

Drawing a Community of Professionals to Biomedical and Health Informatics at SUNY Oswego

Prepared by: Dr. Joseph Miles

For BHI503: eHealth Systems

Working prototype can be viewed at:

<http://pi.cs.oswego.edu/~jmiles3/bhi-oswego/>

Introduction

Biomedical and Health Informatics (BHI) is a community of clinical, technical, administrative and research science uniting to advance healthcare. Our goal is to establish the importance of BHI through an Internet presence for the BHI program at SUNY Oswego.

The term “informatics” seems to be largely misunderstood in healthcare. As SUNY Oswego establishes the Master’s degree program for BHI, it is important that we not only define the field, but also generate the excitement of professionals from many different disciplines to get involved in informatics. We need to establish an Internet resource that is inviting and helpful to a broad spectrum of people interested in being involved with healthcare. To succeed, BHI needs the expertise and experience of doctors, nurses, pharmacists or anyone involved in patient care, as well as the disciplines of computer science, research and healthcare management. It is only by the unified product of all of the above listed disciplines that we can forge a better healthcare system for tomorrow.

Our European associates use the term informatics the same way we use the term computer science in the United States (Groth, 2010). While computing is an essential piece of informatics in the US, technology is the tool we use to effectively transform information into useful data that can be applied to healthcare. Using the example provided by Charles Friedman (2009): a computer is not better than the abilities of a human, but the combination of a human effectively utilizing technology is greater than a human working alone. Dennis Groth describes informatics as the intersection between people, information and technology systems where a student can combine passions for computation and the healthcare domain (2010). The strength of BHI is in the combined expertise of many specialties working together, with the assistance of technology, to improve the health of healthcare.

To attract and inform people about the BHI program at SUNY Oswego, we need to create a website that invites people of varying backgrounds to learn and discuss the future of BHI. The material should be presented concisely but should also definitively establish the importance of BHI.

This document will identify the primary and secondary audiences for our Internet presence as well as identifying interested parties within SUNY Oswego. We will layout the framework for creating an informative product that will invite anyone interested in learning more about BHI to return to the website. A case will be made for additional methods of interaction with website users in order to give users timely and complete answers to their questions. A user of our website should leave with confidence that BHI is a high demand field with many potential professional pathways that is worth considering as a field of study and as a future occupation. A use case will be presented to establish a typical use of the Internet resource as well as proposing alternate scenarios for a user to delve deeper into BHI.

Project Overview

The summary of our website is: “Biomedical and Health Informatics: Where Clinical, Technical and Research Science Unite to Advance Healthcare.” BHI is a broad field that adapts to changes in how we practice healthcare, so providing dynamic content is essential for the sustainability of relevance for a website about BHI. The information resources currently available for BHI give different information to the reader depending on the context of the original source. For example, an informatics program originating from a medical school, computer science department or a library science department will all have different perspectives on BHI. As a new program, SUNY Oswego needs to appreciate the multi-discipline origination of BHI and work to accommodate the cumulative value of those disciplines and give website visitors confidence that they would contribute, as well as receive, value for our program with any of the aforementioned education or professional experience.

The primary goal of the website is to attract people to apply to be a student in the BHI program at SUNY Oswego. A secondary goal would be to attract potential faculty to be involved in the BHI department of SUNY Oswego or attract potential employers to hire graduates or provide internships for the BHI program. In order to achieve these goals, we need to create an informative resource that instills confidence in users concerning the competence of SUNY Oswego.

The website needs to have a familiar and intuitive user interface with a professional feel to showcase our computer science heritage. A well-planned and analyzed user experience (UX) will further a feeling of aptitude for our BHI department. As an aspect of UX, we will ensure that each person navigating our Internet resources finds answers to their questions or has user friendly options for placing inquiries through several different options in order to meet the desires of each individual user. Our product is education, and as with any system that has a product to sell, we want users to bookmark and return to our Internet resource to continue to shop.

Questions we would like to answer with our website would be:

- 1) Why should I be interested in Biomedical and Health Informatics?
- 2) What could I do with a BHI degree and how do I become a BHI professional?
 - What is the employment outlook for BHI professionals (job growth/salary)?
- 3) Who is SUNY Oswego and why choose their BHI program?
 - What BHI courses are offered by SUNY Oswego?
- 4) How do I enroll in the BHI program and what are the prerequisites?
- 5) How can I network with faculty, students and other BHI professionals?
- 6) What other information is available for BHI (external links)?

Project Background

Biomedical and Health Informatics is a career path with strong demand and a diverse job market with room for professional growth (University Alliance, 2016). The Healthcare Information and Management Systems Society reports an average and median salary for healthcare workers in information technology as \$111,388 and \$90,000 respectively (2015). We need to convey the importance, high demand, and competitive salary of BHI to our website users to entice them to want to be part of the BHI program.

Websites of interest that are currently available for similar programs include Human Computer Interaction (HCI) at SUNY Oswego (<https://www.oswego.edu/graduate/human-computer-interaction-ma>), University of Michigan (Health Informatics:

<http://healthinformatics.umich.edu/>), SUNY Downstate Medical Center (Medical Informatics: <http://www.downstate.edu/CHRP/informatics/>), Rochester Institute of Technology (RIT Bioinformatics: <https://www.rit.edu/science/programs/ms/bioinformatics>), and the University of Washington (UW Biomedical and Health Informatics: <https://www.bhi.washington.edu/>).

It is important that the HCI website has a prominent “apply” button on the top of the page along with other important facts concerning deadlines, program start date, number of credit hours and cost per credit hour (Figure 1). University of Michigan also includes a prominent “Register With Us” link near the top of the page (Figure 2). Both Michigan and HCI are concise with their information, but Michigan uses less space which translates well to being viewed with a mobile device. Another enticing aspect of Michigan’s website is that it leads with the inspiring statement, “Health Innovation from Health Information: Join a community of professionals transforming health care.”

SUNY Downstate and RIT are included in this discussion as they are both New York State institutions offering similar programs to BHI. Keeping in mind that SUNY Oswego is a newer program, a secondary goal will be to differentiate ourselves from these established programs. From a design perspective, RIT utilizes a collapsible “accordion style” format for much of the data on their website which helps to keep a concise feel while allowing the user to expand each topic to learn more (Figure 3).

UW’s program in BHI is included because the expected Master’s degree is also named “Biomedical and Health Informatics” like the SUNY Oswego degree. The UW website (Figure 4) is wordier and feels less organized than the other websites mentioned above. UW does have a prominent link for “Prospective Faculty” and could draw more diverse interest to their program including potential investors or hiring entities.

Of note, the varied origins of each informatics course mentioned above appears to be the “School of Information” for Michigan, “College of Health Related Professionals” for SUNY Downstate, “School of Life Science” for RIT, and “School of Medicine” for UW. BHI at SUNY Oswego, coming from an origin of Computer Science, can celebrate the diversity

of its inception while also stressing relationships with Upstate Medical and other associations to emphasize the completeness of the program.

It is important to keep in mind the primary goal of inviting interest in the BHI program at SUNY Oswego so visitors will be inclined to apply to be a prospective student. Secondary goals to consider in the website design include inviting users to apply to work with SUNY Oswego, inquire about employing graduates, offering internships or otherwise investing in the success of SUNY Oswego. A main objective is providing interesting, accurate and concise information to establish the competence of the faculty and institution of SUNY Oswego. Providing motivating content that draws the interest of individuals from many different backgrounds will only serve to advance BHI and improve healthcare.

System Requirements

Starting with the format of the HCI website as seen in Figure 1, we will create an inviting portal for information seekers to become BHI applicants, potential faculty, employers, internship providers, or other associates.

Use Case: Joining BHI at SUNY Oswego (Figure 5)

Primary Actors: Information seekers with an interest in learning more about BHI categorized as: 1) Student Applicant, 2) Potential Faculty, 3) Other associates [Interested party, investor, potential employer, provider of internships, or partner].

Supporting Actors: 1) Website / Social Media Custodian(s), 2) Director of BHI at SUNY Oswego, 3) Oswego Graduate Studies Admissions Department, 4) alumni, current students and associates working in the BHI industry

Offstage Actor: SUNY Oswego

Preconditions: 1) Website is created and hosted as a domain of Oswego.edu with the same or complementary design and user interface as HCI website. 2) Primary and supporting actors have a device and a web browsing client to interact with the website. 3) Website is indexed with search engines with appropriate search terms such as: biomedical, health, medical, informatics, bioinformatics, healthcare, SUNY, Oswego,

Central New York, Syracuse, Metro Center, affordable education, professional, master's degree, employment, and jobs. 4) A SUNY Oswego BHI presence is established on social media through Facebook and Twitter for networking and dynamic content including news, events, and announcements. 5) All content is linked with the Graduate Department of Oswego (@OswegoGradStudy). 6) System exists for evaluating applications. 7) SUNY Oswego Application form exists and is accessible. 8) "Register to learn more" form exists with checkboxes for differentiating actors [student, faculty, employment or internship opportunity, academic partnership].

Success Guarantee: Primary actor reaches the appropriate contact with usable data that can be processed by the SUNY Oswego Graduate Department and/or Director of BHI and, in turn, responds to the primary actor in a timely manner. Timely response will increase the likelihood of achieving the primary goal of attracting new students, including individuals that may have followed an extension path below and return to apply to become a student.

Main Success Scenario, Standard Path (S) and Extensions (E):

S05. Actor lands on BHI website (via search engine, Grad Dept, Social Media, etc)

S10. Actor reads inviting information about BHI

S15. Actor follows link to give information to SUNY Oswego, "Apply Now"

S20. Actor fills out form to initiate the application process

S25. Application is processed

S30. Response to application within 10 business days

S35. Application is accepted by SUNY Oswego and invitation is sent to Actor

S40. Invitation is accepted by the Actor.

Extension for prospective faculty:

E01.15. Actor follows link to give information to SUNY Oswego, "Prospective Faculty."

E01.20. Actor fills out form to apply for a faculty position at SUNY Oswego

Resume at S25.

Extension for other associates:

E02.15. Actor follows “Register to learn more” link

E02.20. Actor fills out form to register with SUNY Oswego

E02.25. Registration is processed

E02.30. Response is provided to the actor within 5 business days

E02.35. Invitation to the actor to sustain contact with SUNY Oswego

Resume at S40.

Extension for rejected actor:

E03.35. Send a reply with no invitation to the actor with regrets.

Alternate paths (A), excluding paths where the actor halts the process at any step:

A01.25. If the form fails to process, a system of reviewing failed data should be initiated to try to extract usable data in order to reply to the actor. Contact the actor and resume at S20.

A02.30. SUNY Oswego fails to respond in a timely manner. There should be a review process for application / registration forms that received no answer. Contact needs to be made with the actor, and if necessary, resume at S20.

A03.35. SUNY Oswego fails to send invitation due to communication failure. As with A02, a review process should exist to ensure successful communication with the actor. Correct error (typo, failed delivery, etc) and resume at S35.

A04.40. Invitation is not accepted by the actor. Application can be re-evaluated before the next semester. If the actor is still deemed a desirable candidate, a friendly re-invite can be initiated, resume S35.

Non-Functional requirements: Internet access, device availability, free client software, confidentiality of actor data, communication software or phone access.

Special Requirements: Maintenance of content and periodic updates to UX.

Frequency of Occurrence: Information on the website needs to be updated at least twice a year.

Technology and Data Variations: UX has to be comfortable and professional on mobile devices as well as desktop and laptop personal computers.

Architectural Design

Our website will be created in a style to complement other Oswego.edu pages. Our design will follow the same template as used for the HCI website as seen in Figure 1. Creation of the pages for BHI will be facilitated on the WordPress publishing platform to take advantage of the WordPress handling of dynamic blog content and WordPress' ability to easily create pages with uniform aesthetic and feel. Each page will have a heading of "Biomedical and Health Informatics at SUNY Oswego: where clinical, technical and research science unite to advance healthcare" to substantiate who we are. Creation and integration of Facebook and Twitter groups @BHIOswego will be essential for dynamic content and networking purposes. As we want users to get involved with BHI at SUNY Oswego, every page on our website will have a prominent link to "apply" for or "register" with the BHI program at SUNY Oswego. An image of the interactive BHI News Blog can be seen in Figure 8. It would be our suggestion that the registration for the BHI website should be the same registration used for registering a new applicant for SUNY Oswego. A hierarchy and flow diagram for the BHI@Oswego pages created through WordPress is pictured in Figure 9.

High-Level Design

Based on Pew Research Center data reported by Susannah Fox (2013), we can assume that nearly 3 out of 4 visitors for our website will land via search from either Google, Bing or Yahoo. Since we cannot control which page a visitor views first, we need to make the standard path of our use case scenario achievable from all locations on the website. Figure 6 is an example of the home page for the website. The modifications made to the first section as compared to the HCI website (Figure 1) is the relocation of the registration link closer to the top of the page, added links to Facebook, Twitter and Google+

to the header, and the addition of a prominent link for prospective faculty. The prototype in Figure 6 is a slight deviation from other SUNY Oswego web pages with the incorporation of a collapsible accordion style menu as seen on the RIT website (Figure 3). The top menu, as seen in Figures 6 and 7, sticks to the top of the screen as users scroll through content in order to keep all menu options constantly available, especially options for registering and applying to SUNY Oswego. Figure 8 is an unchanged copy of the Graduate Application for SUNY Oswego as retrieved 10/22/2016.

Plan for Site Sustainability

Before going live with the website, it would be useful to get user experience feedback on the functionality of the working prototype. We should recruit approximately 20 people to test the interface. A user survey should be created using mostly open ended questions like: "How would you improve your experience with our web content?" or "What additional information would you expect from this site?" During testing, more specific content can be created to develop the working prototype into a fully functional interface. After 30 days of testing and updating content, the website would be ready to go live. After going live, we could offer a voluntary user survey, similar to the survey developed above, to request feedback from new registrants and new applicants in order to continuously improve our user interface.

It would be a major goal to respond to user requests in a timely manner. As a part of continuous quality improvement, we should log when requests are made as well as a time stamp for when we respond to the requests or comments. A lack of response would decrease user confidence in the quality of our institution which would contradict the purpose for creating the website. A reasonable goal would be to respond to all user inquiries within three business days. Since applying to SUNY Oswego would take more than three business days to determine application acceptance, a system for keeping the applicant updated to the application status would be sufficient to achieve our timely responses (the system for application status updates exists and is already in use by SUNY Oswego). In addition to timely comment response, a designated moderator should review blog comments for appropriateness at least twice a week.

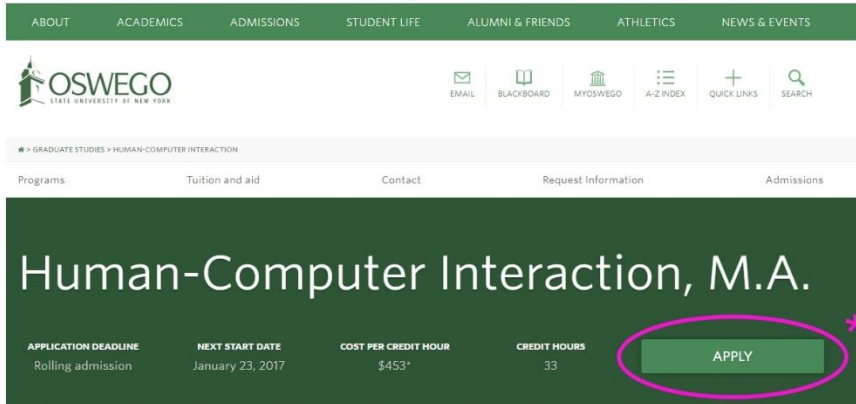
For security purposes, updates to WordPress and the associated theme and plugins should be checked and run (if necessary) on a weekly basis. Blog content should be added at least once a month to update users about news and events in BHI and to keep content fresh and interesting. Content and hyperlinks on static pages should be reviewed at least twice a year. If user feedback is not received over the course of a year, we should seek out feedback from a small group of testers on an annual basis (approximately 5 recruited responses would be sufficient). In the process of an annual review, it would be beneficial to also review the content and interface of other schools of informatics' websites as a benchmark for user experiences across the education industry. As more people provide material on the BHI News Blog, content will become continuously updated and the BHI website will become the intended online community of clinical, technical and research science united to advance healthcare.

Please review our working prototype website:

<http://pi.cs.oswego.edu/~jmiles3/bhi-oswego/>

Email comments can be directed to Joseph Miles <jmiles3@oswego.edu>

or Kristopher Saber <ksaber@oswego.edu>



The Human-Computer Interaction program at Oswego is the first program within the SUNY system dedicated to preparing professionals for careers related to human-computer interaction, user experience design and user-centered research. The program features a unique curriculum that prepares our students to guide the future of human and technology interactions.

Figure 1

Figures 1-4 are sample web pages used for researching this project.

*A indicates the apply link

*B indicates the registration link (only seen on figure 2)

*C indicates a link for prospective faculty or academic partner

Other notes in pink are observations of the user interface.



Figure 2

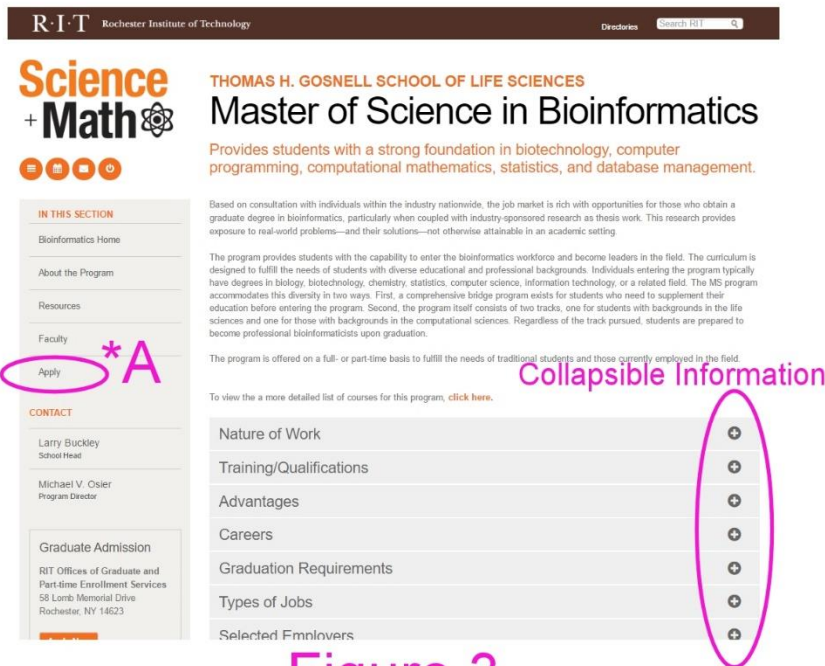


Figure 3

Again, Figures 1-4 are sample web pages used for researching this project.

*A indicates the apply link

*B indicates the registration link (only seen on figure 2)

*C indicates a link for prospective faculty

Other notes in pink are observations of the user interface.

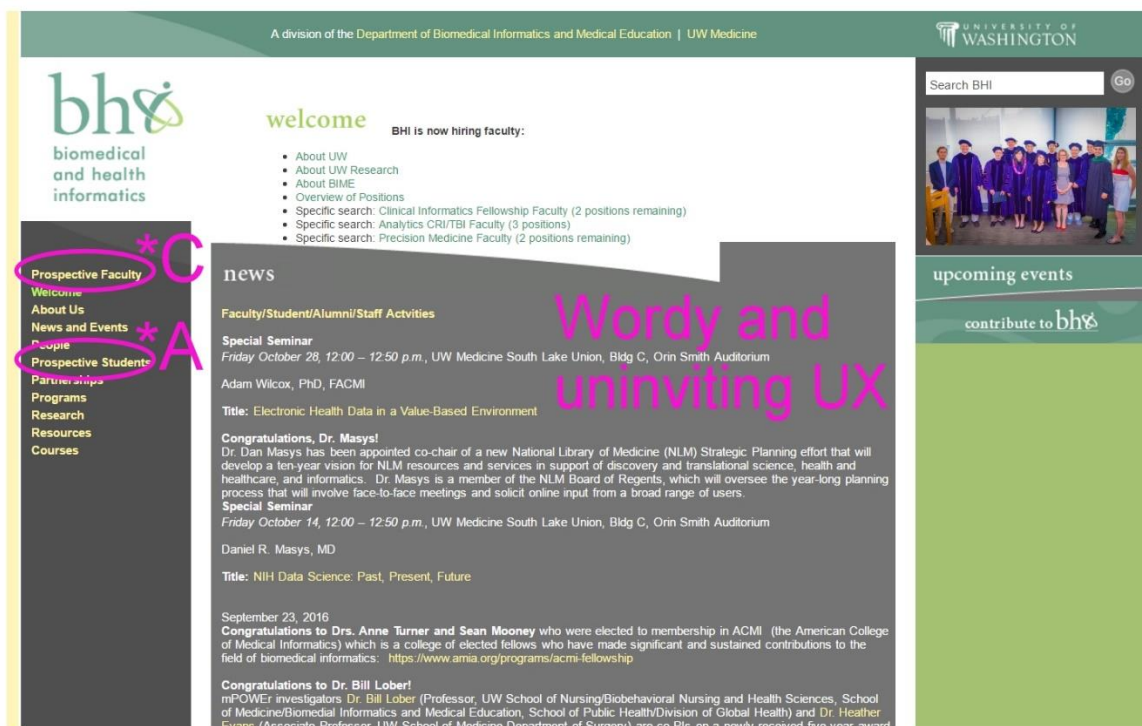


Figure 4

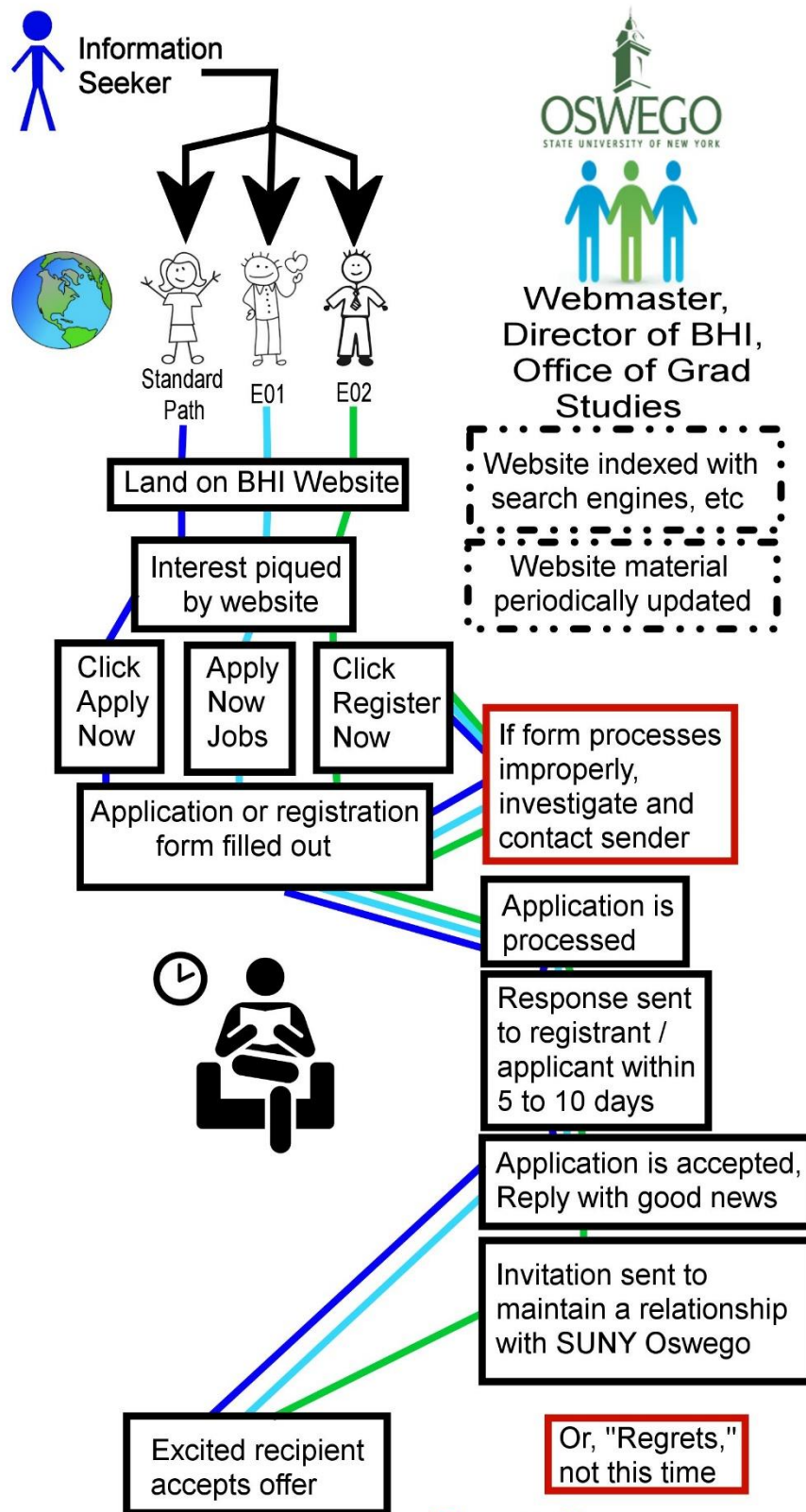


Figure 5 is a graphical representation of the use case.

Figure 5

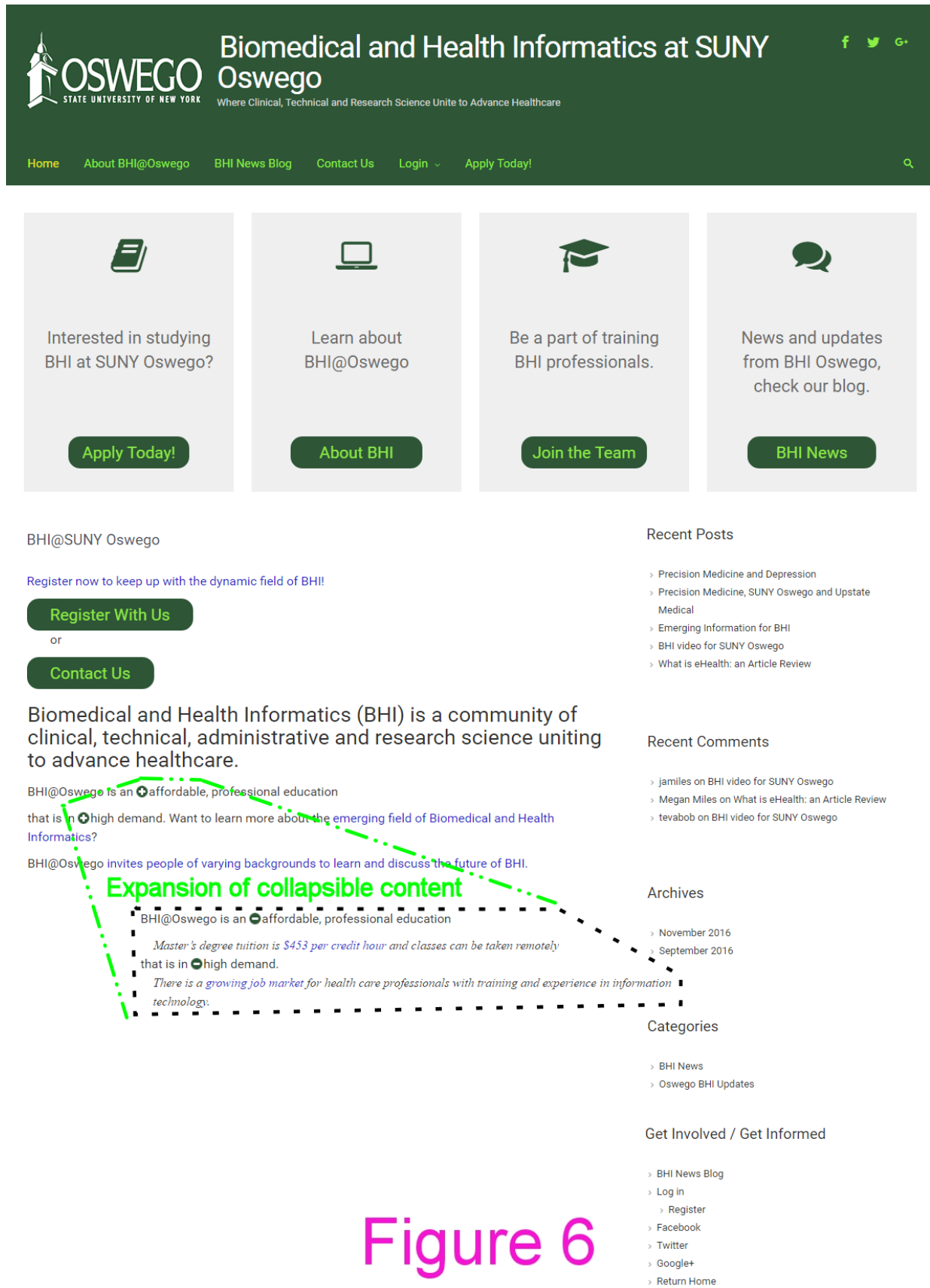
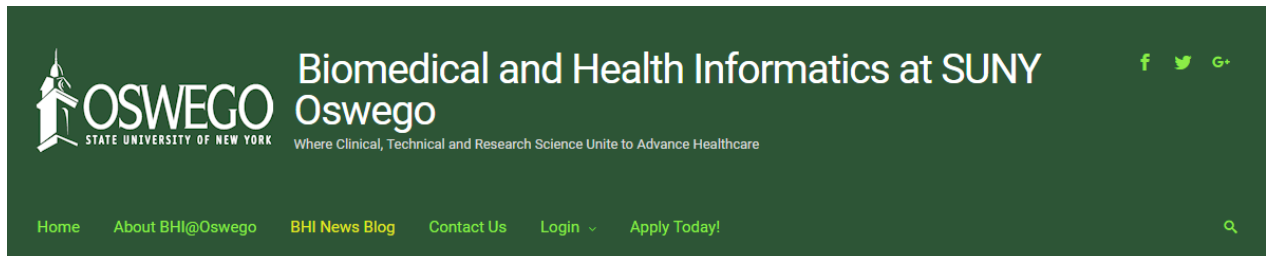


Figure 6

Figure 6 represents the prototype home page for BHI (<http://pi.cs.oswego.edu/~jmiles3/bhi-oswego/>). When a prospective student clicks “Apply Today!,” they will be taken to the graduate application as seen in Figure 8. Lower center of image shows expansion of collapsed content.



Emerging Information for BHI

November 28, 2016 | Written by Jamiles

Join the conversation! Be an active part of the emerging fields of Biomedical and Health Informatics! We will keep you updated on industry news as long as you keep us updated on your experiences in BHI and Health Information Technology. Return to News Home BHI Updates for SUNY Oswego BHI Industry News

BHI News, Oswego BHI Updates

[Read More](#)

Precision Medicine and Depression

November 30, 2016 | Written by Jamiles

In the near future, we will be better able to predict the best treatment for each individual patient without the need for trial-and-error. Someday soon, when someone is diagnosed with depression, we will be able to predict the best course of therapy based on the sum knowledge of previous experience. As we get closer [...]

BHI News

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- > Precision Medicine, SUNY Oswego and Upstate Medical
- > Emerging Information for BHI
- > BHI video for SUNY Oswego
- > What is eHealth: an Article Review

Recent Comments

- > jamiles on BHI video for SUNY Oswego
- > Megan Miles on What is eHealth: an Article Review
- > tebabob on BHI video for SUNY Oswego

Archives

- > November 2016
- > September 2016

Figure 7

Figure 7 is the prototype for the BHI News Blog encouraging users to be informed and to get involved. "Apply Today!" continues to be on display.

Figure 8 is a screen image of the SUNY Oswego Graduate Application.



Graduate Application

Create new account

Username:	6-50 characters
First Name:	
Last Name:	
Email:	
Password:	Minimum 6 characters
Re-enter Password:	Minimum 6 characters

[Get Started](#)

Figure 8

Architecture and flow for the BHI website at SUNY Oswego

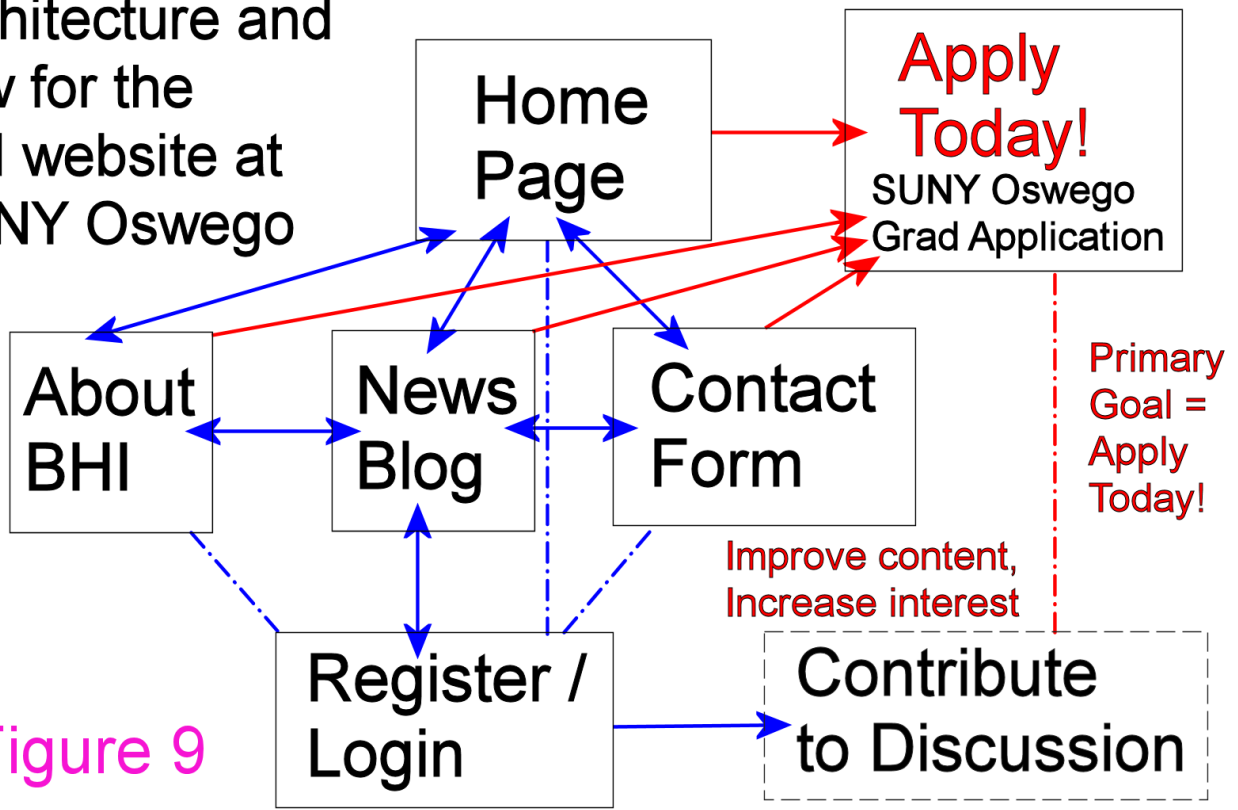


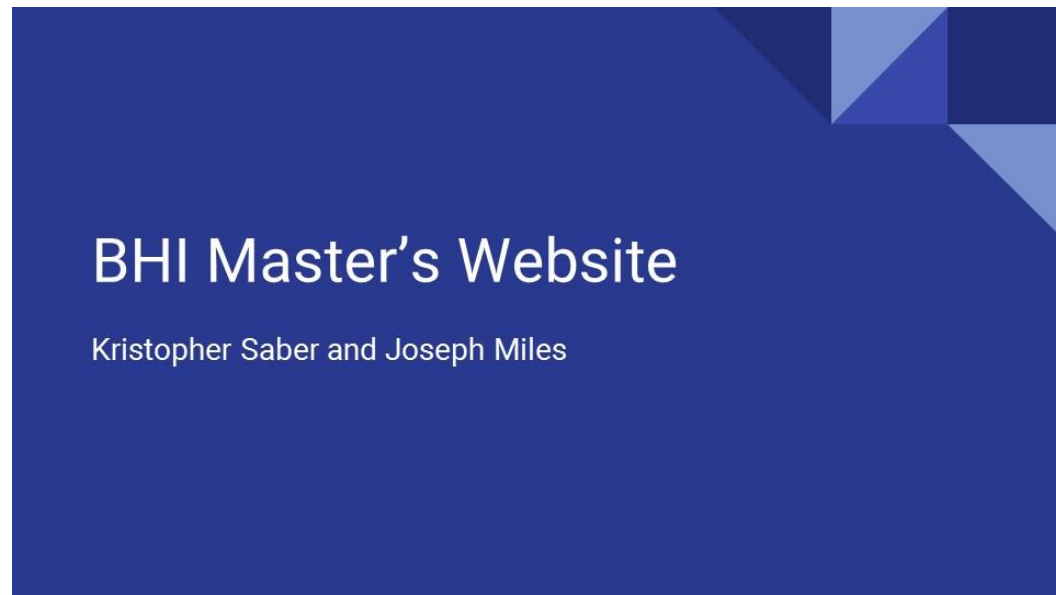
Figure 9

Figure 9 is the basic architecture of the BHI at SUNY Oswego website. Solid blue lines represent typical flow of viewing content; dashed lines represent alternate routes through content; solid red lines represent the ultimate goal for creating this website, increase interest in BHI at SUNY Oswego and increase the number of applicants for the program.

Project presentation as prepared by

Kristopher Saber and Joseph Miles (12/4/2016)

Video presentation for the following slides can be viewed on YouTube: <https://youtu.be/IstP51a-CSE>

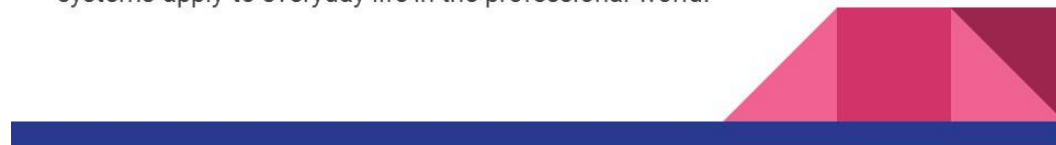


Goals

The goal of the project was to create a UX friendly website for users interested in the BHI master's program.

The website was thought of to be designed as an interactive blog that users could use to learn more about BHI in the real world.

By being able to respond/blog to BHI news events, we made it so users can feel compelled to join the master's program by understanding how electronic health systems apply to everyday life in the professional world.



User Stories

1) **As an** undergraduate student studying an ehealth related field

I want a website that I can interact with that can inform me more about electronic health systems in the real world

So that I can decide whether or not to apply to the BHI master's program after graduating with my bachelor's

Acceptance Criteria

User is able to read content on the BHI website that is related to real electronic health information. Should be able to understand how to post comments on the website in response to news/event content that is available.

User Stories Continued...

3) **As a** health care provider

I want a website that I can interact with that can inform me more about adding information technology skills to my health care experience.

So that I can decide whether or not to apply to the BHI master's program instead of working strictly as a health care clinician.

Acceptance Criteria

User is able to read content on the BHI website that is related to real electronic health information. Should be able to understand how to post comments on the website in response to news/event content that is available.

User Stories Continued...

2) **As an** IT professional

I want a website that I can interact with that can inform me more about how to use my information technology skills to implement electronic health systems in the real world.

So that I can decide whether or not to apply to the BHI master's program instead of working strictly as an IT professional.

Acceptance Criteria

User is able to read content on the BHI website that is related to real electronic health information. Should be able to understand how to post comments on the website in response to news/event content that is available.

Persona

Persona: IT Professional at Johnstown Corporation
 Fictional Name: Robert Briarcliff

Job Title: Senior IT Manager

Demographics:

- 29 years old
- Married
- Bachelor's degree in computer science

Goals and Tasks:

He is determined to understand more about how he can apply his skills to produce more value, so that he can make more money and provide for his family.

- Reads online about information technology positions.
- Looks at certain school websites to determine if he wants to get more education.



Persona continued...

Persona: Computer Science student at SUNY Oswego

Fictional name: Marie Wi

Demographic:

- 20 years old
- Dating

Goals and Tasks:

She is focused and studious with her work. Marie is trying to determine which specific field she wants to work in after graduation with her computer science degree.

Her day to day responsibilities:

- Goes to 2 classes a day
- Completes 3 hours worth of homework every day



Persona continued...

Persona: Retail pharmacist working for CVS

Fictional Name: Robert Tevason

Job Title: Supervising Pharmacist

Demographic:

- 38 years old
- Married with 4 kids
- Doctorate of pharmacy

Goals and Tasks:

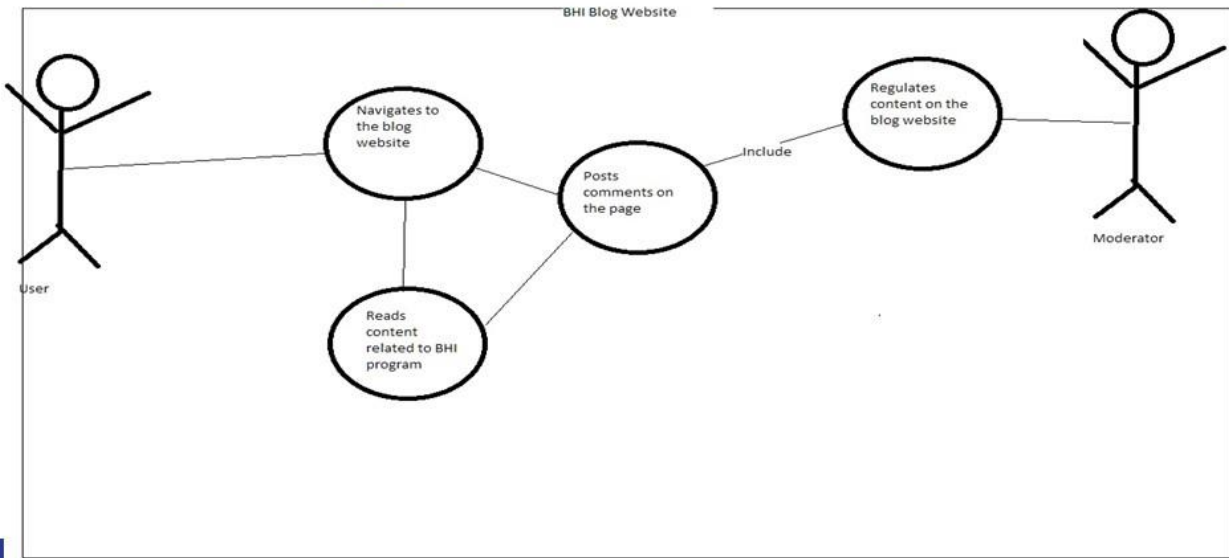
He is working long hours and works every other weekend. He wants stable working hours to be around his family more. He has always enjoyed working with computer technology in the pharmacy.

His day to day responsibilities:

- Processing and dispensing medication to ambulatory patients
- Managing the staffing and functioning of the pharmacy



UML Case Diagram



Website Maintenance

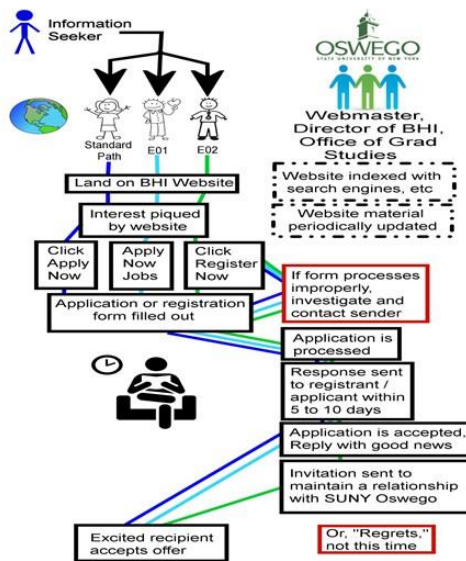
The website should be updated when a new version of a plugin is available on WordPress.

New content should be added once per month and can include news, media, and information related to the BHI master’s program.

A moderator to check the blog posts for appropriate language must also be established. The popularity of the website will determine how frequently the website gets moderated.

Primary goal:

Our product is “education.” As with good SEO technique, we sell our product with honestly presenting accurate data and making an ideal user experience.



Apply Now!

Comment: “indexed with search engines” predated our discussion on SEO. Kris did update meta data for SEO purposes. “indexed” is a misnomer.

Search Engine Optimization

Using the "All in One SEO" plugin in WordPress, search engine optimization is accomplished with meta description tags and a declared "canonical" architecture.

```

<!-- All in One SEO Pack 2.3.11 by Michael Torbert of Semper Fi Web Design[616,754] -->
<meta name="description" content="An interactive blog that contains news information about the SUNY Oswego BHI master&#039;s program. It also has information about E-health systems." />

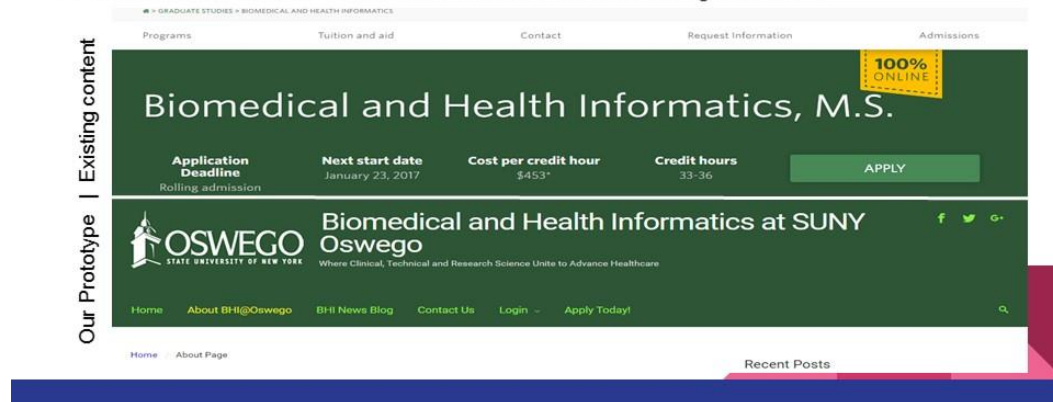
<link rel="canonical" href="http://pi.cs.oswego.edu/~jmiles3/bhi-oswego/" />
<!-- /all in one seo pack -->

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As will be mentioned later: expandable / collapsible content will provide richness in content for SEO without cluttering the user interface.

Design considerations

We wanted our site to look similar to other SUNY Oswego content

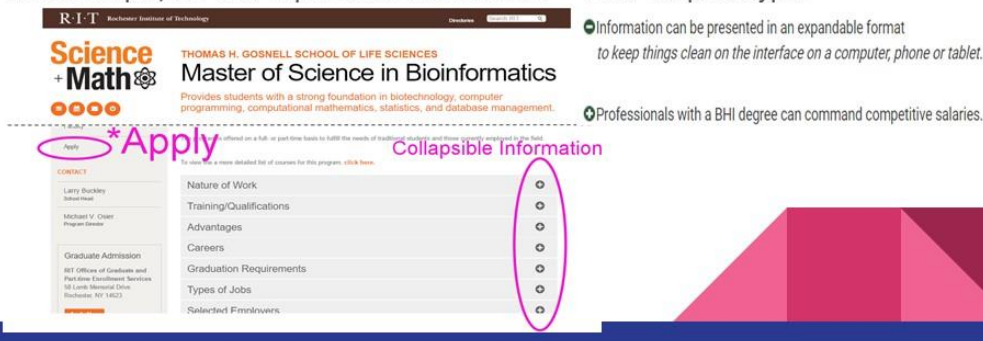


Design from other colleges

A review was made of other Informatics websites for design inspiration.

One example, RIT and expandable information:

And our prototype:



Other colleges, continued

One favorite,
University of Michigan

*A=Apply,

*B=Register (maintain relationship)

*C=Involve outside parties

“Engage with the program” →
Looks great on mobile device



Designed for “on-the-go”

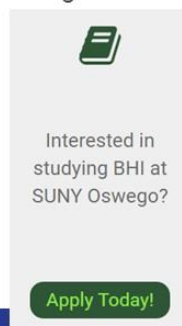
The content was created with all
screen sizes in consideration.

On a phone, content looks like this:
 (“sandwich” menu is expanded for picture)



Design and on-the-go, continued

Since education is the product we want to sell, “Apply today” should be a prominent option at any “landing point” for the site. Using boxes and buttons as displayed below, the content looks great on all sizes of devices:

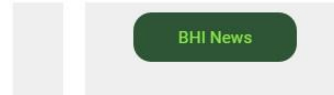


Keep 'em comin' back

Each page has links to Facebook, Twitter and Google+

Content is also updated through the BHI News Blog which is also linked as well as having running content on the right margin of each page:

["BHI@Oswego invites people of varying backgrounds to learn and discuss the future of BHI."](#)



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- > What is eHealth: an Article Review



Who are we?

Biomedical and Health Informatics (BHI) is a community of clinical, technical and research science uniting to advance healthcare.

As presented on each page of our site:



In Conclusion

- 1) Understand who we are (and our "competition")
- 2) Understand who we are trying to reach, make an exciting experience
- 3) Create a comfortable / familiar user experience for all devices



Source data for the prototype website can be found at:

<http://pi.cs.oswego.edu/~jmiles3/bhi-oswego/share/>

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