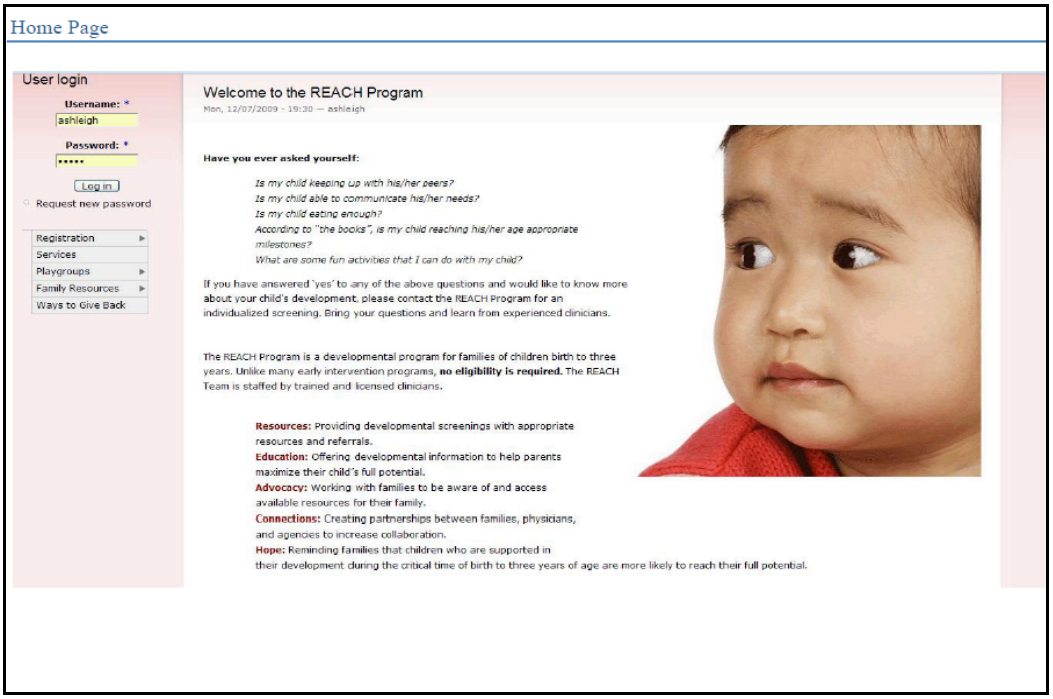
Appendix A – Last Year's IQP Website



Home Page

Username: * ashleigh

Password: * •••••

Welcome to the REACH Program

Mon, 12/07/2009 - 19:30 — ashleigh

Have you ever asked yourself:

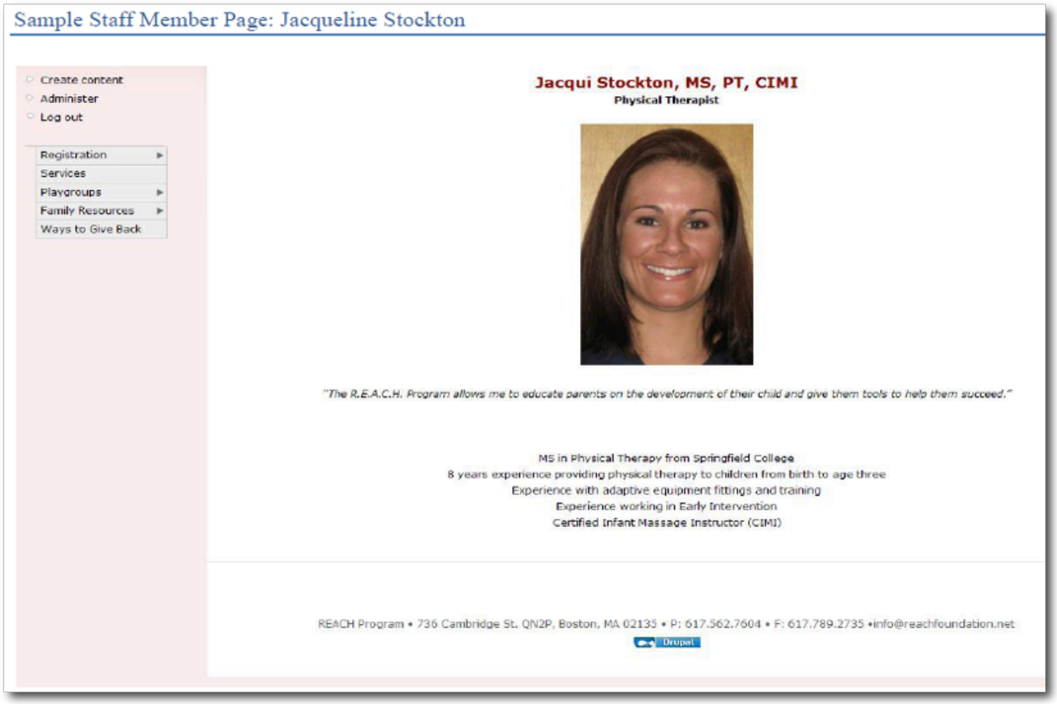
Is my child keeping up with his/her peers?
Is my child able to communicate his/her needs?
Is my child eating enough?
According to "the books", is my child reaching his/her age appropriate milestones?
What are some fun activities that I can do with my child?

If you have answered 'yes' to any of the above questions and would like to know more about your child's development, please contact the REACH Program for an individualized screening. Bring your questions and learn from experienced clinicians.

The REACH Program is a developmental program for families of children birth to three years. Unlike many early intervention programs, **no eligibility is required.** The REACH Team is staffed by trained and licensed clinicians.

Resources: Providing developmental screenings with appropriate resources and referrals.
Education: Offering developmental information to help parents maximize their child's full potential.
Advocacy: Working with families to be aware of and access available resources for their family.
Connections: Creating partnerships between families, physicians, and agencies to increase collaboration.
Hope: Reminding families that children who are supported in their development during the critical time of birth to three years of age are more likely to reach their full potential.

Figure 24 - Last Year's IQP Website 1



Sample Staff Member Page: Jacqueline Stockton

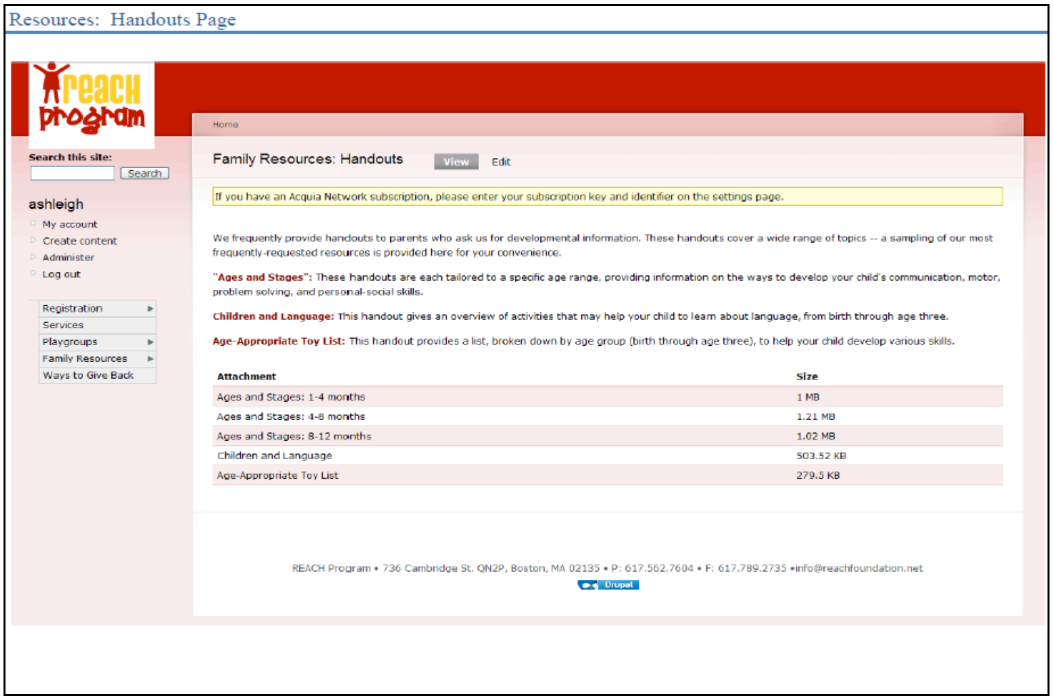
Jacqui Stockton, MS, PT, CIMI
Physical Therapist

"The R.E.A.C.H. Program allows me to educate parents on the development of their child and give them tools to help them succeed."

MS in Physical Therapy from Springfield College
8 years experience providing physical therapy to children from birth to age three
Experience with adaptive equipment fittings and training
Experience working in Early Intervention
Certified Infant Massage Instructor (CIMI)

REACH Program • 736 Cambridge St. QN2P, Boston, MA 02135 • P: 617.562.7604 • F: 617.789.2735 •info@reachfoundation.net

Figure 25 - Last Year's IQP Website 2



Family Resources: Handouts

If you have an Acquia Network subscription, please enter your subscription key and identifier on the settings page.

We frequently provide handouts to parents who ask us for developmental information. These handouts cover a wide range of topics -- a sampling of our most frequently-requested resources is provided here for your convenience.

"Ages and Stages": These handouts are each tailored to a specific age range, providing information on the ways to develop your child's communication, motor, problem solving, and personal-social skills.

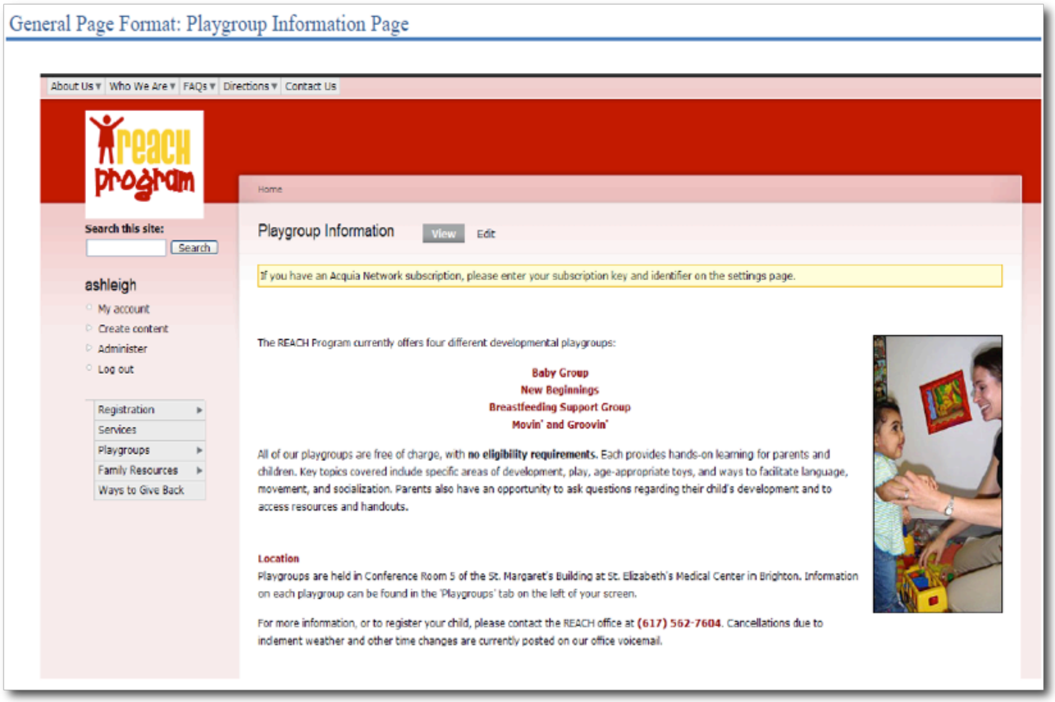
Children and Language: This handout gives an overview of activities that may help your child to learn about language, from birth through age three.

Age-Appropriate Toy List: This handout provides a list, broken down by age group (birth through age three), to help your child develop various skills.

Attachment	Size
Ages and Stages: 1-4 months	1 MB
Ages and Stages: 4-8 months	1.21 MB
Ages and Stages: 8-12 months	1.02 MB
Children and Language	503.52 KB
Age-Appropriate Toy List	279.5 KB

REACH Program • 736 Cambridge St. QN2P, Boston, MA 02135 • P: 617.562.7604 • F: 617.789.2735 •info@reachfoundation.net

Figure 26 - Last Year's IQP Website 3



Playgroup Information

If you have an Acquia Network subscription, please enter your subscription key and identifier on the settings page.

The REACH Program currently offers four different developmental playgroups:

Baby Group
New Beginnings
Breastfeeding Support Group
Movin' and Groovin'

All of our playgroups are free of charge, with **no eligibility requirements.** Each provides hands-on learning for parents and children. Key topics covered include specific areas of development, play, age-appropriate toys, and ways to facilitate language, movement, and socialization. Parents also have an opportunity to ask questions regarding their child's development and to access resources and handouts.

Location
Playgroups are held in Conference Room 5 of the St. Margaret's Building at St. Elizabeth's Medical Center in Brighton. Information on each playgroup can be found in the 'Playgroups' tab on the left of your screen.

For more information, or to register your child, please contact the REACH office at **(617) 562-7604**. Cancellations due to indement weather and other time changes are currently posted on our office voicemail.

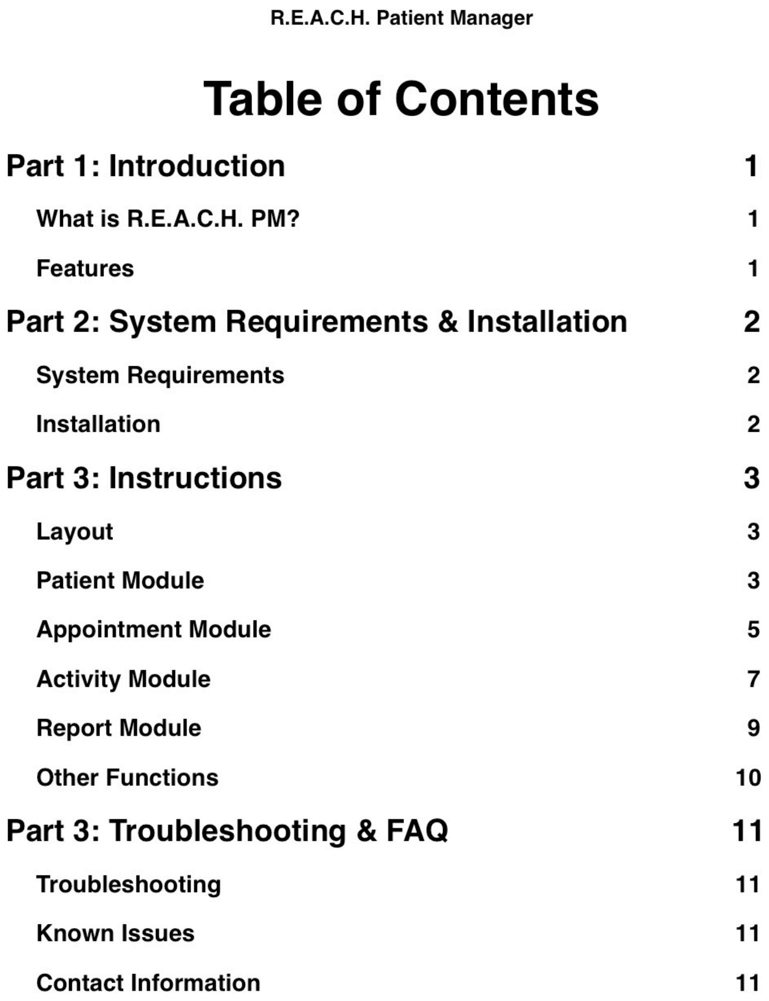
Figure 27 - Last Year's IQP Website 4

Appendix B – R.E.A.C.H. Patient Manager User Manual

R.E.A.C.H Patient Manager

User Manual

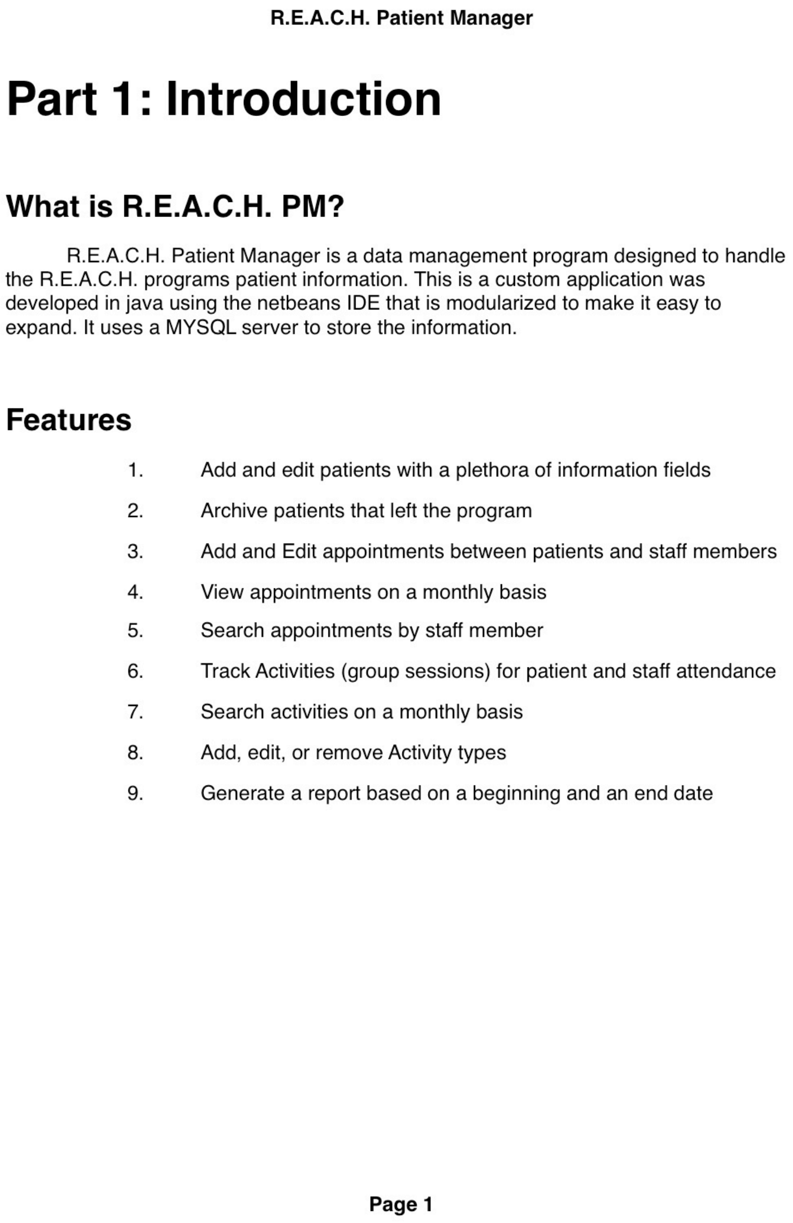
Figure 28 - User Manual Page 1



R.E.A.C.H. Patient Manager

Table of Contents

Figure 29 - User Manual Page 2



R.E.A.C.H. Patient Manager

Part 1: Introduction

What is R.E.A.C.H. PM?

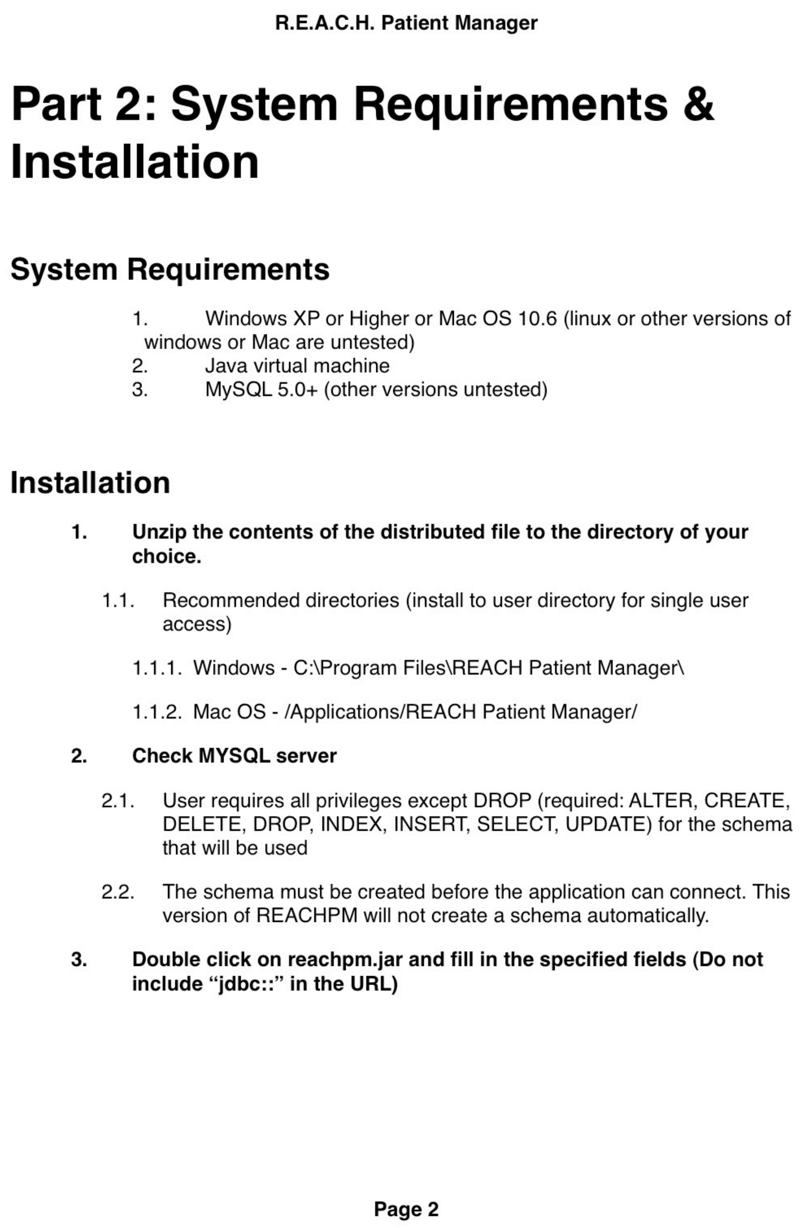
R.E.A.C.H. Patient Manager is a data management program designed to handle the R.E.A.C.H. programs patient information. This is a custom application was developed in java using the netbeans IDE that is modularized to make it easy to expand. It uses a MYSQL server to store the information.

Features

1. Add and edit patients with a plethora of information fields
2. Archive patients that left the program
3. Add and Edit appointments between patients and staff members
4. View appointments on a monthly basis
5. Search appointments by staff member
6. Track Activities (group sessions) for patient and staff attendance
7. Search activities on a monthly basis
8. Add, edit, or remove Activity types
9. Generate a report based on a beginning and an end date

Page 1

Figure 30 - User Manual Page 3



R.E.A.C.H. Patient Manager

Part 2: System Requirements & Installation

System Requirements

1. Windows XP or Higher or Mac OS 10.6 (linux or other versions of windows or Mac are untested)
2. Java virtual machine
3. MySQL 5.0+ (other versions untested)

Installation

1. **Unzip the contents of the distributed file to the directory of your choice.**

   1.1. Recommended directories (install to user directory for single user access)

   1.1.1. Windows - C:\Program Files\REACH Patient Manager\

   1.1.2. Mac OS - /Applications/REACH Patient Manager/

2. **Check MYSQL server**

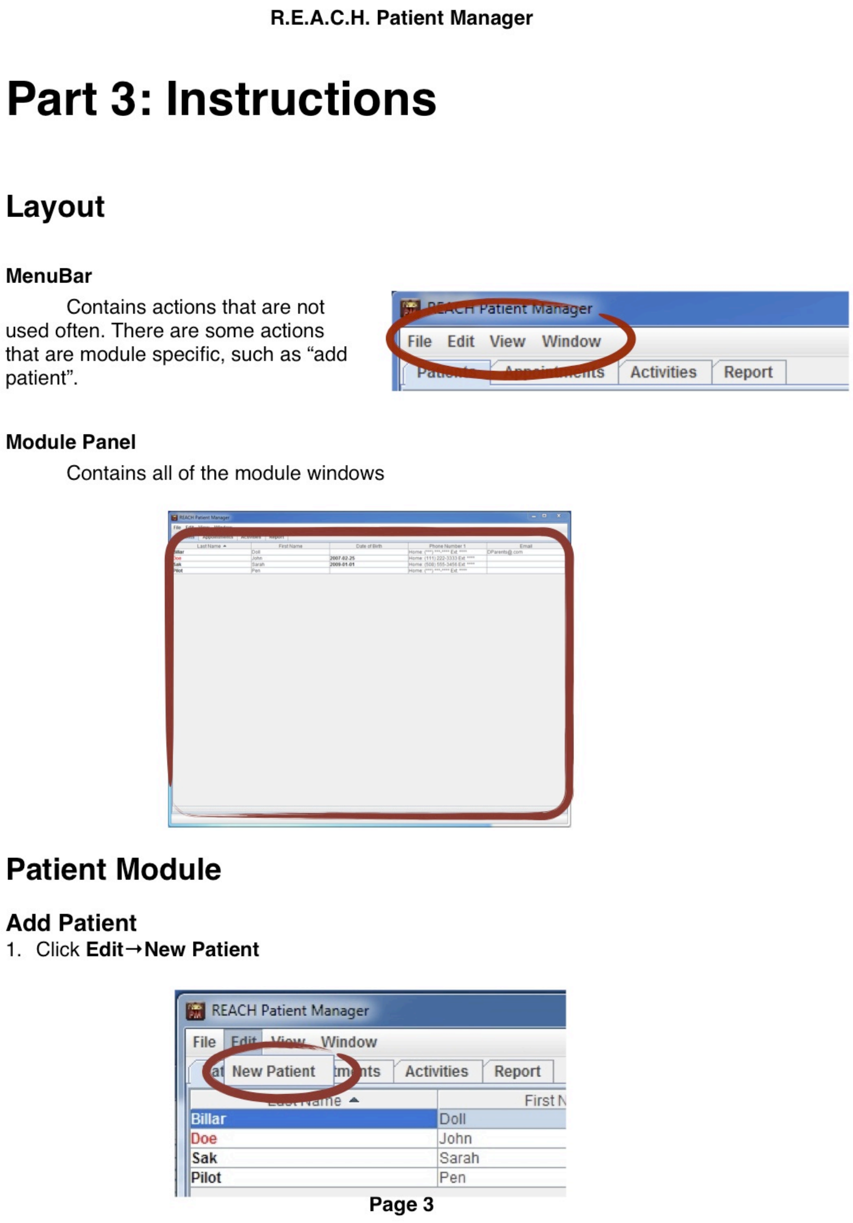
   2.1. User requires all privileges except DROP (required: ALTER, CREATE, DELETE, DROP, INDEX, INSERT, SELECT, UPDATE) for the schema that will be used

   2.2. The schema must be created before the application can connect. This version of REACHPM will not create a schema automatically.

3. **Double click on reachpm.jar and fill in the specified fields (Do not include “jdbc::” in the URL)**

Page 2

Figure 31 - User Manual Page 4



R.E.A.C.H. Patient Manager

Part 3: Instructions

Layout

MenuBar

Contains actions that are not used often. There are some actions that are module specific, such as “add patient”.

Module Panel

Contains all of the module windows

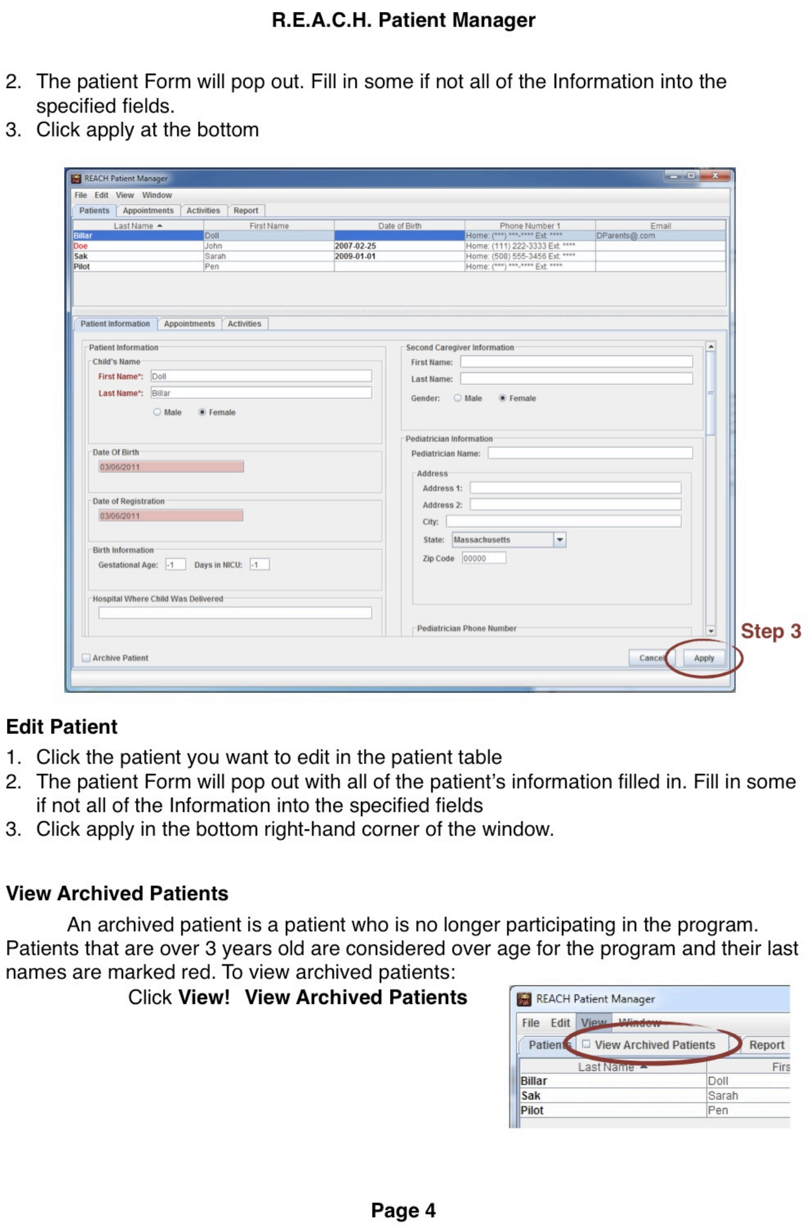
Patient Module

Add Patient

1. Click **Edit→New Patient**

Page 3

Figure 32 - User Manual Page 5



R.E.A.C.H. Patient Manager

2. The patient Form will pop out. Fill in some if not all of the Information into the specified fields.
3. Click apply at the bottom

REACH Patient Manager

Last Name ▲	First Name	Date of Birth	Phone Number 1	Email
Billar	Doll		Home: (***) ***-**** Ext: ****	DParents@.com
Doe	John	2007-02-25	Home: (111) 222-3333 Ext: ****	
Sak	Sarah	2009-01-01	Home: (508) 555-3456 Ext: ****	
Pilot	Pen		Home: (***) ***-**** Ext: ****	

Patient Information

Child's Name

First Name*: Doll

Last Name*: Billar

○ Male ● Female

Date Of Birth

03/06/2011

Date of Registration

03/06/2011

Birth Information

Gestational Age: -1 Days in NICU: -1

Hospital Where Child Was Delivered

Second Caregiver Information

First Name:

Last Name:

Gender: ○ Male ● Female

Pediatrician Information

Pediatrician Name:

Address

Address 1:

Address 2:

City:

State: Massachusetts

Zip Code 00000

Pediatrician Phone Number

☐ Archive Patient

Step 3

Edit Patient

1. Click the patient you want to edit in the patient table
2. The patient Form will pop out with all of the patient's information filled in. Fill in some if not all of the Information into the specified fields
3. Click apply in the bottom right-hand corner of the window.

View Archived Patients

An archived patient is a patient who is no longer participating in the program. Patients that are over 3 years old are considered over age for the program and their last names are marked red. To view archived patients:

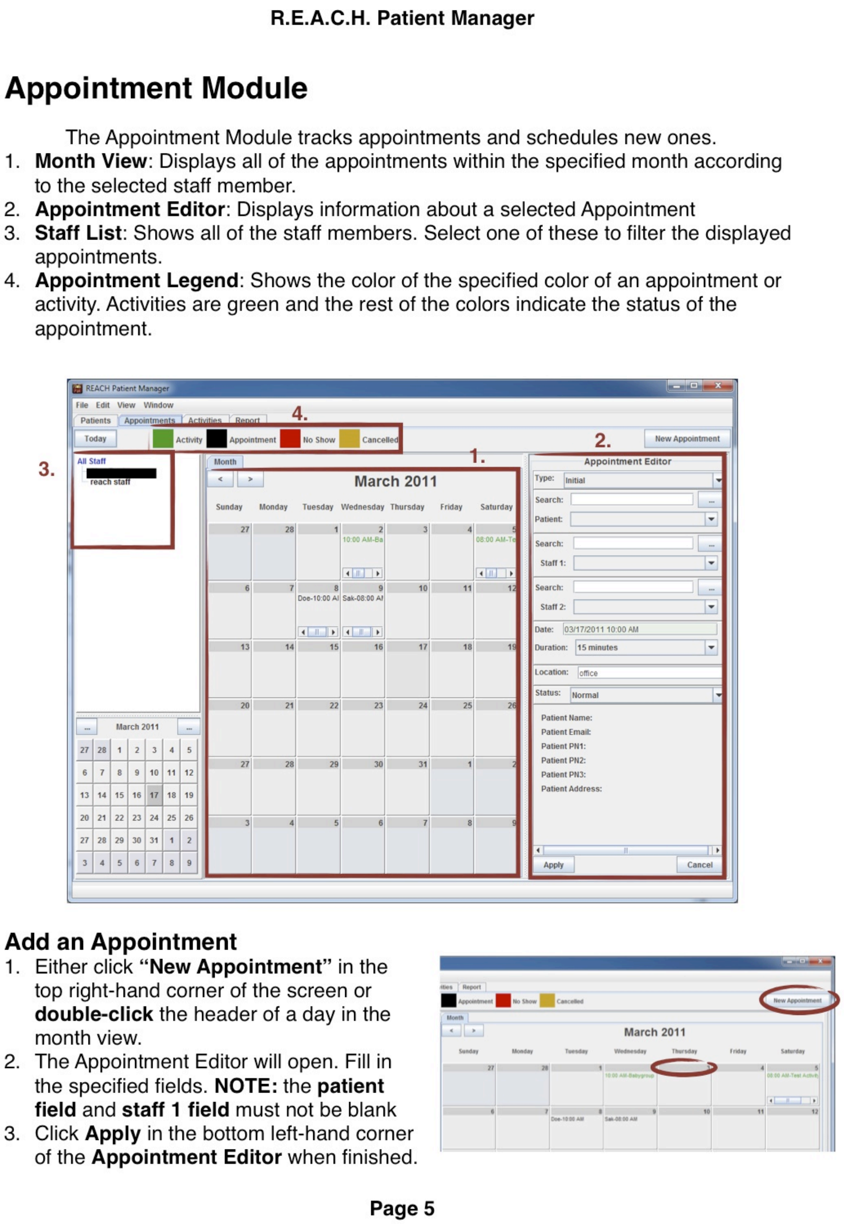
Click **View! View Archived Patients**

REACH Patient Manager

Last Name ▲	Firs
Billar	Doll
Sak	Sarah
Pilot	Pen

Page 4

Figure 33 - User Manual Page 6



R.E.A.C.H. Patient Manager

Appointment Module

The Appointment Module tracks appointments and schedules new ones.

1. **Month View**: Displays all of the appointments within the specified month according to the selected staff member.
2. **Appointment Editor**: Displays information about a selected Appointment
3. **Staff List**: Shows all of the staff members. Select one of these to filter the displayed appointments.
4. **Appointment Legend**: Shows the color of the specified color of an appointment or activity. Activities are green and the rest of the colors indicate the status of the appointment.

Type: Initial

Search:

Patient:

Search:

Staff 1:

Search:

Staff 2:

Date: 03/17/2011 10:00 AM

Duration: 15 minutes

Location: office

Status: Normal

Patient Name:

Patient Email:

Patient PN1:

Patient PN2:

Patient PN3:

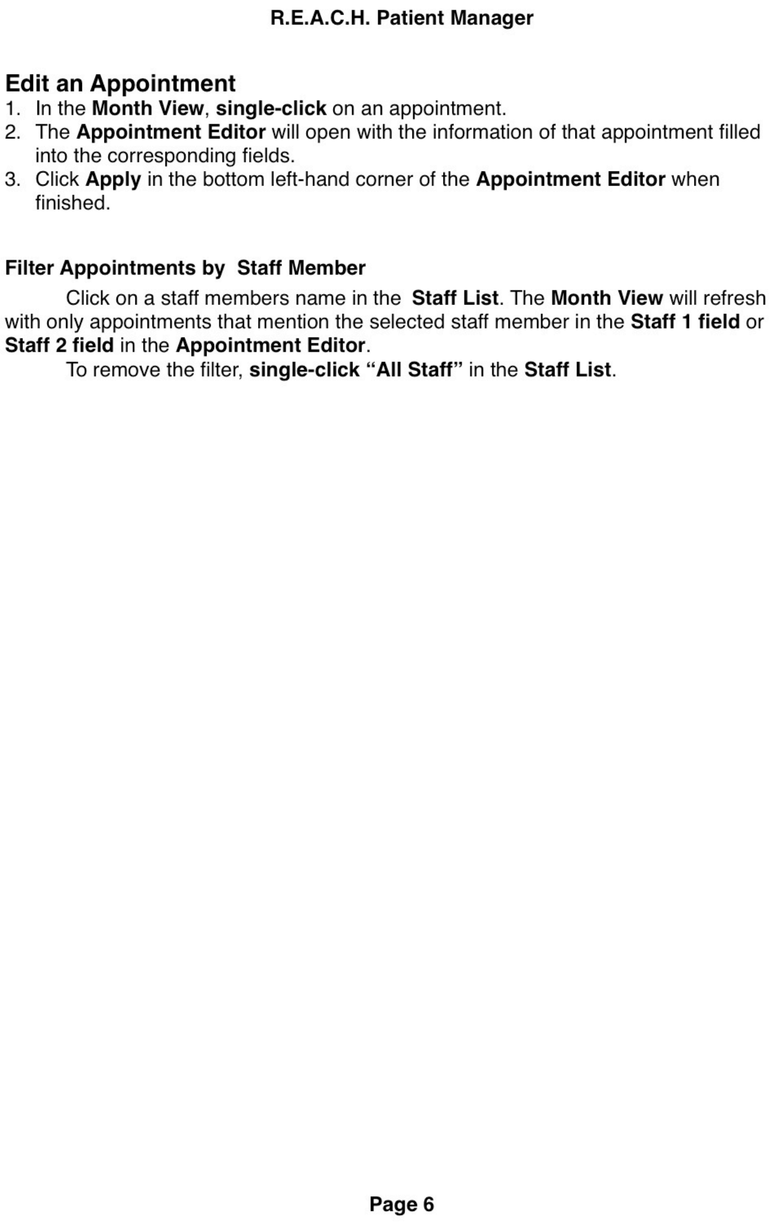
Patient Address:

Add an Appointment

1. Either click **"New Appointment"** in the top right-hand corner of the screen or **double-click** the header of a day in the month view.
2. The Appointment Editor will open. Fill in the specified fields. **NOTE:** the **patient field** and **staff 1 field** must not be blank
3. Click **Apply** in the bottom left-hand corner of the **Appointment Editor** when finished.

Page 5

Figure 34 - User Manual Page 7



R.E.A.C.H. Patient Manager

Edit an Appointment

1. In the **Month View**, **single-click** on an appointment.
2. The **Appointment Editor** will open with the information of that appointment filled into the corresponding fields.
3. Click **Apply** in the bottom left-hand corner of the **Appointment Editor** when finished.

Filter Appointments by Staff Member

Click on a staff members name in the **Staff List**. The **Month View** will refresh with only appointments that mention the selected staff member in the **Staff 1 field** or **Staff 2 field** in the **Appointment Editor**.

To remove the filter, **single-click "All Staff"** in the **Staff List**.

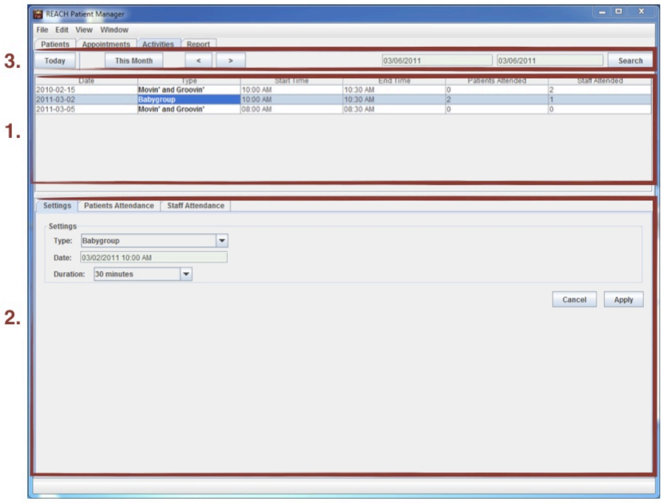
Page 6

Figure 35 - User Manual page 8

Activity Module

The Activity Module manages activities (group sessions) and tracks the patient as well as user attendance for each activity. This module is divided into 3 sections.

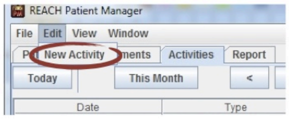
1. **Activity Table**: displays activities and important information about the activity.
2. **Activity Editor**: Displays the information about the selected activity. It also includes a tab to manage patient attendance and another tab to manage staff attendance.
3. **Navigation Bar**: Contains navigation functions to easily navigate activities on a date range basis to monthly basis.



Date	Type	Start Time	End Time	Patients Attended	Staff Attended
2010-02-15	Movin' and Groovin'	10:00 AM	10:30 AM	0	2
2011-03-02	Babygroup	10:00 AM	10:30 AM	2	1
2011-03-05	Movin' and Groovin'	08:00 AM	08:30 AM	0	0

Settings
Type: Babygroup
Date: 03/02/2011 10:00 AM
Duration: 30 minutes

Add an Activity



1. Click **Edit→New Activity**
2. The **Activity Editor** will open with the attendance tabs disabled.
3. Fill in the required fields.
4. Click **Apply** when finished.
5. The Activity will be created, which enables attendance. Go to **Edit Attendance** for more information.

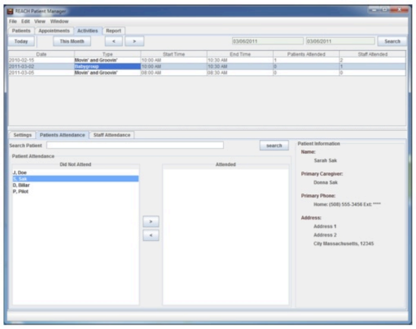
Figure 36 - User Manual Page 9

Edit an Activity

1. Single-Click on an activity in the **Activity Table**.
2. The Activity Editor will open with the attendance tabs enabled.
3. Go to **Edit Attendance** for information regarding attendance tabs.
4. If editing the settings of an activity.
   4.1. Edit the fields
   4.2. Click **Apply** when finished.

Edit Attendance

1. Add to **"Attended"**
   1.1. Select people from **"Did Not Attend"** list
   1.2. Click **>** button
2. Remove from **"Attended"** list
   2.1. Select people from **"Attended"** list
   2.2. Click **<** button
3. **NOTES:**
   3.1. Patient Attendance tab includes a search bar and a patient information pane. Both only function with the **"Did Not Attend"** list.
   3.2. To view patient information, click on the specified patient in the **"Did not Attend".** The information will automatically fill in.
   3.3. To Search for a patient, type in either their first name or last name in the search field.


REACH Patient Manager
File Edit View Window
Patients Appointments Activities Report
Today
This Month
<
>
Search
Settings Patients Attendance Staff Attendance
search
>

03/06/2011 03/06/2011

Date	Type	Start Time	End Time	Patients Attended	Staff Attended
2010-02-15	Movin' and Groovin'	10:00 AM	10:30 AM	1	2
2011-03-02	Babygroup	10:00 AM	10:30 AM	0	1
2011-03-05	Movin' and Groovin'	08:00 AM	08:30 AM	0	0

Search Patient:

Patient Attendance

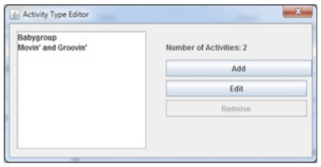
Did Not Attend: J, Doe; S, Sak; D, Billar; P, Pilot

Attended:

Patient Information
Name:
Sarah Sak
Primary Caregiver:
Donna Sak
Primary Phone:
Home: (508) 555-3456 Ext: ****
Address:
Address 1
Address 2
City Massachusetts, 12345

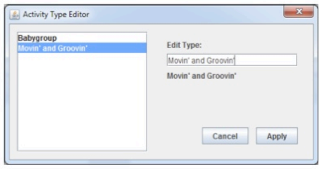
Add or Edit an Activity Type

1. Click **Window! Activity Types**
2. A window will open with a list of Activity Types on the left-hand side.
3. To edit an Activity Type
   3.1. Select the activity from the list.
   3.2. Click **Edit**.
4. To add and Activity Type click **Add**.
5. Fill in the **type field** with the new name.
6. Click **Apply**.
7. The window will ask for confirmation.
8. Click **Apply** again to confirm change.



Babygroup
Movin' and Groovin'

Number of Activities: 2



Babygroup
Movin' and Groovin'

Edit Type:
Movin' and Groovin'
Movin' and Groovin'

Remove an Activity Type

1. Click **Window! Activity Types**
2. A window will open with a list of Activity Types on the left-hand side.
3. Select the Type you want to remove.

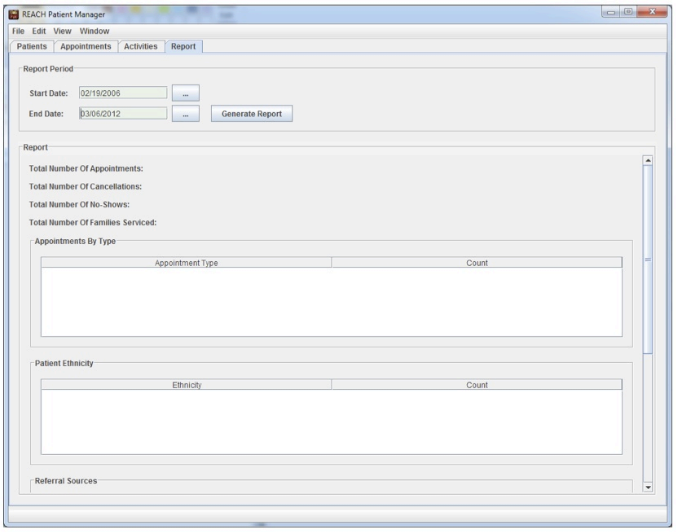
Figure 37 - User Manual Page 10

3.1. If an Activity is using that type of activity, the activity cannot be removed.
3.2. The **“Number of Activities”** field shows you how many activities are of this type.

4. Click **Remove** when ready.
5. Click **Apply** to confirm decision.

Report Module

The Report module is designed to analyze the patient, appointment, and activity data between a certain date period then output the results in the specified fields.



Report Period

Start Date: 02/19/2006

End Date: 03/06/2012

Report

Total Number Of Appointments:

Total Number Of Cancellations:

Total Number Of No-Shows:

Total Number Of Families Serviced:

Appointments By Type

Appointment Type	Count

Patient Ethnicity

Ethnicity	Count

Referral Sources

Generate a Report

1. Select a start date
2. Select an end date
3. Click **Generate Report**.

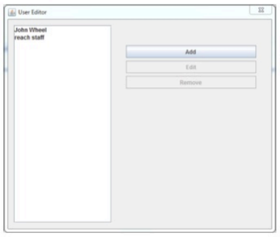
Figure 38 – User Manual Page 11

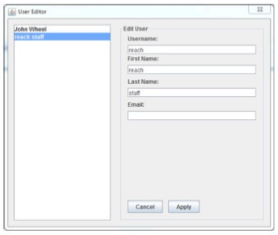
R.E.A.C.H. Patient Manager

Other Functions

Add and edit Staff members / Users

1. Click **Window→User Editor**
2. A window will appear called the User Editor.
3. **Add**
   - 3.1. Click **Add**.
   - 3.2. Fill in the specified fields (only username, first name, and last name are required)
   - 3.3. Click **Apply.**
   - 3.4. On confirmation screen, click **Apply** again.
4. **Edit**
   - 4.1. Click Edit
   - 4.2. Change the specified fields (only username, first name, and last name are required)
   - 4.3. Click **Apply.**
   - 4.4. On confirmation screen, click **Apply** again.
5. To refresh the Staff list in the appointment module, an application restart is required.



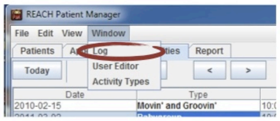


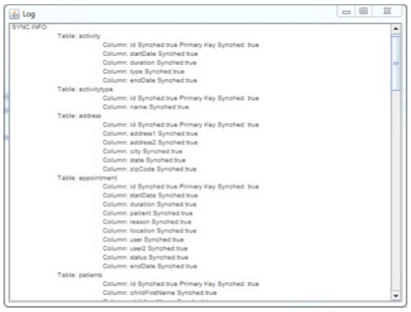
Username: reach
First Name: reach
Last Name: staff
Email:

Show Log

This window is intended for debugging the application. If anything goes wrong, this log should show the reason. To open it:

Click **Window→Log**

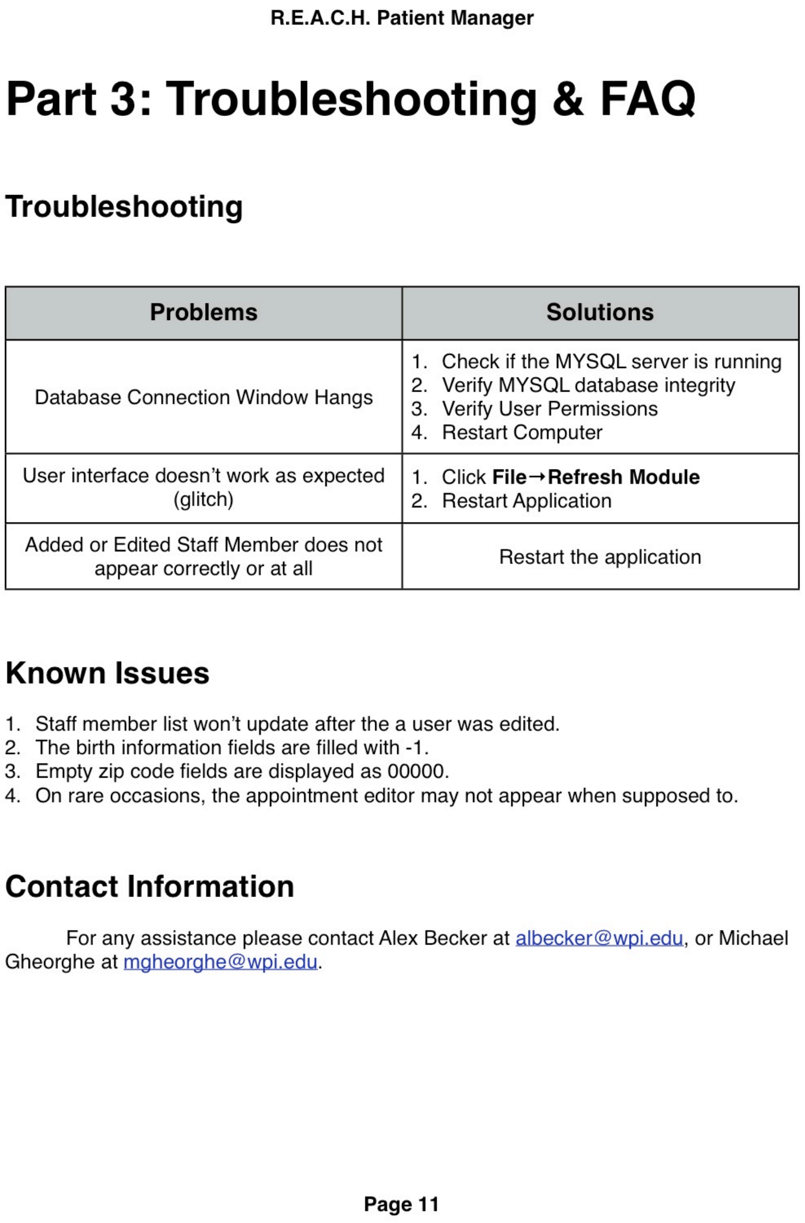




```
SYNC INFO:
            Table: activity
                        Column: id Synched:true Primary Key Synched: true
                        Column: startDate Synched:true
                        Column: duration Synched:true
                        Column: type Synched:true
                        Column: endDate Synched:true
            Table: activitytype
                        Column: id Synched:true Primary Key Synched: true
                        Column: name Synched:true
            Table: address
                        Column: id Synched:true Primary Key Synched: true
                        Column: address1 Synched:true
                        Column: address2 Synched:true
                        Column: city Synched:true
                        Column: state Synched:true
                        Column: zipCode Synched:true
            Table: appointment
                        Column: id Synched:true Primary Key Synched: true
                        Column: startDate Synched:true
                        Column: duration Synched:true
                        Column: patient Synched:true
                        Column: reason Synched:true
                        Column: location Synched:true
                        Column: user Synched:true
                        Column: user2 Synched:true
                        Column: status Synched:true
                        Column: endDate Synched:true
            Table: patients
                        Column: id Synched:true Primary Key Synched: true
                        Column: childFirstName Synched:true
```

Page 10

Figure 39 - User Manual Page 12



R.E.A.C.H. Patient Manager

Part 3: Troubleshooting & FAQ

Troubleshooting

Problems	Solutions
Database Connection Window Hangs	1. Check if the MYSQL server is running 2. Verify MYSQL database integrity 3. Verify User Permissions 4. Restart Computer
User interface doesn't work as expected (glitch)	1. Click **File→Refresh Module** 2. Restart Application
Added or Edited Staff Member does not appear correctly or at all	Restart the application

Known Issues

1. Staff member list won't update after the a user was edited.
2. The birth information fields are filled with -1.
3. Empty zip code fields are displayed as 00000.
4. On rare occasions, the appointment editor may not appear when supposed to.

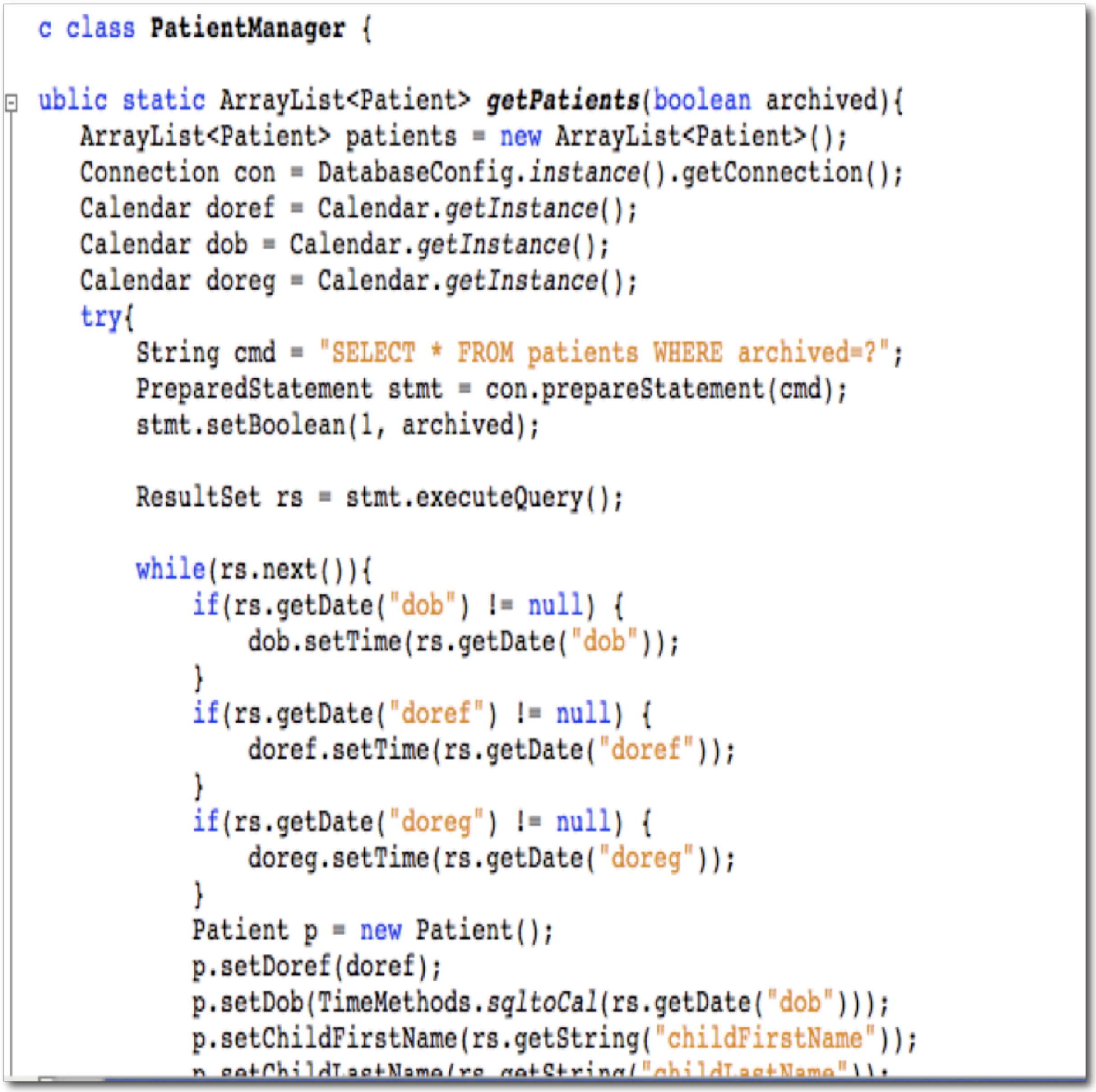
Contact Information

For any assistance please contact Alex Becker at albecker@wpi.edu, or Michael Gheorghe at mgheorghe@wpi.edu.

Page 11

Figure 40 - User Manual Page 13

Appendix C – Sample Code



```
c class PatientManager {

ublic static ArrayList<Patient> getPatients(boolean archived){
    ArrayList<Patient> patients = new ArrayList<Patient>();
    Connection con = DatabaseConfig.instance().getConnection();
    Calendar doref = Calendar.getInstance();
    Calendar dob = Calendar.getInstance();
    Calendar doreg = Calendar.getInstance();
    try{
        String cmd = "SELECT * FROM patients WHERE archived=?";
        PreparedStatement stmt = con.prepareStatement(cmd);
        stmt.setBoolean(1, archived);

        ResultSet rs = stmt.executeQuery();

        while(rs.next()){
            if(rs.getDate("dob") != null) {
                dob.setTime(rs.getDate("dob"));
            }
            if(rs.getDate("doref") != null) {
                doref.setTime(rs.getDate("doref"));
            }
            if(rs.getDate("doreg") != null) {
                doreg.setTime(rs.getDate("doreg"));
            }
            Patient p = new Patient();
            p.setDoref(doref);
            p.setDob(TimeMethods.sqltoCal(rs.getDate("dob")));
            p.setChildFirstName(rs.getString("childFirstName"));
            p.setChildLastName(rs.getString("childLastName"));
```

Figure 41 - Sample Code

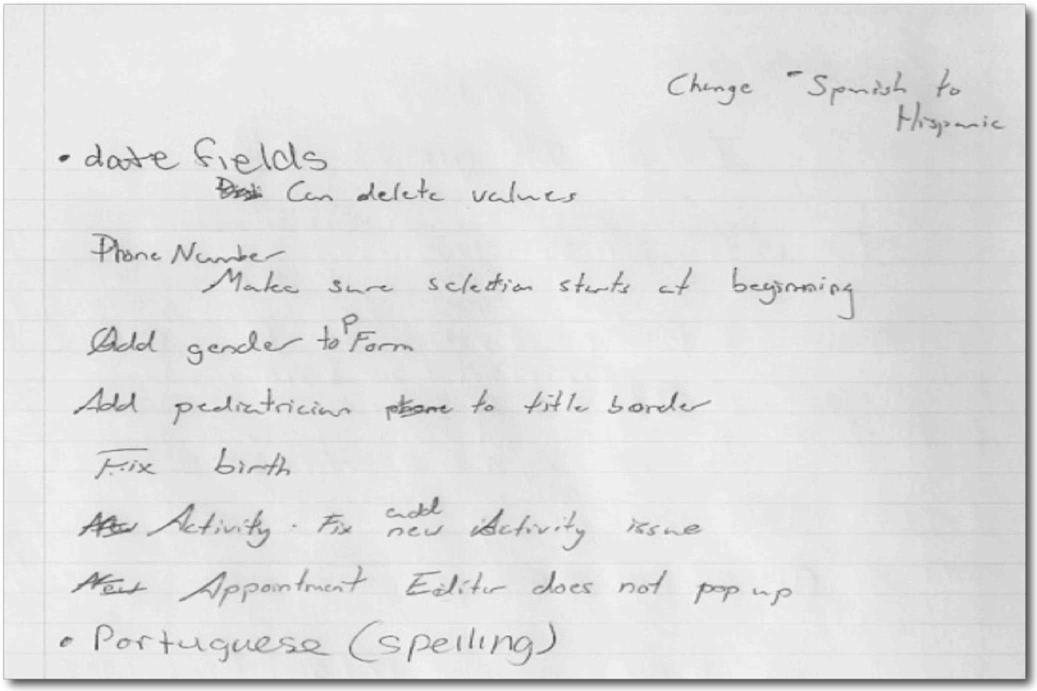
Appendix D – Interview Tree & Interview Notes

Table 5 showed the Interview tree and Interviewee’s job titles:

Table 5 - Interview Tree

Interviewers	Interviewees
Alexander Becker and Zijian Xia	N.C.
Nhi Vo and Michael Gheorghe	J. S.
Christopher Cullinan	L.S.

The interview notes as shown in Figure 28, 29 and 30 that were taken by team members:



Change "Spanish to Hispanic

- date fields

  ~~Bask~~ Can delete values

Phone Number

  Make sure selection starts at beginning

Add gender to P Form

Add pediatrician ~~phone~~ to title border

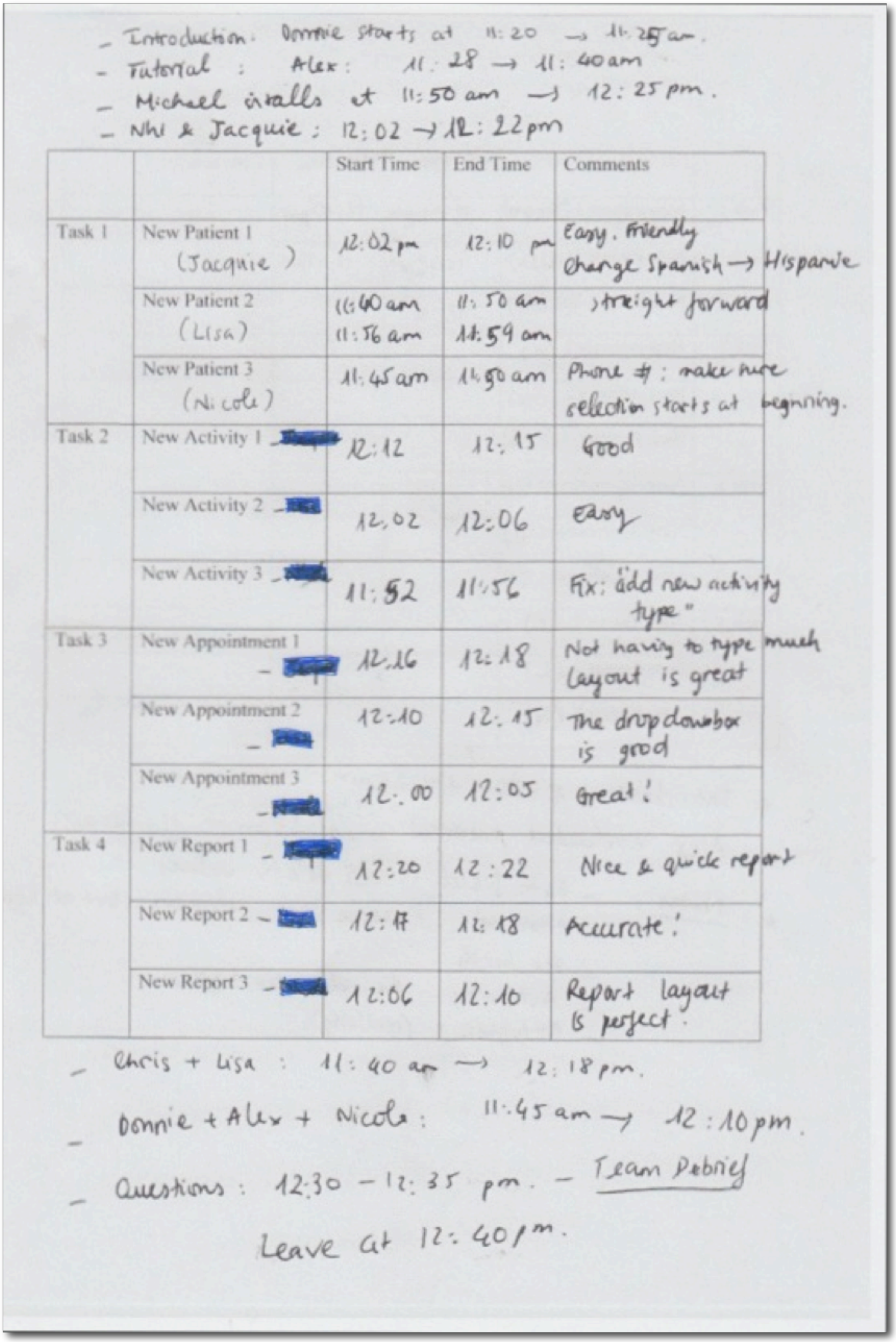
Fix birth

~~Add~~ Activity · Fix add new Activity issue

~~New~~ Appointment Editor does not pop up

- Portuguese (spelling)

Figure 42 - Interview Note 1



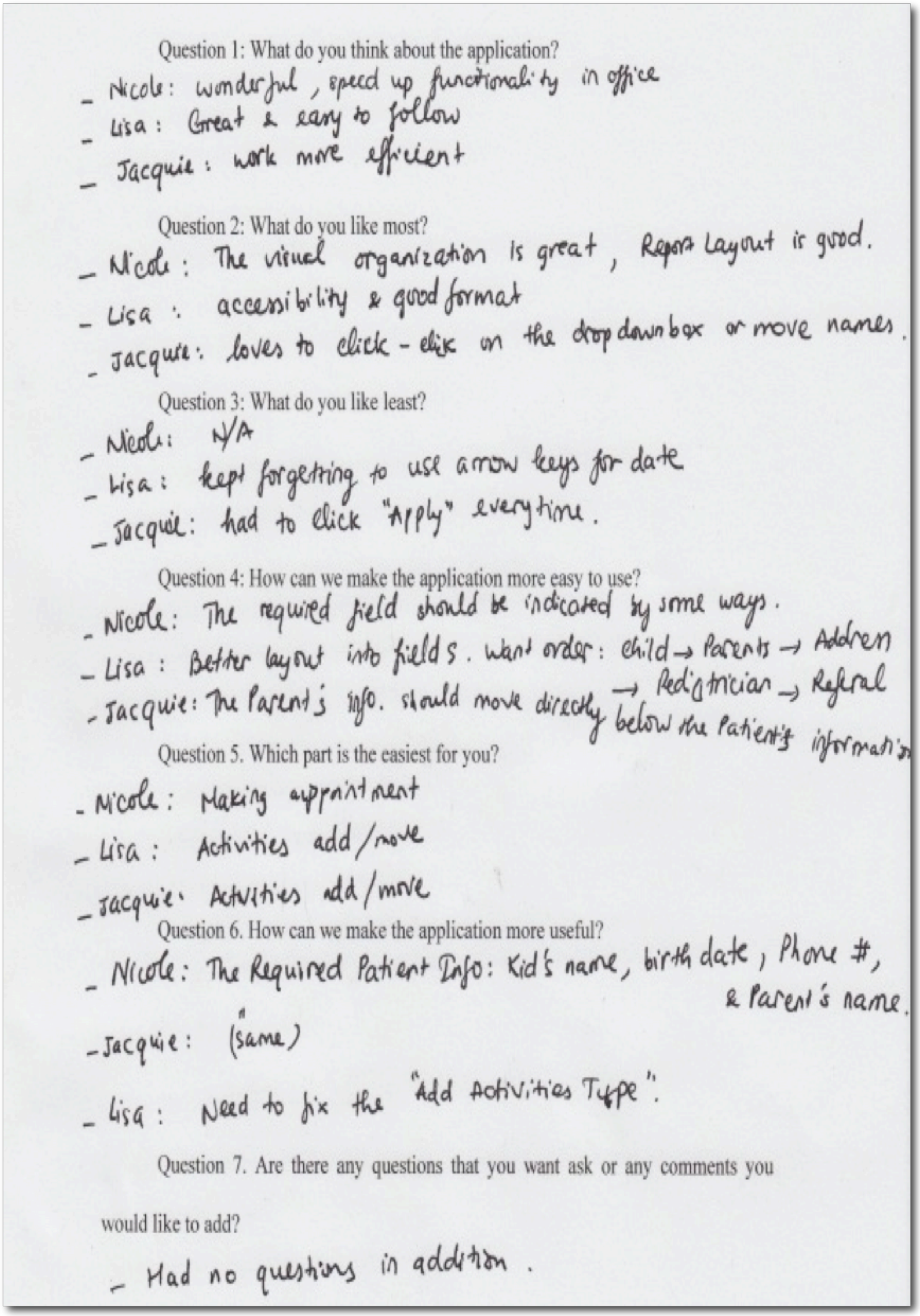
- Introduction: Donnie starts at 11:20 → 11:25 am.
- Tutorial : Alex: 11:28 → 11:40am
- Michael installs at 11:50 am → 12:25 pm.
- Nhi & Jacquie: 12:02 → 12:22pm

		Start Time	End Time	Comments
Task 1	New Patient 1 (Jacquie)	12:02 pm	12:10 pm	Easy. Friendly Change Spanish → Hispanic
	New Patient 2 (Lisa)	11:40 am 11:56 am	11:50 am 11:59 am	straight forward
	New Patient 3 (Nicole)	11:45 am	11:50 am	Phone #: make sure selection starts at beginning.
Task 2	New Activity 1 – [redacted]	12:12	12:15	Good
	New Activity 2 – [redacted]	12:02	12:06	Easy
	New Activity 3 – [redacted]	11:52	11:56	Fix: "add new activity type"
Task 3	New Appointment 1 – [redacted]	12:16	12:18	Not having to type much Layout is great
	New Appointment 2 – [redacted]	12:10	12:15	The dropdownbox is good
	New Appointment 3 – [redacted]	12:00	12:05	Great!
Task 4	New Report 1 – [redacted]	12:20	12:22	Nice & quick report
	New Report 2 – [redacted]	12:17	12:18	Accurate!
	New Report 3 – [redacted]	12:06	12:10	Report layout is perfect.

- Chris + Lisa : 11:40 am → 12:18 pm.
- Donnie + Alex + Nicole: 11:45 am → 12:10 pm.
- Questions: 12:30 – 12:35 pm. – Team Debrief

Leave at 12:40 pm.

Figure 43 – Interview Note 2



Question 1: What do you think about the application?

- Nicole: wonderful, speed up functionality in office
- Lisa: Great & easy to follow
- Jacquie: work more efficient

Question 2: What do you like most?

- Nicole: The visual organization is great, Report Layout is good.
- Lisa: accessibility & good format
- Jacquie: loves to click - click on the drop down box or move names.

Question 3: What do you like least?

- Nicole: N/A
- Lisa: kept forgetting to use arrow keys for date
- Jacquie: had to click "Apply" everytime.

Question 4: How can we make the application more easy to use?

- Nicole: The required field should be indicated by some ways.
- Lisa: Better layout into fields. want order: child → Parents → Addren → Pediatrician → Referal
- Jacquie: The Parent's info. should move directly below the Patient's information

Question 5. Which part is the easiest for you?

- Nicole: Making appointment
- Lisa: Activities add/move
- Jacquie: Activities add/move

Question 6. How can we make the application more useful?

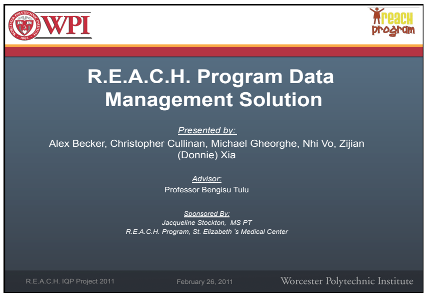
- Nicole: The Required Patient Info: Kid's name, birth date, Phone #, & Parent's name.
- Jacquie: (same)
- Lisa: Need to fix the "Add Activities Type".

Question 7. Are there any questions that you want ask or any comments you would like to add?

- Had no questions in addition.

Figure 44 - Interview Note 3

Appendix G – Final Presentation



WPI reach program

R.E.A.C.H. Program Data Management Solution

Presented by:
Alex Becker, Christopher Cullinan, Michael Gheorghe, Nhi Vo, Zijian (Donnie) Xia

Advisor:
Professor Bengisu Tulu

Sponsored By:
Jacqueline Stockton, MS PT
R.E.A.C.H. Program, St. Elizabeth 's Medical Center

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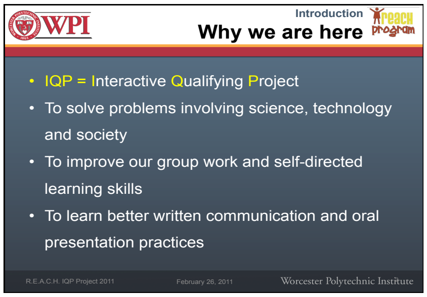

WPI Introduction reach program

Why we are here

- IQP = Interactive Qualifying Project
- To solve problems involving science, technology and society
- To improve our group work and self-directed learning skills
- To learn better written communication and oral presentation practices

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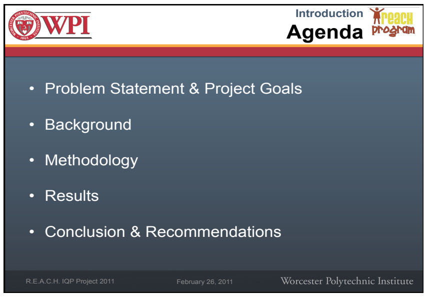

WPI Introduction reach program

Agenda

- Problem Statement & Project Goals
- Background
- Methodology
- Results
- Conclusion & Recommendations

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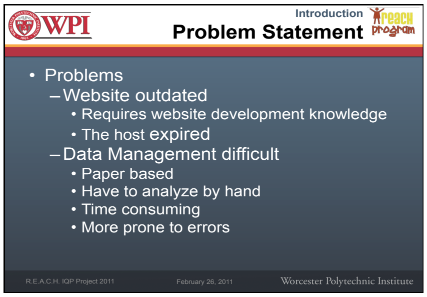

WPI Introduction reach program

Problem Statement

- Problems
  - Website outdated
    - Requires website development knowledge
    - The host expired
  - Data Management difficult
    - Paper based
    - Have to analyze by hand
    - Time consuming
    - More prone to errors

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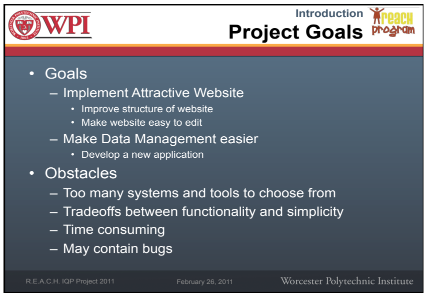

WPI Introduction reach program

Project Goals

- Goals
  - Implement Attractive Website
    - Improve structure of website
    - Make website easy to edit
  - Make Data Management easier
    - Develop a new application
- Obstacles
  - Too many systems and tools to choose from
  - Tradeoffs between functionality and simplicity
  - Time consuming
  - May contain bugs

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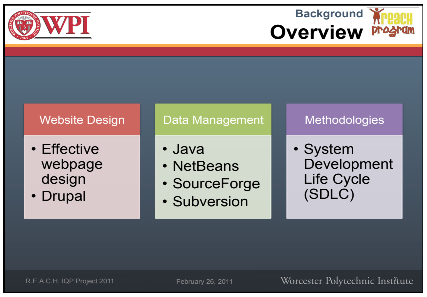

WPI Background reach program

Overview

Website Design	Data Management	Methodologies
• Effective webpage design • Drupal	• Java • NetBeans • SourceForge • Subversion	• System Development Life Cycle (SDLC)

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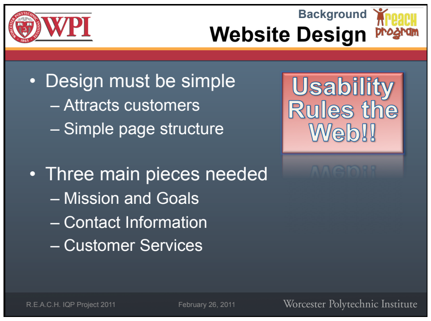
Figure 45 - Final Presentation 1

R.E.A.C.H Project Proposal 2/26/11



Background

Website Design

- Design must be simple
  - Attracts customers
  - Simple page structure
- Three main pieces needed
  - Mission and Goals
  - Contact Information
  - Customer Services

Usability Rules the Web!!

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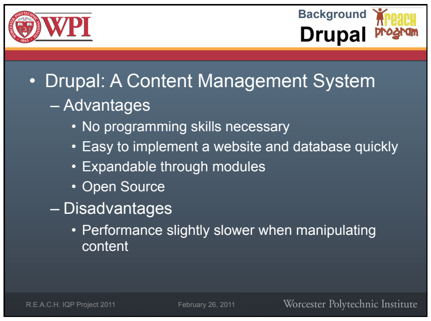

Background

Drupal

- Drupal: A Content Management System
  - Advantages
    - No programming skills necessary
    - Easy to implement a website and database quickly
    - Expandable through modules
    - Open Source
  - Disadvantages
    - Performance slightly slower when manipulating content

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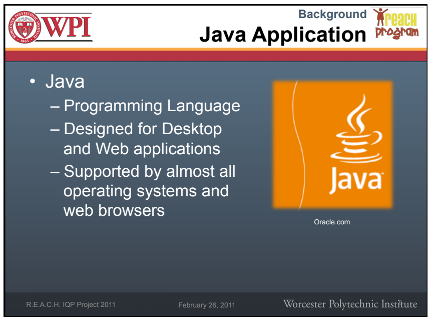

Background

Java Application

- Java
  - Programming Language
  - Designed for Desktop and Web applications
  - Supported by almost all operating systems and web browsers

Oracle.com

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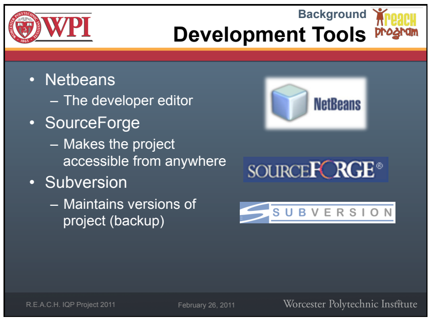

Background

Development Tools

- Netbeans
  - The developer editor
- SourceForge
  - Makes the project accessible from anywhere
- Subversion
  - Maintains versions of project (backup)

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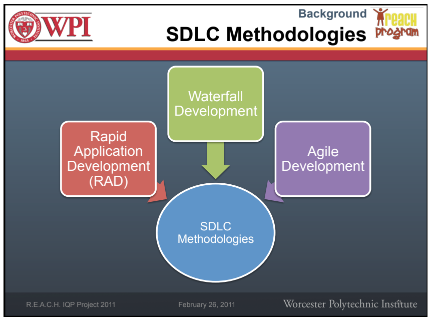

Background

SDLC Methodologies

Waterfall Development

Rapid Application Development (RAD)

Agile Development

SDLC Methodologies

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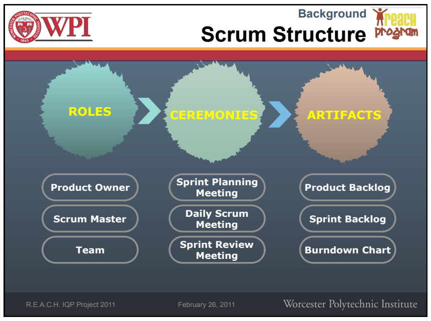

Background

Scrum Structure

ROLES

CEREMONIES

ARTIFACTS

Product Owner

Scrum Master

Team

Sprint Planning Meeting

Daily Scrum Meeting

Sprint Review Meeting

Product Backlog

Sprint Backlog

Burndown Chart

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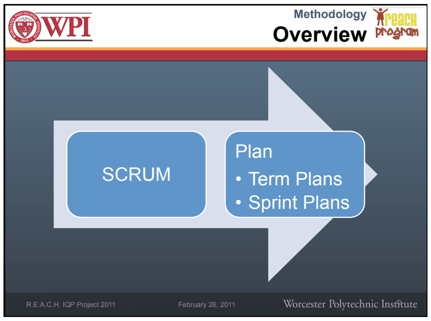
2

Figure 46 - Final Presentation 2



Methodology

Overview

SCRUM

Plan
- Term Plans
- Sprint Plans

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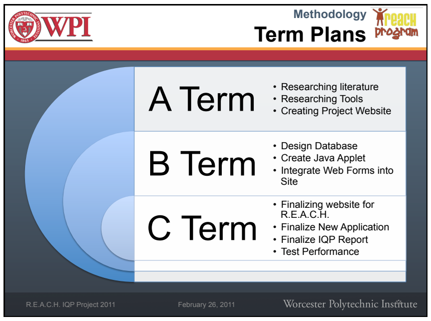

Methodology

Term Plans

A Term
- Researching literature
- Researching Tools
- Creating Project Website

B Term
- Design Database
- Create Java Applet
- Integrate Web Forms into Site

C Term
- Finalizing website for R.E.A.C.H.
- Finalize New Application
- Finalize IQP Report
- Test Performance

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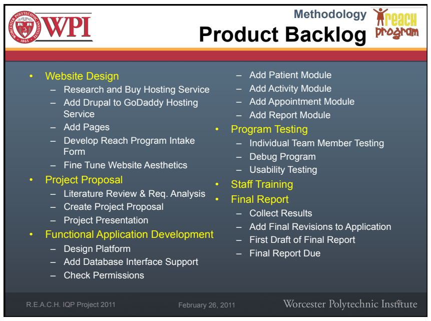

Methodology

Product Backlog

- Website Design
  - Research and Buy Hosting Service
  - Add Drupal to GoDaddy Hosting Service
  - Add Pages
  - Develop Reach Program Intake Form
  - Fine Tune Website Aesthetics
- Project Proposal
  - Literature Review & Req. Analysis
  - Create Project Proposal
  - Project Presentation
- Functional Application Development
  - Design Platform
  - Add Database Interface Support
  - Check Permissions
  - Add Patient Module
  - Add Activity Module
  - Add Appointment Module
  - Add Report Module
- Program Testing
  - Individual Team Member Testing
  - Debug Program
  - Usability Testing
- Staff Training
- Final Report
  - Collect Results
  - Add Final Revisions to Application
  - First Draft of Final Report
  - Final Report Due

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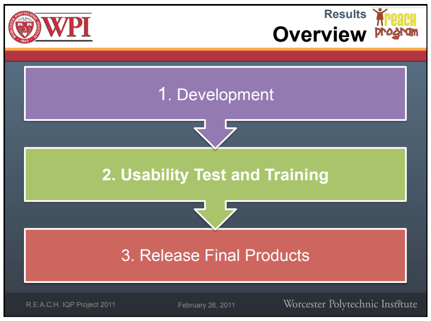

Results

Overview

1. Development

2. Usability Test and Training

3. Release Final Products

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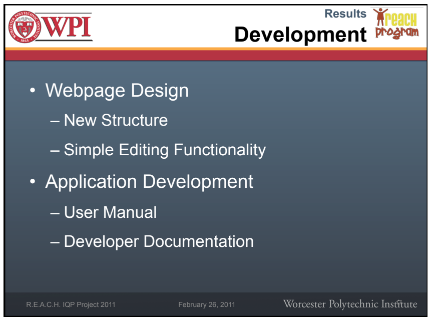

Results

Development

- Webpage Design
  - New Structure
  - Simple Editing Functionality
- Application Development
  - User Manual
  - Developer Documentation

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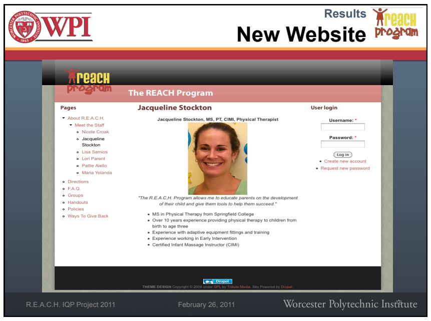

Results

New Website

The REACH Program

Pages
- About R.E.A.C.H.
  - Meet the Staff
    - Nicole Croak
    - Jacqueline Stockton
    - Lisa Samios
    - Lori Parent
    - Pattie Aiello
    - Maria Yolanda
- Directions
- F.A.Q.
- Groups
- Handouts
- Policies
- Ways To Give Back

Jacqueline Stockton

Jacqueline Stockton, MS, PT, CIMI, Physical Therapist

"The R.E.A.C.H. Program allows me to educate parents on the development of their child and give them tools to help them succeed."

- MS in Physical Therapy from Springfield College
- Over 10 years experience providing physical therapy to children from birth to age three
- Experience with adaptive equipment fittings and training
- Experience working in Early Intervention
- Certified Infant Massage Instructor (CIMI)

User login

Username: *

Password: *

Log in
- Create new account
- Request new password

THEME DESIGN Copyright © 2009 under GPL by Tribute Media. Site Powered by Drupal.

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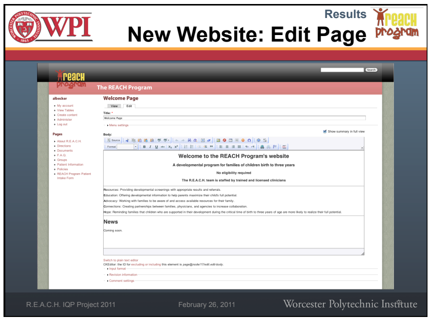
Figure 47 - Final Presentation 3



Results

New Website: Edit Page

albecker

- My account
- View Tables
- Create content
- Administer
- Log out

Pages

- About R.E.A.C.H.
- Directions
- Documents
- F.A.Q.
- Groups
- Patient Information
- Policies
- REACH Program Patient Intake Form

Welcome Page

Title: *
Welcome Page

Menu settings

Body:

Welcome to the REACH Program's website

A developmental program for families of children birth to three years

No eligibility required

The R.E.A.C.H. team is staffed by trained and licensed clinicians

Resources: Providing developmental screenings with appropriate results and referrals.
Education: Offering developmental information to help parents maximize their child's full potential.
Advocacy: Working with families to be aware of and access available resources for their family.
Connections: Creating partnerships between families, physicians, and agencies to increase collaboration.
Hope: Reminding families that children who are supported in their development during the critical time of birth to three years of age are more likely to realize their full potential.

News

Coming soon.

Switch to plain text editor
CKEditor: the ID for excluding or including this element is *page@node/7/edit.edit-body*.

- Input format
- Revision information
- Comment settings

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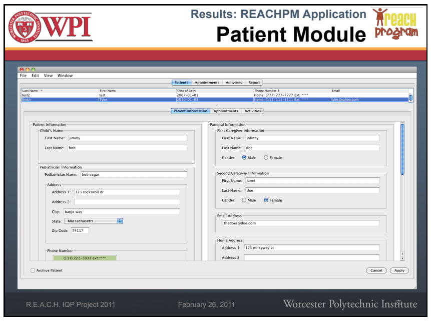

Results: REACHPM Application

Patient Module

Last Name	First Name	Date of Birth	Phone Number 1	Email
test2	test	2007-01-01	Home: (777) 777-7777 Ext: ****	
Smith	Tyler	2010-01-08	Home: (111) 111-1111 Ext: ****	tyler@yahoo.com

Patient Information

Child's Name
First Name: jimmy
Last Name: bob

Pediatrician Information
Pediatrician Name: bob segar

Address
Address 1: 123 rocknroll dr
Address 2:
City: banjo way
State: Massachusetts
Zip Code 74117

Phone Number
(111) 222-3333 ext:****

Parental Information

First Caregiver Information
First Name: johnny
Last Name: doe
Gender: ● Male ○ Female

Second Caregiver Information
First Name: janet
Last Name: doe
Gender: ○ Male ● Female

Email Address
thedoes@doe.com

Home Address
Address 1: 123 milkyway st
Address 2:

□ Archive Patient

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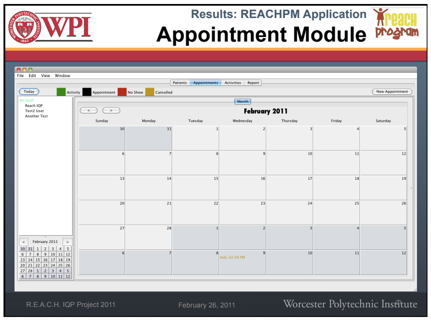

Results: REACHPM Application

Appointment Module

🟩 Activity ⬛ Appointment 🟥 No Show 🟨 Cancelled

All Staff
Reach IQP
Test2 User
Another Test

February 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	1	2	3	4	5
6	7	8	9 bob-02:00 PM	10	11	12

< February 2011 >

30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	1	2	3	4	5
6	7	8	9	10	11	12

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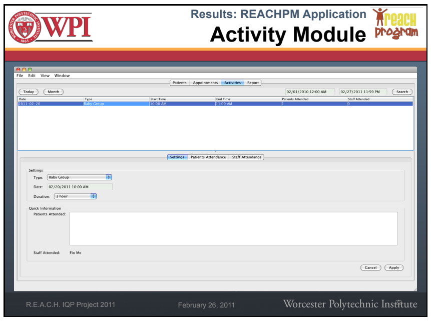

Results: REACHPM Application

Activity Module

02/01/2010 12:00 AM 02/27/2011 11:59 PM

Date	Type	Start Time	End Time	Patients Attended	Staff Attended
2011-02-20	Baby Group	10:00 AM	11:00 AM	2	0

Settings
Type: Baby Group
Date: 02/20/2011 10:00 AM
Duration: 1 hour

Quick Information
Patients Attended:
Staff Attended: Fix Me

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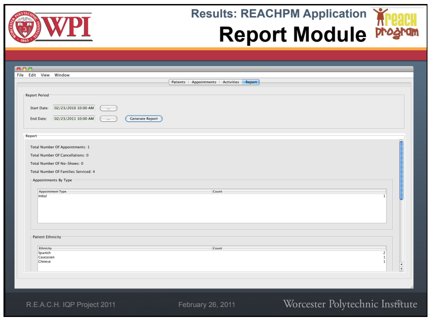

Results: REACHPM Application

Report Module

Report Period
Start Date: 02/23/2010 10:00 AM
End Date: 02/23/2011 10:00 AM

Report
Total Number Of Appointments: 1
Total Number Of Cancellations: 0
Total Number Of No-Shows: 0
Total Number Of Families Serviced: 4

Appointments By Type

Appointment Type	Count
Initial	1

Patient Ethnicity

Ethnicity	Count
Spanish	2
Caucasian	1
Chinese	1

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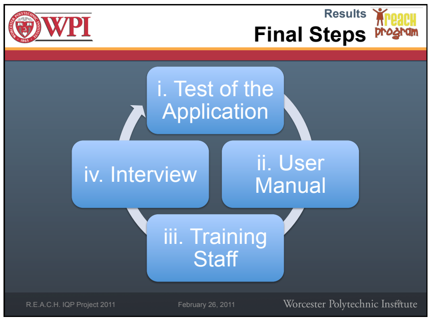

Results

Final Steps

i. Test of the Application
ii. User Manual
iii. Training Staff
iv. Interview

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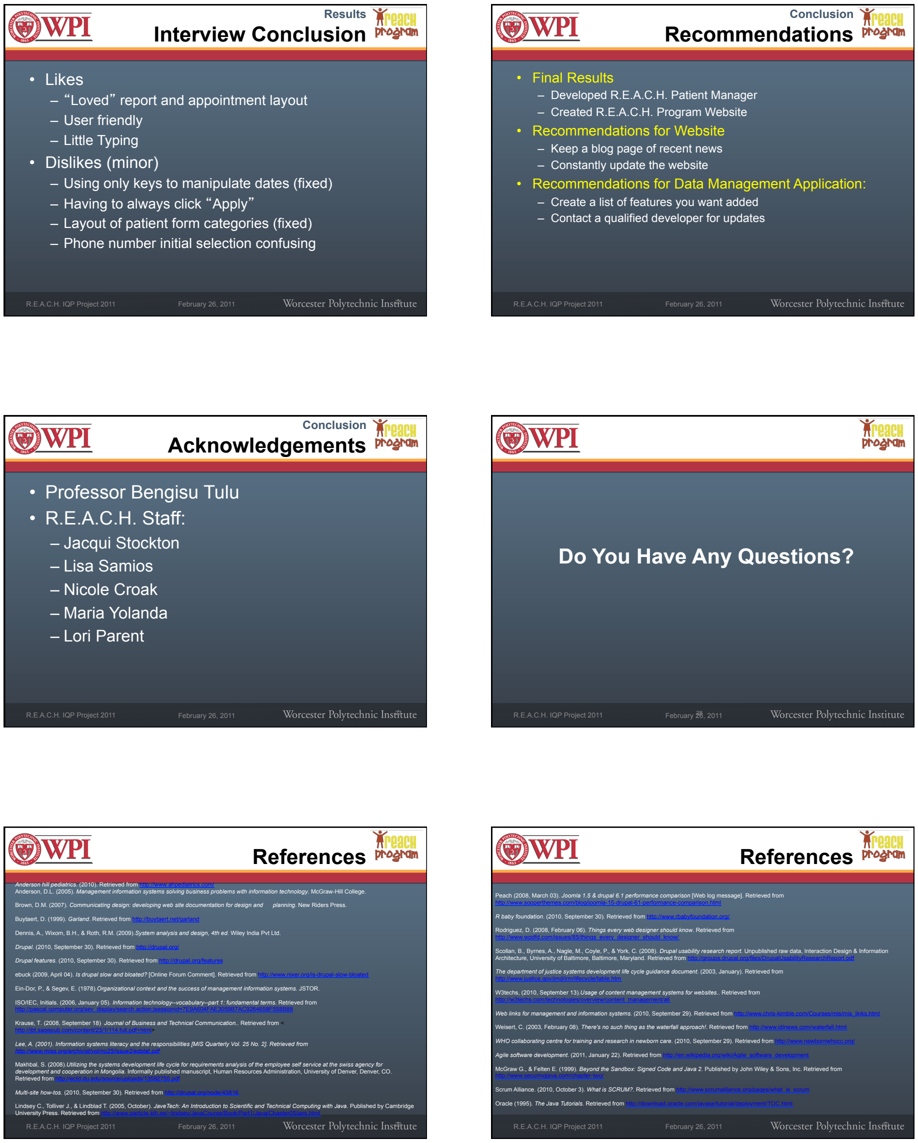
Figure 48 - Final Presentation 4



Results
Interview Conclusion

- Likes
  - “Loved” report and appointment layout
  - User friendly
  - Little Typing
- Dislikes (minor)
  - Using only keys to manipulate dates (fixed)
  - Having to always click “Apply”
  - Layout of patient form categories (fixed)
  - Phone number initial selection confusing

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Conclusion
Recommendations

- Final Results
  - Developed R.E.A.C.H. Patient Manager
  - Created R.E.A.C.H. Program Website
- Recommendations for Website
  - Keep a blog page of recent news
  - Constantly update the website
- Recommendations for Data Management Application:
  - Create a list of features you want added
  - Contact a qualified developer for updates

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Conclusion
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  - Nicole Croak
  - Maria Yolanda
  - Lori Parent

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Do You Have Any Questions?

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Figure 49 - Final Presentation 5