NORTH DAKOTA ATLAS

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ABSTRACT

The North Dakota Atlas is a collaborative project between the Departments of American Indian Studies, Anthropology, Biology, Communications, Computer Science, History, Integrated Studies, and Religious Studies seeking to create an online atlas. The purpose of the atlas is to engage an interdisciplinary group of students in experiential and collaborative learning to map demographic, economic, and social changes across the state. It will be an important resource for policy makers, community members, and K-12 colleagues and students. It will also expand students' education experiences with significant community engagement and impact. Finally, it will provide a tangible product for public consumption to increase participation of the public as informed citizens.

***Index Terms*—** Web Design, Atlas, Maps

1. INTRODUCTION

This literature review includes articles focused on the design goals of the project: simplicity, usability, efficiency, focus on the works of students, and public use.

2. APPROACH

2.1 Simplicity

Simple websites enable users to find the content they need without complications. "A cluttered website tries to convey too much info and too many messages at one time…Too many messages communicated on a website means that none of the messages are communicated properly" [4]. One of the main goals of the atlas is to convey the work students have done in a clear, concise manner. Less content that is balanced will contribute to this goal.

Further, a study was pubilshed named *The Impact of Visual Layout Factors on Performance in Web Pages: Cross-Language Study*. This study included tracking a user's eye movements. The authors write "We investigated interactions among four visual layout factors in Web page design…Performance was particularly poor in pages with many links" [3]. In order for this project to be effective, the visuals used on the site must establish a clear pattern for the user to follow. The fewer links and distractions, the easier it is for the user to navigate the site.

The original North Dakota Atlas site was a scroll style. All the information was on one page and the user had to continuously scroll for more content. To keep the website simple, the new design requires minimal scrolling and multiple pages with themes. The landing page provides two options to direct the users. There are more menus included to simplify the website design, including a page dedicated to a map table of contents.

1.1 Landing page on ndatlas.und.edu

The clean and simple layout of the future North Dakota atlas webpages implements Bootstrap, "the most popular HTML, CSS, and JS framework for developing responsive, mobile first projects on the web" [5]. Most modern pages are based off of templates, but Bootstrap allows the designer to build from scratch with simple elements. "Bootstrap easily and efficiently scales your websites and applications with a single code base, from phones to tablets to desktops with CSS media queries" [5]. The Bootstrap manual provides small portions of code that are easily copied or modified for the web designers use. The use of Bootstrap enables an organized, simple, and modern design.

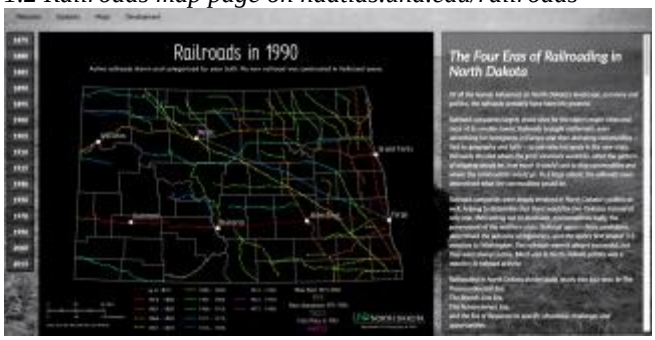
2.2 Usability and Efficiency

The usability and efficiency of a website are closely related. If the site runs slowly, users may get frustrated and move onto another source. In the book *Web Cartography*, it is

noted that "the web map should not be too too large in both image and file size. Otherwise it is likely the user will be unwilling to wait for the map to download" [2].
According to Ilya Grigorik, the author of *Image Optimization*, "optimizing images can often yield some of the largest byte savings and performance improvements for your website." He continues by advising "CSS effects and CSS animations can be used to produce resolution-independent assets that always look sharp… Vector graphics use lines, points, and polygons to represent an image…Vector formats are ideally suited for images that consist of simple geometric shapes" [6].

The atlas project uses vector graphic maps to display the data for each year in relation to the topic presented. These maps render well on various electronic devices. Unfortunately, the images in the backgrounds of the webpages take some time to load. This causes the webpages to lag. Optimization could be done to improve the performance of the webpage.

1.2 Railroads map page on ndatlas.und.edu/railroads



2.4 Maps, The Students Work

The main goal of this project is to display the work students from various departments have done. The format of an online atlas was favored because it includes maps, graphs, and text interacting together based on a specific theme.

According to Daniel Richard of the Institute of Cartography, "An atlas should be a combinaton of maps and additional information combined with a well structured work." Further, "An atlas is a bound collection of maps. It often includes illustrations, informative tables, or textual matter…" For an online atlas to be successful, "Maps produced with vector graphics applications…presented in an attractive way… and exported to a raster file format give best results."

The maps that were used in the past were interactive maps implemented with an extension called Leaflet. These maps presented interesting information, however they were very slow to load. They had to request the information from a completely different server then load it to the ndatlas server. Also, they had zooming capabilities that slowed the site and were unnecessary. These delays led to the reimagining of the ndatlas page with static images.

The future map development on the North Dakota Atlas project will include interactive components. "Maps can be defined as graphic representations of our environment… The browser and the fact that most of these maps have to travel over networks put some constraints on the design and physical nature of web maps" [1]. To avoid these delays, it will be strictly front-end development with JavaScript that does not rely on information on other servers. Daniel Richard mentions that maps graphics are very suitable for interaction. "It is possible to put all kinds of additional information behind the map image. This extra information could be made accessible via techniques such as mouse-over" [1]. The expansion of the Atlas page may use this technique to create more advanced visuals based on the vector maps currently being used.

3. CONCLUSION

The North Dakota Atlas strives to incorporate modern design principles while conveying information students have developed through study and research with text and graphics. Better loading times and optimized images will improve the simplicity and usability of the site. Further student projects will contribute to it's growth and help it become a valuable resource for North Dakota's history.

4. REFERENCES

[1] A.B. Smith, C.D. Jones, and E.F. Roberts, "Article Title," *Journal*, Publisher, Location, pp. 1-10, Date.

[1] Richard, Daniel, *10 Web Atlases – Internet Atlas of Switzerland*. Springer-Verlag, Berlin, 1999.

[2] Brown, Allan and Kraak, Menno-Jan, "Web Cartography Developments and Prospects," Taylor & Francis, London, 2005.

[3] Parush, Avi, yonit, Schwarts, Shtub, Avy, and Chandra, M. Jeya, "The Impact of Visual Layout Factors on Performance in Web Pages: A Cross-Language Study," Human Factors: The Journal of the Human Factors and Ergonomics Study, vol. 47 no. 141-157. Spring 2005.

[4] Design, Bob, "B2B Web Design Agency Reveals 7 Web Design Trends that Died in 2015". *PR Newswire*, PRNewswire, San Diego, Dec. 13, 2015.

[5] getbootstrap.com. Web, Nov. 10, 2016.

[6] Grigorik, Ilya, "Image Optimization", Oracle, Web, Nov. 21, 2016.