Honors Program

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Applying Effective Web Design Techniques to
The Upper Midwest Regional Honors Council Website:
A Review

Mathematics

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Honors Council Website: A Review

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Abstract

In today's information-centric world, undoubtedly the most important communications tool for any individual or organization is a coherent, accessible website. Content contained on a webpage is useful to the consumer only by its accuracy, relevance, and accessibility. It is therefore imperative for any website to focus not just on *what* information is displayed on a webpage, but *how* that information is organized in order to maximize effectiveness and, ultimately, user satisfaction.

The Upper Midwest Regional Honors Council (UMRHC), an affiliate of the National Collegiate Honors Council (NCHC)l, is an organization comprised of college and university honors programs that, until 2012, did not maintain a central web presence. With no prior experience in website design or implementation, I undertook the task of creating a website, www.umrhc.org, in December of 2011, which was published to the World Wide Web in April of that year. In early 2013, the website underwent a complete redesign into the present day layout.

This paper aims to explore how my personal web development process evolved, from conception through the first and second iterations of the website. The website is examined through design aspects that are generally accepted practices of professional web developers and areas where the website deviated from normal standards. Specifically, the website is critiqued using World Wide Web Consortium guidelines. I apply several design theories and identify how the website coincides with those theories, in addition to areas in which the website can improve to meet or exceed the recommendations of said theories.

Introduction

Although it seems a distant memory today, there once existed a time when finding an answer to, "What is Bemidji State University's mission statement?" required time and effort. For many, it is difficult to remember how daily life operated without widespread access to the World Wide Web. Information traveled only as quickly as the telephone line, and communicating a message to a broad audience was limited to advertisements. Of course, present day technology allows us near instant access to the Bemidji State University website, where I learn my four years here was the "Best Decision Ever."

Effective web design is critical to increasing website usability (Chou 2002). The ability for a user to quickly identify how to navigate a webpage and parse through the relevant information is due to effective web design, and is the reason why Bemidji State's motto is so readily accessible. All types of websites, be they educational, business, or otherwise informative, benefit from an effective website layout. It is then prudent to ask, "What is the most effective design?" There is no universal answer to this question. The layout of a website is dependent upon its purpose. Organizations like Amazon and Wikipedia encourage exploration on their websites, while a government website may focus on directing users to a specific online form or informational page. Commercial websites are often designed to maximize sales, and the layout can vary drastically from that of an informative or academic website. The most effective design is dependent upon the purpose of the website. However, all effective websites share underlying characteristics in their design that contribute to increased user satisfaction and increased usability of the website (Barcellos et al. 2000).

Barcellos et al. applied Frederick Herzberg's hygiene-motivator theory in an attempt to identify the elements of a website that increase user satisfaction. In Herzberg's theory, hygienic factors include those which do not contribute to increased satisfaction, but rather dissatisfaction by their absence. For a website, working hyperlinks are hygienic in that users expect a link to navigate elsewhere, and when it leads to an incorrect or non-existent webpage, users are dissatisfied. In contrast, motivational features increase user satisfaction with their presence but otherwise do not contribute to dissatisfaction. (Barcellos et al. 2000). An example would be the ability to "like" or "tweet" a news article from the article's page. An effectively designed website prioritizes hygienic factors while incorporating motivational features as needed. As the website incorporates motivational factors, users become more satisfied with the experience and use the website more often (DeSanctis 1983).

The usability of a website is dependent upon a number of factors: learnability, memorability, errors, and satisfaction (Nielsen 1993). A website has high *learnability* when a user can easily decipher the layout of the webpages and access the information. *Memorability* refers to the ease of which a returning user can navigate the website. The website should limit the number of *errors*, such as broken links or inaccurate information, and if each factor is correctly implemented, the user should feel highly satisfied with the website (Nielsen 1993).

A 2004 University of Rhode Island study identified additional factors of an effectively designed website. The authors of this study applied Kaplan's preference framework to the cognitive landscape of a website in order to determine which factors were most contributive to user satisfaction (Purinton and Rosen 2004). Three of the four factors in the framework, coherency,

legibility, and complexity, were found to be most significant. *Coherent* websites are logical, well-written, and easily navigable, and include elements such as adequate font sizes, a simple design, and an uncrowded presentation. *Legible* websites are memorable and distinct from competitors. A consistent navigation menu and a website map help contribute to a memorable website. *Complex* websites contain a variety of visuals stimulants to enhance the web experience, including pictures and videos. Overall, the study found simple designs that provide access to, but not over-saturate the user with, information tend to be the most satisfying to the web user (Purinton and Rosen 2004).

The First Iteration of the Website

The design process for the UMRHC website began in late 2011. Because there was no prior website for the organization, there was some leeway in regards to the information content of the website. Initially, the purpose of the website was to provide a resource for information on the annual Upper Midwest Regional Honors Conference. In previous years, conference websites were created and hosted by the institution hosting that year's conference, with no maintenance across multiple years. The end result is an inconsistent presentation of information and no familiarity in design year-to-year, two of the critical aspects in effective web design. As a secondary purpose, the website would provide information on all member honors programs to create a greater sense of community within the regional organization.

Once the purposes of the website were defined, the website was sketched on paper. As Hong et al. note, "…designers…generally followed a process of regressive refinement in their designs from less detail to greater detail." (Hong et al. 2000) It was critical to include every essential

aspect in the first iteration of the website, as these aspects would carry through to potential future iterations. Unfortunately, there remains only one surviving document from the preliminary design phase. The page details how the website will be structurally formatted (along with some irrelevant information regarding server hosting) [Figure 1]. After determining the information content of the website, the focus shifted to how the pages would be designed aesthetically. Given the limited experience in website design, a very simple single-column design was chosen, with horizontal divisions separating the various content areas on the page. Navigationally, it was clear a drop-down menu with sub-menus would best suit the layout, as a number of categories were comprised of several sub-categories.

One of the greatest challenges in the design process was learning how to write the code for the website. The World Wide Web Consortium (W3C), "…an international community that develops open standards to ensure the long-term growth of the Web," characterizes HyperText Markup Language (HTML) and Cascading Style Sheets (CSS) as the basis for building webpages (w3.org). HTML provides the website structure, while CSS builds the aesthetic layout of the pages. However, having no previous experience writing HTML or CSS code, it would be nigh impossible to create a functional website if not for programs such as Adobe Dreamweaver. In addition to previewing how the website will look during the design process, Dreamweaver allows a fluid transition between coding HTML and coding CSS, so it was a natural fit for this project. The website was completed in April 2012, with the main layout depicted in Figures 2-5.

The choice for a maroon and gold color scheme was based primarily on the official letterhead of the organization, as reflected in the banner at the top of the pages (at the time of design, it was

unclear whether the organization was abbreviated with or without the "regional" part). In general, color schemes which permit light backgrounds and dark texts are desirable from a accessibility standpoint and all in accordance with W3C guidelines (w3.org). Text was only displayed against white or gold backgrounds, while maroon was reserved for the banner area. The organizational logo contained a link to the home page and was placed at the top of each page, ensuring the user is able to navigate easily to a familiar page should the user get lost. In addition, the navigational menu was consistent throughout the entire site and linked to the main categorical areas, again satisfying the hygienic needs of the user.

While it satisfied a majority of the minimum requirements, the first iteration of www.umrhc.org was not without flaws. The "News" page was devoid of information, and some listed states do not have a linked page, breaking the hygienic "no-broken links" rule. Hyperlinks both within the navigation menu and within the general text areas grow larger and change font when hovering over them. In turn, this lead to abnormalities when hovering over certain links in which the entire page would shift downwards to accommodate the larger text. The cosmetic errors were the result of poorly written CSS code, while the navigational issues were due in large part to deadline constraints and accidental oversight.

The W3C authors international accessibility standards for websites in regards to accessibility for disabled users. In particular, the Web Content Accessibility Guidelines (WCAG) target seeing-impaired and blind users and offer suggestions for developers to improve the accessibility of a website. The first iteration of www.umrhc.org was tested against the WCAG guidelines using an online webtool (AChecker) that automatically searches for potential issue on the website. Web

images often contain hidden alternative text so blind users are aware of what images are on the page, and many of the images in the first iteration were poorly described or contained no alternative text. In addition, the navigation menu was identified as potentially inhibiting to disabled users, though it was not cited as a critical error. The most glaring omission from the UMRHC website was a site map, or a webpage with only hyperlinks from each page to each other page it navigates to. A site map is beneficial to both disabled and able users alike, and it also aids search engines as they index the website. It should be noted that these tests were conducted post-second iteration implementation, and as such, some issues were not resolved in the redesign of www.umrhc.org.

The Second Iteration of the Website

There were two primary reasons the UMRHC website underwent a complete redesign. First, the website was not aesthetically pleasing, and the functionality of the website was suffering as a result. Second, the purpose of the website had shifted from serving as the information center for the conference to the information center for the organization as a whole. As the developer's technical skills expanded, so too did the possibilities for the new website layout [Figures 6-8]. Of note is the progression from design to design and the integration of more detailed objects on the webpage as the process continued into implementation, supporting the Hong et al. web development theory.

The website's shift from conference information to organizational information brought about new challenges for the website design. In particular, the main UMRHC page [Figure 9] needed to be directed to the likely users of the website, that is, the honors program directors and staff of

the member institutions. Sections for dues notifications, conference registration, and abstract submissions were deemed most critical and received placement on the main page. An area for a blog page was also implemented, though it has yet to be fully incorporated across the organization. Navigation remained relatively unchanged in terms of function, with the exception of removing menus to "News" and "NCHC" as these were not top priority pages within the purpose of the website. The reconciliation of UMHC versus UMRHC culminated in the removal of the organization's letterhead in favor of a new logo specific to the website.

Aesthetically, the second iteration of www.umrhc.org appears cleaner and more modern than the first iteration. This is due in part to the new color scheme and increased programming ability of the developer. The second iteration incorporates only the maroon from the letterhead along with a charcoal black, and the background is plain white. Maroon text, with some exceptions, identifies a hyperlink, while black text is utilized in headings and paragraph text. The simplified color scheme emphasizes the desire to increase coherency (text colors and fonts are varied and serve a purpose) and learnability of the website. Additionally, the member pages [Figures 10-11] received a major overhaul, simplifying navigation between states and adding more content to the state pages. Facebook and Twitter buttons bring a social media presence not previously seen in the first iteration. The buttons are one of the few Herzberg motivational elements implemented in UMRHC website

The coding of the second iteration website is improved from the first iteration, though still with minor issues. The CSS functions "float" and "relative position" were utilized on pages with multiple sections across the width of the page (as seen on the main page). Floating an HTML

object allows other objects to stack horizontally with each other. As an example, each of the

three smaller sections on the main page are floated to the left, allowing them to sit along the

same horizontal plane. They are also relatively positioned, meaning their position on the page is

relative to each other object on the page. Due to this, the layout on some screen sizes, combined

with a magnified viewing window, pushes the bottom text (the footer) between the floated

sections. Not only does this create a cosmetic issue, but also an accessibility issue with regard to

the W3C guidelines. The AChecker tool identified similar problems to those of the first iteration:

non-descriptive alternative text, no site map, and issues with the navigation menu. However, the

second iteration encountered fewer potential and known accessibility issues overall than its

predecessor.

Conclusions

The goal in designing UMRHC was to create a website that served the needs of the users. This is

accomplished by designing an effective website minimally comprised of hygienic factors, such

as working links, accurate information, and easily navigable pages (Barcellos et al. 2000). The

first iteration of the website failed at least one, and likely two, of these factors. The website

contained several broken or missing links, and as a result, navigation suffered. Aesthetically, the

layout and color scheme contributed to a lack of coherency and legibility. Given the additional

accessibility issues, the first iteration of www.umrhc.org is best described as a disappointment in

terms of W3C design standards and effective website design theory. Many of the positive

attributes of the first iteration were retained in its successor. The site restructure facilitated an

increase in legibility, coherency, learnability, and memorability, as there are currently no broken

hyperlinks, the information is accurate and relevant, and the website navigation is simplified and

easy to understand. However, the accessibility of the current website falls short of W3C standards. Despite this, both aesthetically and technically, the present day format of the UMRHC website is much improved over the old design.

Future Recommendations

In accordance with W3C guidelines, the website should look to add a site map and make the alternative text of images more descriptive to aid disabled users. In its current state, the UMRHC website satisfies all hygienic factors relevant to the website. The addition of motivational features requires careful planning so as not to interfere with the current hygienic factors while also adding value to the content of the website. As mentioned previously, a blog page for member institutions to participate has not yet been implemented, though such a service has been requested by members of the UMRHC. Other possible additions to the site include a message board with user login capabilities and an online payment system. Though these appear motivational in nature, once successfully implemented and widely used, the new additions may turn hygienic and become essential features of the website.

Acknowledgments

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References

Barcellos, Silvia, Gisela M. Von Dran, Ruth V. Small, and Ping Zhang. *A Two Factor Theory for Web Design. Syracuse University.* Syracuse University, 2000. Web. 05 Mar. 2013.

Chou, Elaine. *Redeigning a Large and Complex Website.* Proc. of SIGUCCS, Providence, Rhode Island., 23 Nov. 2002. Web. 25 Apr. 2012.

DeSanctis, Geradine. "Expectancy Theory as an Explanation of Voluntary Use of a Decision support System." *Psychological Reports* 52 (1983): 247-60. Feb. 1983. Web. 25 Apr. 2013.

Hong, Jason I., James Lin, James A. Landay, and Mark W. Newman. *DEIM: Finding a Tighter Fit Between Tools and Practice for Web Site Design. Carnegie Mellon University.* Carnegie Mellon University, 1 Jan. 2000. Web. 07 Mar. 2013.

Nielsen, Jakob. *Usability Engineering.* Boston: Academic, 1993. Web. 20 April 2013.

Purinton, Elizabeth, and Deborah E. Rosen. "Web site Design: Viewing the Web as a Cognitive Landscape." *Journal of Business Research* 57.7 (2004): 787-94. *ScienceDirect.com.* Elsevier. Web. 13 Mar. 2013.

"w3.org." *World Wide Web Consortium ().* Web. 20 Apr. 2013.

Figure 1

Prices
on Domain
Names

① Talk to Sam or Cody

② Do we need FTP? (password

→ ③ Search prices on several host/s

[UMRHC . com]
UMRHC .org

④ Drop down Menus
  1 HOME
  2 Events / Conferences — Past
                           — Current
  3 Members   — Future
           States   FORMS
         INSTITUTIONS
  4 Board of Directors — Committee
  5 Scholarships   Contacts
           → Forms → Submit link
           — General Information
  6 Reports
           — Minutes
           — Treasurer's rpt
           Current
           — Registration — Submission
           — Presentation
           — Local attractions
                 — motels
                 — restaurants
7 LINKS TO NCHC
8 News

Figure 2

Figure 3

Figure 4

Minnesota

Bemidji State University

College of St. Scholastica

Southwest Minnesota State University

University of Minnesota-Crookston

back to members
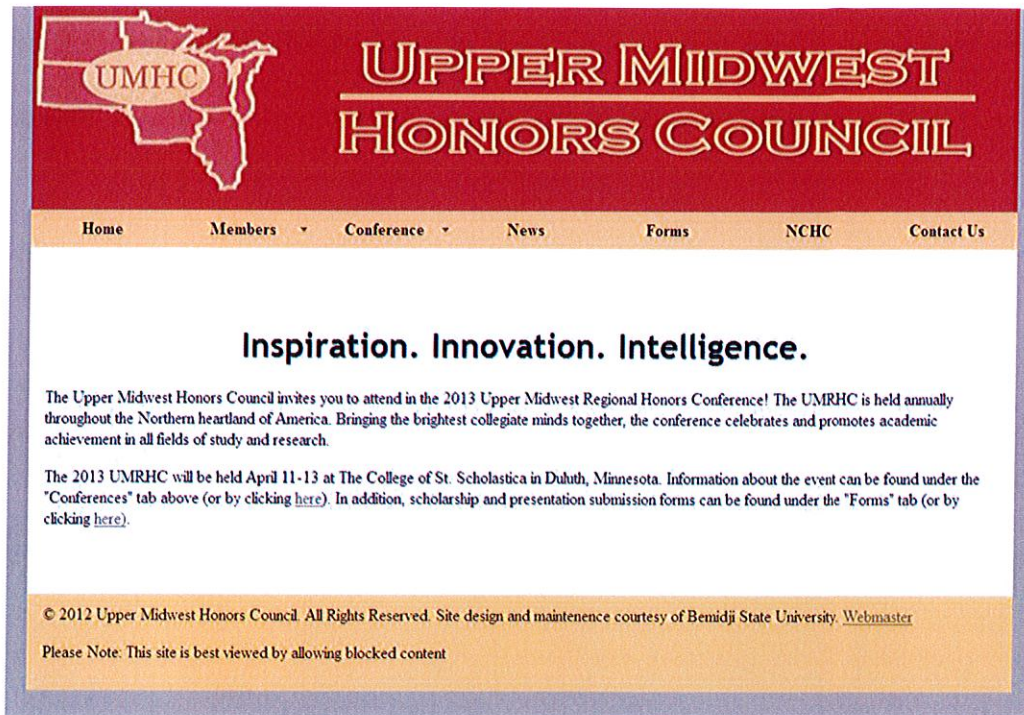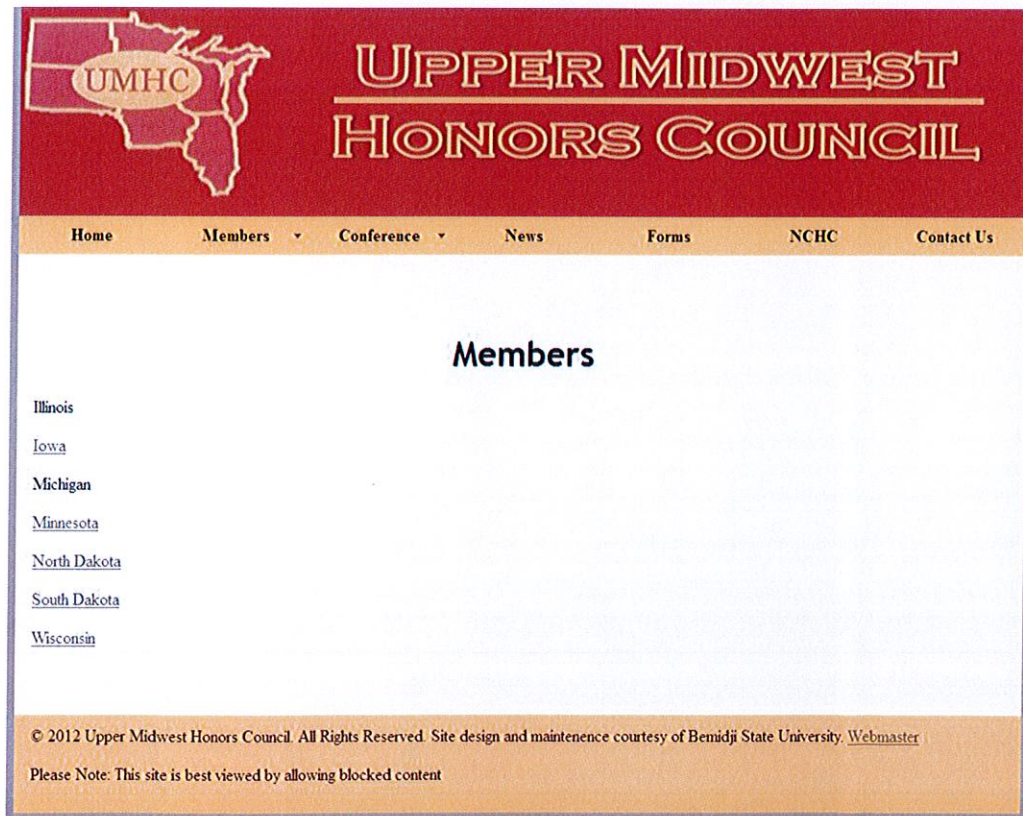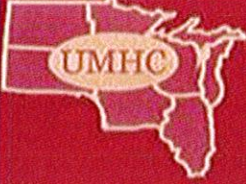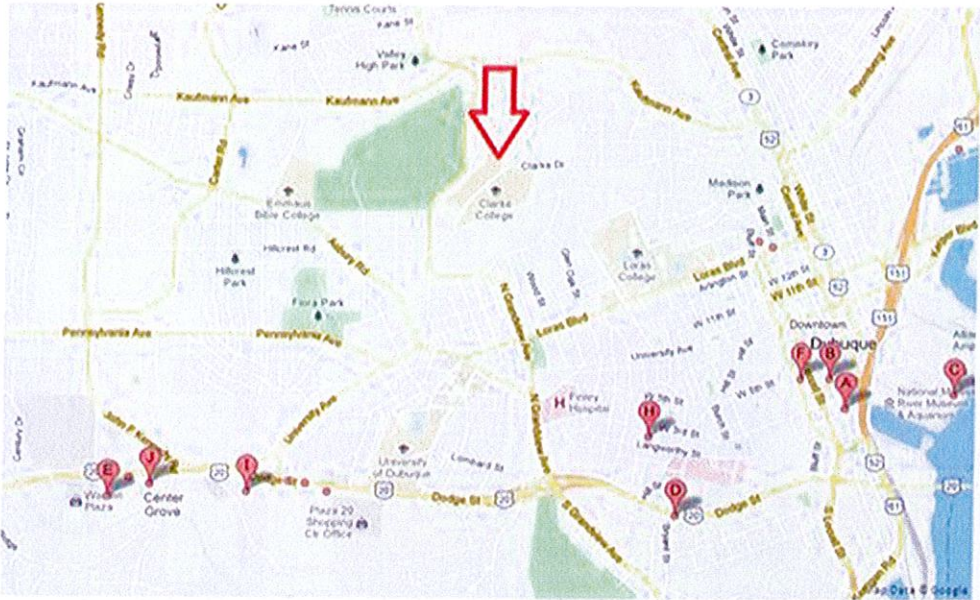
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Please Note: This site is best viewed by allowing blocked content

Figure 5
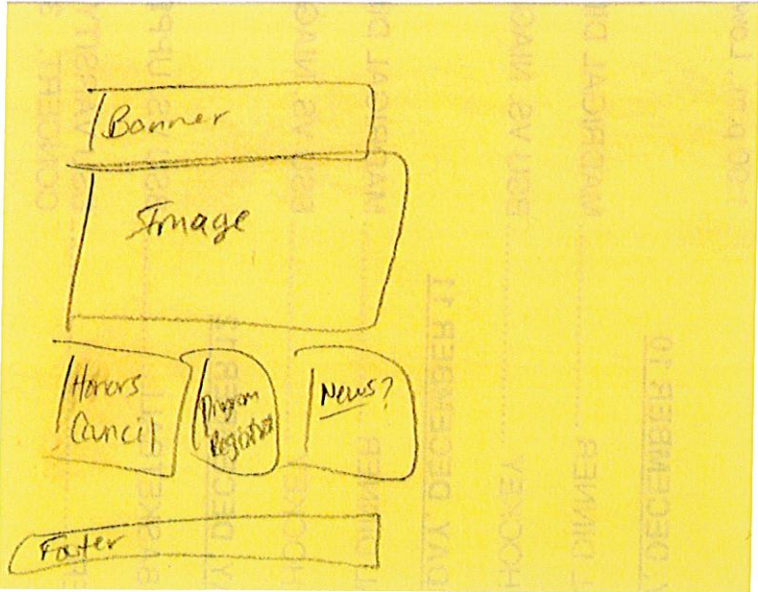
Figure 6

Figure 7

Figure 8

Midwest
ional
Conference

Home Page

UMRHC | Upper Midwest Regional
Honors Conference

HOME   MEMBERS

St. Scholastica
picture

Text

Scholarships   Recent New

Contact us
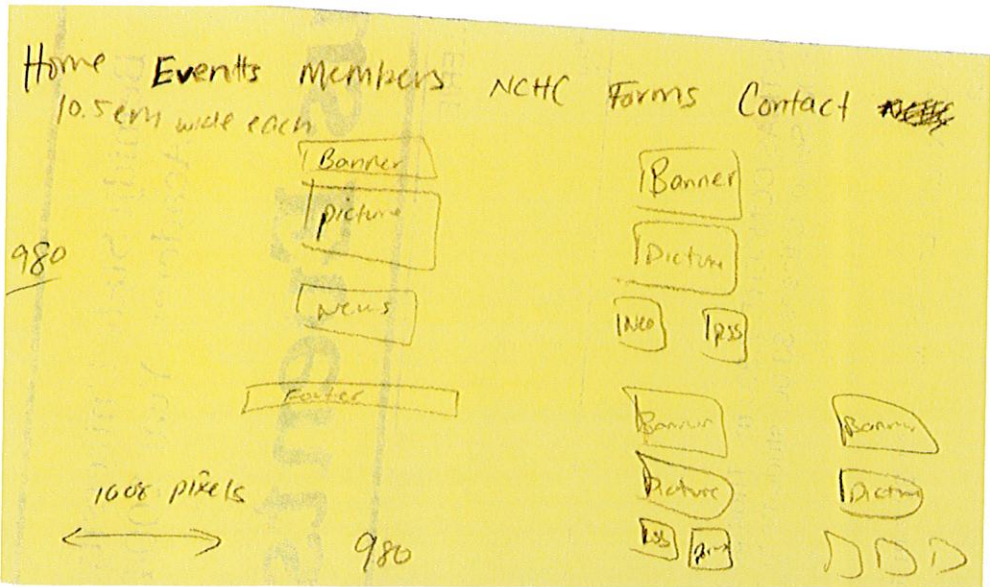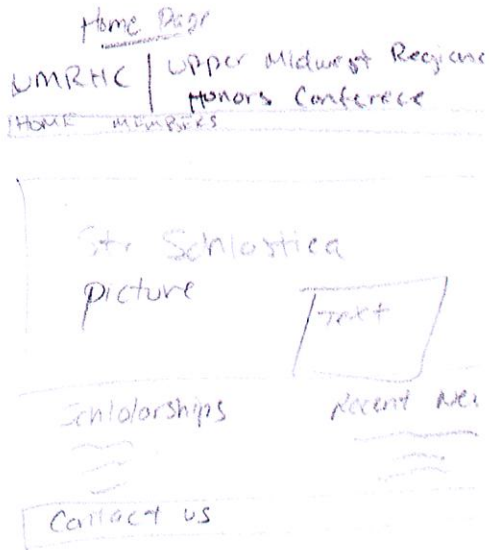
nner Pages   Members
- | Upper Midwest Regional
- | HONORS CONFERENCE

Bemidji State University
- located on the shores of lake
  Bemidji, this university...
- Honors program

College of St. Scholastica

Figure 9

Figure 11