HUMBOLDT STATE UNIVERSITY’S INTERACTIVE ACCESSIBILITY MAP:
A MOBILITY TOOL DEVELOPMENT PROCESS CASE STUDY

HUMBOLDT STATE UNIVERSITY

By

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ABSTRACT

HUMBOLDT STATE UNIVERSITY’S INTERACTIVE ACCESSIBILITY MAP: A MOBILITY TOOL DEVELOPMENT PROCESS CASE STUDY

Joseph Matthew Russavage

This case study gives a description of the development of Humboldt State University’s Interactive Accessibility Map (HSU-IAM). It examines the context of the project, basic parameters and requirements. It also outlines the development process, current state of the project, and the resources required for the continuation of the project. This case study project may be useful for future efforts to develop interactive digital maps as tools for the physically disabled.

The context of this project includes an overview of primary stakeholders. The study briefly explores what it means to be physically disabled in general in order to understand the audience and define the purpose of the project. It also explores the cartographic tools available and provides an explanation of the chosen tools and methods. Cartographic development taught by ICD primarily used Adobe and Macromedia software. These are the makers of the software used for HSU-IAM.

This case study includes a chronological review of the development of HSU-IAM, including the procedures necessary for updating the application to reflect changes to HSU’s campus layout. Should a GIS package be developed this case study considers what it would take to port this program’s data and contents into a typical GIS package or new web tool based on current standards. Finally, the results in this case study show that
the application’s core functionality and datasets are nearly complete. Changes to campus affect the work that remains. Migration to a GIS-based application could solve challenges related to finishing HSU-IAM.
ACKNOWLEDGEMENTS

This thesis would not have been possible were it not for the support and efforts of many incredible people. I only hope that this work proves to be worthy of their generosity.

Ralph McFarland, the first person to recognize the need for such a project, knows intimately the challenge faced by people with physical disabilities at Humboldt State University. Thank you for driving the great legacy of American innovation supporting people with physical disabilities. In some small way I know we have furthered the discussion and thinking regarding making higher education more practical for people with physical disabilities.

Kevin O’Brien, the director of the Student Disability Resource Center that gave Mr. McFarland’s dream the momentum that carried it to this moment, is owed credit for pushing this project past the first bottleneck where it was hard to know how to continue the project in a meaningful way. I hope this study serves not only Humboldt State University but the greater academic community seeking to improve the lives of people with disabilities, to whom he has dedicated his career. I deeply respect his life’s work and see in his life the promise of serving humanity. He has made me a better person. This is the greatest gift of all. I will strive in my life to honor him.

Dennis Fitzsimons, my mentor through this process, never gave up on me, gave me advice and resources for which my appreciation grows every day. None of this would
have been possible without his optimism and creative problem-solving. If there were more people like Dennis in this world we would all be better off. Thank you.

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ACRONYMS AND ABBREVIATIONS

ACCESS BOARD: Architectural and Transportation Barriers Compliance Board — The federal agency created by ADA responsible for coordinating and clarifying disability law with the Department of Justice and Department of Transportation.

ADA: Americans with Disabilities Act — Federal legislation built upon the Federal Rehabilitation Act of 1973. This act is written to protect people with disabilities from discrimination and require that public services are accessible to people with disabilities.

ADAAG: Americans with Disabilities Act Accessibility Guidelines — A document designed by the Access Board to assist the Department of Justice in establishing accessibility standards for new construction and alterations in places of public accommodation and commercial facilities. See 56 FR 35408, as corrected at 56 FR 38174 (August 12, 1991), and 57 FR 1393 (January 14, 1992), 36 CFR part 1191.

AT: Assistive Technology — Technology designed to assist people with disabilities.

CATS: California Assistive Technology Systems — A department within California's Department of Rehabilitation that handles California's compliance with the Assistive Technology Act of 1998.

CBC: California Business Code — Details California Statute specifying path entrance, elevator and path widths and slopes.

CFILC: California Foundation for Independent Living Centers — A Center that worked with CATS to create the AT Network.

CITA: Center for Information Technology Accommodation — A federal department under the Office of Government-wide Policy through the General Services Administration. This department monitors compliance of Section 508 of the Rehabilitation Act as well as the Assistive Technology Act.

CSU: California State University — California's public institutes of higher education, including Humboldt State University, the location of this thesis' subject.

EnACT: Ensuring Access through Collaboration and Technology — A government agency that supports students with disabilities within the California State University in attaining their postsecondary educational goals.

FEHC: California's Department of Fair Employment and Housing — also known as California's Civil Right's Agency. FEHC registers disability discrimination complaints.
GSA: U.S. Government Services Administration — A general administration office charged with educating federal employees and building the infrastructure necessary to support Rehabilitation Act Section 508 implementation, thus making federal agencies' electronic and information technology accessible to people with disabilities.

HSU: Humboldt State University — the California State University that developed the Interactive Accessibility Map on which this thesis is based.

HSU-IAM: Humboldt State University's Interactive Accessibility Map — the digital online interactive map that this thesis reviews and studies.

IDEA: Individuals with Disabilities Education Act — Federal legislation that protects the right of children with disabilities to an education unthreatened by discrimination.

ITAW: Information Technology Accessibility and Workforce Initiative — an initiative created by GSA to provide assistive technology solutions that eliminate barriers for people with disabilities.

NPRM: Notice of Proposed Rule Making — a federal notice published shortly before an act is put into law.


W3C: Worldwide Web Consortium — an international organization recognized by many governments and industry leaders as the main international standards organization for the World Wide Web.

WAI: Web Accessibility Initiative — A program started by the W3C and endorsed by the White House of 1997. The program’s purpose is to improve the accessibility of the World Wide Web for people with disabilities.
CHAPTER 1.
INTRODUCTION

For people with physical disabilities, mobility in public places is one of the most prevalent and important challenges to community participation. Universities are particularly concerned with the mobility of people with physical disabilities. Research and academic opinions documented in Policies for Diversity in Education show that higher education tends to lead to increased autonomy, socialization, and productivity for individuals with disabilities. This is detailed in subsequent chapters. The schools in the California State University (CSU) system are required by the federal government to be largely accessible to people with federally recognized disabilities. Federal legislation requires that the managers of all public space make every reasonable effort to ensure accessible of the space to people with disabilities. This legislation is contained in the Americans with Disabilities Act (ADA), which is reviewed in Chapter 2.

Humboldt State University (HSU) provides many resources for its community of people with disabilities through the Student Disability Resource Center (SDRC). These resources are primarily intended to provide means for students with disabilities to have access to activities on campus equivalent to students not requiring assistance from SDRC. One such resource is the Campus Accessibility Map. This map shows generally accessible travel areas and marks the approximate locations most accessibility features (See Appendix B, HSU’s Original Accessibility Map). The HSU campus is spread out
over a distance of half a mile between Granite Avenue and 14th Street just east of US Highway 101 in Arcata. Some campus buildings are as old as 1913, while other buildings were completed in 2009. The hills and stairs, elevators and doors (both accessible and inaccessible) covering HSU make the accessible path between any two buildings occasionally circuitous or unclear, even when using the current Campus Accessibility Map. Ralph McFarland, SDRC director in 2005, commissioned the creation of an online interactive accessibility map for the purpose of clarifying mobility issues and increasing community participation for people with physical disabilities at HSU.

This case study explores the development and mechanics of HSU’s Interactive Accessibility Map (HSU-IAM). Specifically it looks at the nature of the maps created, the interface and interactive elements of the computer program, and the underlying code and data structures that allow users to query the map for accessibility information for campus buildings as well as accessible routes from one building to another.

HSU-IAM was primarily developed using Macromedia Flash 8 software and the ActionScript 2.0 programming language. The graphics were developed using Flash 8 and Adobe Illustrator CS2. Illustrator is a common graphics tool and is taught to HSU cartography students and used by the Institute for Cartographic Design (ICD). ICD also uses Flash and ActionScript for creating interactive and animated maps. Extensible Markup Language (XML) files contain the accessibility information of buildings and
routes. Interactivity with buttons or menus invokes ActionScript that performs logic operations and queries the XML files for requested accessibility information. HSU-IAM has a single author (Joseph Russavage) who was assisted at various stages in the process by other students in the ICD.

There is still work to be done before a publically-accessible hyperlink to HSU-IAM can be placed on HSU's or SDRC's website. The content and functionality of the program must be thoroughly tested for accuracy. Additional texts and maps for routes need to be developed and some minor alterations need to be made to ensure proper operation of all features. This document serves to point out what needs to be done, and provides suggestions as to how these changes can be implemented.
CHAPTER 2.

PROJECT CONTEXT

International surveys estimate that at least one in every 10 children is born with or acquires impairment. However, disability is not only a question of physical or mental status from childhood but may occur to anyone through accidents, illnesses or conflicts during a life time.


As the quote above implies, concern for people with disabilities is universal. Every person has the potential to become disabled at any time. Every expecting parent may contemplate the possibility of raising a child with a disability, since any child can be born with a disability. The United Nations Educational, Scientific and Cultural Organization promotes action around the world addressing the issues of people with disabilities, and conducting research to understand the issues more thoroughly.

International support exists for research and innovation for people with disabilities, through numerous initiatives and funding opportunities. The United States is a leader in improving the equality and freedom of people with disabilities (United Nations Educational, Scientific and Cultural Organization, 1997, pp. 1–9).

The context of the Humboldt State University Interactive Accessibility Map (HSU-IAM) is an interweaving confluence of stakeholders, academic thinking and legal developments. Many of the stakeholders have been unified by political influence through the formation of agencies and legal initiatives. Academic thinking has evolved over the
course of the social experiments initiated through legislation and political action.

Consequently, academic thinking affects political action and can lead to legislation. The history of United States legislation leading to the development of HSU-IAM provides a means for reviewing the context of this project. The stakeholders, academic thinking and legislation behind HSU-IAM are described in this chapter.

The legislative history behind HSU-IAM starts at the federal level, leads to the state level and finally to the university level. Stakeholders at the Federal level include the President, Congress, and multiple departments, such as the Department of Justice, Rehabilitation, State Architect, the State Personnel Board, the General Service Administration, the National Council on Disability, the Architectural and Transportation Barriers Compliance Board, and the ADA Interagency Task Force. State and University stakeholders include the California State University System, HSU’s physically disabled students, faculty, staff and visitors, the Student Disability Resource Center (SDRC), and the Institute for Cartographic Design (ICD). In the review of these stakeholders throughout this chapter the major issues and academic thinking related to these issues are investigated, including the role of digital technology in responding to the challenges of people with disabilities, postsecondary education and people with disabilities, accessibility, identity issues, geographic information systems (GIS), cartography, ethical and sociological questions, and similar projects.
This project's legislative stakeholders can be examined chronologically and from the top down, starting with the United States' first federal legislation protecting people with disabilities, the Architectural Barriers Act of 1968 and the Rehabilitation Act of 1973. Over the last four decades these acts were amended to more thoroughly protect the basic rights of a wider range of people with disabilities. The basic rights of people with disabilities are primarily protected through civil rights, the design of public spaces, services and technology. A number of federal agencies have developed detailed codes for design of public space and technology. These developments are managed through the Federal Interagency Task Force, as well as the agency initially put in charge of the particular code. For example, the Department of Justice and Department of Transportation are responsible for most aspects of the physical accessibility of public spaces (The United States Access Board, 1984, pp. 1–16). The rights of people with disabilities extend beyond physical accessibility. There are many other initiatives governed by different departments at the federal and state levels (U.S. Department of Justice, 2005). The legislation is outlined at the federal level and defined, delineated and delegated at the state and university level. Appropriate feedback is then conveyed from state officials to federal officials, agencies and committees. General guidelines set at the federal level become specific initiatives enforced by designated university departments through State and CSU policies.
2.1 Federal Legislation and Stakeholders

The laws regarding people with disabilities legislated and monitored at the federal level address the needs and concerns of people with disabilities. There have been decades of challenges and debate, starting with the Architectural Barriers Act of 1968 and the Rehabilitation Act of 1973. After nearly two decades of legal disputes, many parts of the amended Rehabilitation Act became the foundation for the Americans with Disabilities Act (ADA) of 1990. ADA is now the overarching federal legislation that covers the disabilities that the United States government recognizes and addresses. ADA continues to be amended, with the most recent set of amendments codified in 2008.

One amendment that was made to ADA is the Assistive Technology Act of 1998. This act provides guidance for the development of technology intended to aid people with disabilities and has spurred the creation of agencies and policies throughout the government. The General Services Administration (GSA) created the Center for Information Technology Accommodation (CITA) under the Federal Office of Governmentwide Policy. This act delineates software design requirements for accessibility by people with disabilities (Tucker & Goldstein, 1991). For physical accessibility requirements the Architectural and Transportation Barriers Compliance Board (the “Access Board”) was “created in 1973 [in the Rehabilitation Act] to ensure access to federally funded facilities. The Board is now a leading source of information on accessible design. It develops and maintains design criteria for the built environment,
transit vehicles, telecommunications equipment, and for electronic and information technology” (U.S. Access Board, 2009, pp. http://www.access-board.gov/about.htm). The Access Board works closely with the Department of Justice and the Department of Transportation to ensure that federal requirements are carried out down to the local level. These agencies work with State agencies and officials to ensure that local agencies such as universities actively maintain compliance with these federal minimum requirements, and provide regular reports regarding changes to compliance requirements.


Federal legislation addressing the needs of people with physical disabilities started with the Architectural Barriers Act of 1968. This legislation broadly required that all buildings that are designed, built, altered, or leased by the U.S. government must be accessible to the public, including individuals with disabilities. The design standards that this Act employs to judge accessibility are called Uniform Federal Accessibility Standards (UFAS). UFAS continues to be enforced, though other legislation also deals with architectural guidelines (U.S. Department of Justice, July, pp. 1–12).

The Rehabilitation Act of 1973 (29 U.S.C. 794) was designed to cover all disabilities the United States government recognizes and addresses. This act was originally made up of seven sections, also known as “Titles.” (See Appendix C for relevant sections of The Rehabilitation Act). Title 1 deals with employing people with
disabilities. Title 2 mandates research to improve the inclusion of people with disabilities in society's full range of activities. Title 3 deals with training and educating disabled people. Title 4 forms the National Council on Disability. Title 5 creates a variety of committees and boards to execute and monitor the policies developed in the Rehabilitation Act and ADA. Title 6 mandates efforts to create and expand work opportunities for people with disabilities. Title 7 outlines resources that promote independent living for people with disabilities (93rd Congress, H.R. 8070, 1973, pp. 10–48).

Each “Title” is broken into sections. The first digit of a section corresponds to the title within which that section is found. The subsequent digits represent the sections numerical order (e.g., Section 508 is the 8th section of Title 5). The Rehabilitation Act was consistently amended until the majority of the wording was replaced with the Americans with Disabilities Act of 1990. The Rehabilitation Act still exists, but ADA is now the overarching disabilities legislation. The Rehabilitation Act has been refined to cover primarily only the prohibition of discrimination on the basis of disability. According to “A Guide to Disability Rights Law” by The U.S. Department of Justice (http://www.ada.gov/cguide.htm), Section 501 “requires affirmative action and nondiscrimination in employment by Federal agencies of the executive branch” (U.S. Department of Justice, July). Section 503 extends the same rights to federal contractors and subcontractors. Section 504 requires reasonable accommodations be made so that
people with a wide range of disabilities can be assured access to essential social activities such as education and work. The specifics of how Section 504 is carried out are left up to the relevant federal agencies and government-funded entities, such as publically funded schools, transportation agencies, hospitals, etc. (U.S. Department of Justice, July). This applies to post-secondary public education institutions such as Humboldt State University. According to http://section508.gov, Section 508 “was enacted to eliminate barriers in information technology, to make available new opportunities for people with disabilities, and to encourage development of technologies that will help achieve these goals” (U.S. Access Board, 2009). In essence, Section 508 extends Section 504 coverage to digital and electronic information technology. The technical standards and compliance information related to HSU-IAM are set in U.S.C. 1194.21 and 1194.22. Appendix C includes these codes. Agencies at the federal, state and local level increasingly provide the details regarding reasonable accommodations to make technology accessible. The ADA Interagency Task Force was created in 2000 to share and coordinate information about disability access issues among the many relevant agencies at the federal and state levels. The Task Force is composed of directors from the departments of Rehabilitation, General Services, State Architect, Fair Employment and Housing and the State Personnel Board (Tucker & Goldstein, 1991).
2.1.2 The Americans with Disabilities Act of 1990.

The Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) replaced much of the Rehabilitation Act of 1973 as the major legislation protecting the rights of people with all forms of disabilities recognized by the U.S. government. This act includes five titles. Title 1 specifies that no federally funded entity shall discriminate against people with federally recognized disabilities when hiring. Title 2 requires that, within reason, all federally funded facilities and services be accessible to people with disabilities. Title 3 mandates that all federally funded programs and certain private resources be accessible to people with federally recognized disabilities. Post-secondary education institutions such as universities are covered by Title 3 when private and Title 2 when public. The accessibility standards for both Title 2 and Title 3 are covered in the ADA Standards for Accessible Design, including architectural standards for accessible buildings, paths, entrances and elevators (42 United States Congress, 1990). These standards provide accessibility guidelines which are used to review campus routes and consider the best options for people with physical disabilities. People with physical disabilities should be directed to use accessible paths, entrances and elevators wherever possible. However HSU includes buildings and paths that predate accessibility legislation. Not all buildings and paths on campus meet the requirements laid out in ADA Title 3. For example, Founders Hall - the primary humanities classroom building - was built in 1918, decades before any accessibility legislation. In order to cover the entire
campus despite variations in accessibility, HSU-IAM presents information that meets Title 3 standards wherever possible and the best accessibility options available where Title 3 standards are not met. Title 4 requires that telecommunications devices be accessible for people with hearing disabilities. This largely deals with telecommunications. Title 5 covers “miscellaneous provisions” (Tucker & Goldstein, 1991). These titles fill loopholes in laws that could potentially allow for certain types of discrimination such as retaliation and coercion. Title 3 alone pertains to the development of HSU-IAM, though even this pertinence is uneven across campus due to the mixed accessibility nature of HSU.

2.1.3 ADA Standards for Accessible Design, the Access Board, and the ADA Accessibility Guidelines for Buildings and Facilities.

Appendix A of ADA Title 3 codifies federal standards for accessible design. The Access Board created a document called “The Americans With Disabilities Act Accessibility Guidelines for Buildings and Facilities; State and Local Government Facilities (ADAAG).” The Department of Justice “stated that it anticipated that it would amend its Title 2 regulations to adopt ADAAG as the accessibility standards for State and local government facilities after the Access Board supplemented ADAAG, 56 FR 35694, 35711 (July 26, 1991).” ADAAG is the final authority on accessibility guidelines for Federal, State and local government facilities. The document also includes non-substantive editorial changes to the ADA Standards for Accessible Design, according to

2.1.4 The Assistive Technology Act of 1998, the Alliance for Technology Access, and the Center for Information Technology Accommodation.

The language in the Assistive Technology Act (ATA) is the most contemporary codification of the general understanding about people with disabilities. After evolving over 25 years, ATA states:

(a) FINDINGS- Congress finds the following:
(1) Disability is a natural part of the human experience and in no way diminishes the right of individuals to--
   (A) live independently;
   (B) enjoy self-determination and make choices;
   (C) benefit from an education;
   (D) pursue meaningful careers; and
   (E) enjoy full inclusion and integration in the economic, political, social, cultural, and educational mainstream of society in the United States.
(2) Technology has become one of the primary engines for economic activity, education, and innovation in the Nation, and throughout the world. The commitment of the United States to the development and utilization of technology is one of the main factors underlying the strength and vibrancy of the economy of the United States.

The Assistive Technology Act of 1998

The Assistive Technology Act of 1998 was written to ensure that technology used by federally funded institutions, like HSU, is accessible to people with disabilities. In
addition, the act mandates the creation of technologies and services that increase the independence of people with disabilities. This act is upheld by the Alliance for Technology Access. The Alliance for Technology Access provides “information and support services to children and adults with disabilities, and work to increase their use of technology” (http://www.ataccess.org/). This alliance also works with state and local agencies to ensure local compliance with the Assistive Technology Act (105th Congress, 1998).

The U.S. General Services Administration (GSA) was “charged with the task of educating federal employees and building the infrastructure necessary to support [Rehabilitation Act] Section 508 implementation... that federal agencies’ electronic and information technology is accessible to people with disabilities” (www.gsa.gov/section508). GSA created the Center for Information Technology Accommodation (CITA) and the IT Accessibility and Workforce (ITAW) initiative through the Office of Governmentwide Policy. CITA “provides a wide range of technical assistance to help all federal offices achieve the goals and requirements of Section 508” and provides training and information for creating digital materials that are accessible to people with disabilities. ITAW is “the government wide policy resource for Section 508,” and “provides assistive technology solutions to eliminate barriers for people with disabilities” (United States General Services Administration, 2009). The website which
maintains the details on how to create accessible online information is available at http://usability.gov.

2.1.5 Education of the Handicapped Act and Individuals with Disabilities Education Act.

In 1975 Congress passed the “Education of the Handicapped Act” which guaranteed free education to children with disabilities. This act later became the Individuals with Disabilities Education Act (IDEA). IDEA, along with ADA entitles children with disabilities to an education unthreatened by discrimination. Education is typically a state and local activity, and the Federal government does not guarantee free education. Instead it requires that any educational facility receiving federal funds prove that its services are available to all qualified people with disabilities. California runs educational facilities that receive federal funds. There are 28 public university campuses across the state, collectively known as the California State University (CSU) system. Humboldt State University (HSU) is the northernmost campus in the CSU system. Requirements listed in IDEA include “related services” which include transportation to, from, between and within school buildings (108th Congress, 2004). HSU-IAM is assistive technology that helps people with disabilities to independently navigate between and within school buildings.

The Department of Education has created a demonstration project called Ensuring Access Through Collaboration and Technology (EnACT). Its mission statement says
EnACT will “support students with disabilities within the California State University in attaining their postsecondary educational goals” (Department of Education, 2009).

EnACT may be interested in HSU-IAM as a tool as it fits EnACT’s mission statement.


While many changes in government policy occur through the typical legislative process, some changes simply require presidential decree. On June 18, 2001 President George W. Bush made the New Freedom Initiative (NFI) official through Executive Order 13217. This initiative is based on the findings of the Olmstead v. L.C. Supreme Court decision issued in July 1999 (527 U.S. 581). The court opinion stated that the built environment cannot obstruct individuals with disabilities from performing their jobs or functioning normally in public spaces. Since the initiative began, several grants have been created to pay for infrastructure changes and additional support that helps to increase the involvement of people with disabilities in work and public space (U.S. Department of Transportation, 2009).

2.1.7 Recent Changes to ADA.

President George W. Bush signed into law the ADA Amendments Act on September 25, 2008. The new rules have been effective as of January 2009. These changes do not affect paths, slopes or other design and development standards, but rather broaden the definition of a disability to be more inclusive. Episodic disabilities that can
go into remission were not covered by ADA as written in 1991. The language of subsequent amendments classifies episodic issues as disabilities if they limit a major life activity when active. A person with a disability is covered by the ADA regardless of the mitigating effects of medicine and equipment that improves the person's abilities. The meaning of “major life activities” has been extended to include caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, lifting, bending, speaking, breathing, learning, reading, concentrating, thinking, communicating, working, and controlling major bodily functions. One is considered disabled if he or she is discriminated against due to a perceived disability. Even temporary impairments can qualify a person for ADA rights and protections if the impairment limits a major life activity for more than 6 months. Thus, individuals that sustain major injuries, such as university athletes, may be covered by the ADA (Benfer, 2009).

The efforts of the federal government have extended into numerous non-government institutions. Of note is the World Wide Web Consortium's (W3C) Web Accessibility Initiative (WAI). The W3C is an organization recognized by many governments and industry leaders as the main international standards organization for the World Wide Web. In 1997 W3C started WAI with an endorsement from the White House. WAI “develops strategies, guidelines, and resources to help make the Web accessible to people with disabilities” (Worldwide Web Consortium, 2009). WAI points to the fact that the effort to create free and accessible public places and services for
people with disabilities requires creativity and innovation. Digital technology presents both opportunities and challenges for people with disabilities. Efforts like WAI and HSU-IAM go hand-in-hand in the general effort to improve life for people with disabilities.

2.2 State Legislation and Stakeholders

In California, disability is treated as a civil rights issue. California’s Unruh Civil Rights Act is the major state legislation addressing people with disabilities. California’s Department of Fair Employment and Housing (FEHC) is also known as California’s Civil Right’s Agency. In 2007 disability made up 38% of all accusations FEHC registered (Department of Fair Housing Employment and Housing, A Brief Overview, November 2008). Within California’s Code of Regulations are the details that implement Federal requirements for people with disabilities (U.S. Department of Housing and Urban Development, 2009).

2.2.1 California Codes.

California’s Code of Regulations is the official body of California State law. It contains 28 titles, each addressing a different aspect of public life (California Office of Administrative Law, 2009). Within the California Code of Regulations are the California Civil Code, California Government Code and the California Building Code.
2.2.2 California Civil Code.

California Civil Code 51, also known as the Unruh Civil Rights Act, includes people with disabilities among the groups protected against discrimination. Within the Unruh Civil Rights Act are sections 54 through 55.2, which state that “individuals with disabilities or medical conditions have the same right as the general public to the full and free use of the streets, highways, sidewalks, walkways, public buildings, medical facilities, including hospitals, clinics, and physicians' offices, public facilities, and other public places.” See Appendix C for the Civil Code pertaining to HSU-IAM.

2.2.3 California Government Code.

California Government Code 11135–11139.8, details how federal law is practiced, enforced and monitored in California. The issues covered by these sections of the California Government Code are described in Legal Rights of Persons with Disabilities published by the California Department of Justice in November 2003. The issues covered include accessibility of entrances and paths of travel, stadiums, theaters and related entertainment facilities, restrooms, drinking facilities, public phones, curbs, sidewalks, historical buildings, gas stations, parks and recreational facilities, signs, floor space, dining facilities, religious buildings, office buildings, libraries, classrooms, public living spaces, courtrooms and elevators.
2.2.4 California Building Code.

The California Building Code contains the majority of architecture accessibility specifications found in state law. California Building Code, Title 24, Part 2, Volume 1, Chapter 11A, B and C, and parts of Chapter 10, covers state regulations for accommodating people with physical and sensory disabilities. They are designed to meet the requirements set forth by ADA.

2.2.5 California Assistive Technology Systems and the AT Network.

California's Department of Rehabilitation created the California Assistive Technology Systems (CATS) to be the acting agency enforcing the Assistive Technology Act. CATS, along with the California Foundation for Independent Living Centers (CFILC) created the AT Network “to meet the assistive technology needs of Californians” (Technology, National Information System for Assistive, 2010). CATS may be interested in HSU-IAM as a system that helps disabled people independently plan their routes using publically available online digital maps and mapping services.

2.3 The California State University System, Humboldt State University, Higher Education and Disability, and HSU-IAM

HSU policies and programs are developed, directed and monitored from a variety of sources. All the previously discussed agencies, organizations and laws influence HSU's programs and policies. Most changes to university programs and policies come
through coded memoranda written by the CSU Office of the Chancellor under the direction of the CSU Board of Trustees. CSU internal memos are used to convey university plans and policy changes necessary to comply with federal or state code. These coded memos are typically written by the CSU Board of Trustees and/or Chancellor’s Office to HSU President Rollin Richmond. The president then passes the information to relevant staff members, faculty and students. One memo from the CSU Chief Academic Officer and Chief Financial Officer to the Presidents of California State Universities “sets forth the roadmap for ensuring accessibility of information technology and resources in compliance with federal and state laws and CSU policy” (Reichard, Code: AA-2006-41, 2006). This memo starts with Executive Order 926, the CSU Board of Trustees Policy on Disability Support and Accommodations, which states, “It is the policy of the CSU to make information technology resources and services accessible to all CSU students, faculty, staff and the general public regardless of disability.” This is a restatement of the federal requirement laid out in ADA Section 504 and 508, codified in California Government Code 11135. The memo also provides a work plan and timeline, requirements, and list of priorities for the planning, implementation and assessment of Executive Order 926.
2.3.1 The California State University System.

The policies that the CSU Board of Trustees created for people with disabilities are a reflection of the federal and state statutes and codes, rules and regulations, agencies and organizations that have been reviewed above. Based on these federal and state sources HSU employs a number of plans and policies concerning people with disabilities. One such program is the CSU Accessible Technology Initiative. This initiative specifies what is acceptable for technology employed by universities in the CSU system in order to meet the needs of qualified people with disabilities (California State University, 2009). In addition, the Student Disability Resource Center is the resource for qualified people with disabilities to find the services and support they need to succeed at Humboldt State University.

2.3.2 CSU’s Accessible Technology Initiative.

The Accessible Technology Initiative is based on Section 508 of the Rehabilitation Act. Coded Memorandum AA-2007-04 “sets forth revised timelines and clarifies the tasks and deliverables associated with the implementation of the Accessible Technology Initiative” (Reichard, Code: AA-2007-04, 2007). CSU has developed a number of Web Standards for the Accessible Technology Initiative (Access Board, 2009). See Appendix C for a list of these requirements. HSU-IAM in its current form appears to follow these guidelines.
The California State University (CSU) System has a website that details the programming standards for making digital media accessible to people with disabilities. For example, web pages must be composed in such a way that screen readers can interpret the web page for people with visual disabilities. These requirements are listed on the website, along with tutorials and other resources for developers. Links to both the California Government Code 11135 and Section 508 of the ADA are also provided (California State University, 2009).

2.3.3 People with Physical Disabilities at HSU.

Disability, according to the CSU, is “a physical or mental impairment of an individual that limits one or more of the major life activities and requires either a record of such an impairment, or documentation of having been regarded as having such impairment.” Mobility limitation is specifically defined as “Limitation in locomotion or motor functions that indicates a need for accommodations, support services, or programs. Included in this category are persons who have asthma, cardiovascular problems, or other physical limitations that restrict the ability to function without accommodation in the campus environment” (Spence, 2002).

People at HSU with physical disabilities are the primary users for HSU-IAM. This includes faculty, staff, students and visitors. According to the HSU Admissions Website there were 7,800 students at HSU and 521 full-time faculty members as of April
7, 2009. When the project began in 2005 there were 7,462 students and 533 faculty; with 469 students classified as disabled (Analytic Studies, 2009). According to Student Disability Resource Director Kevin O’Brien there were 384 students classified as disabled enrolled as of April 7, 2009 (O'Brien, 2009). When HSU-IAM was initially discussed, SDRC Director Mr. McFarland, himself an individual with a physical disability for which he used a wheelchair, explained that he felt difficulty navigating campus negatively affects enrollment by people with physical disabilities (McFarland, 2005).

Physical disability and mobility limitations can happen to anyone, either permanently or temporarily. Some people are born missing limbs. Others never develop basic functions due to birth defect or disease. Still others are injured previous to, or during, their time at HSU. Such injuries may last only a day or a week, such as a sprain, strain or damaged ligament. Other injuries can be long-term or permanent, such as breaking or losing a leg, or spinal damage. College athletes commonly experience physical injury leading to short and long term mobility limitations (Galvin, 2005). HSU has strong programs in both collegiate sports and forestry (a profession recognized for its risk to life and limb). Being a campus fraught with hills and stairs, this university is particularly fitting to be studied for questions of accessibility in higher education.

In 2004, just before the development of HSU-IAM began, students with disabilities were asked to rate the accessibility around HSU. HSU ranked 12th among the
23 CSU campuses. 36% of the students stated that the accessibility of the HSU campus was less than good (Student Disability Resource Center, 2009). While it might be excessively expensive to make the entire campus accessible to people with disabilities, a cost effective alternative is clear publication of campus accessibility. The traditional model of a disability is occasionally referred to in academic circles as the medical model. This model views a disability as a medical problem (Mason, 1992). Society strives to ease the challenges created by medical conditions, if not treat and cure the condition entirely. “The Integration Alliance Background and Manifesto” in Diversity in Education (Mason, 1992) argues that this model serves to segregate and separate children with disabilities, typically leading children with disabilities to feel inferior to “normal” children. According to the author this model “misrepresents the problem of disability completely. Although we do, of course, have medical conditions which may hamper us, the major disability we face is that caused by the social and environmental barriers placed upon us by the structures of our societies. As these are all created by human beings, they can be removed by human beings, and replaced by structures which facilitate our participation in life instead of our exclusion from life” (Mason, 1992, p. 223). HSU-IAM represents a solution in line with Mason’s “social barriers” model. While it may be impractical to propose that all stairs and unmanageable slopes be removed from campus, perhaps the next best solution is to provide people that have disabilities with a tool that helps them independently plan their trips around campus. Just as people who rely on
public transit do not require someone else to devise their route plans, thanks to adequate public transit maps, a person with a disability should not need someone else to plan their travel schedules because of their particular transportation needs. This is because of “the importance placed on our so-called ‘special needs’ over and above our ordinary needs.” According to Mason, this focus on ‘special needs’ over ‘normal needs’ exacerbates an already challenging life and can increase susceptibility to emotional and behavioral difficulties which are incorrectly attributed to the physical or medical condition. “HSU-IAM may be seen as focusing on the ‘normal need’ to plan one’s travels as opposed to the ‘special needs’ solution that SDRC paratransit options help to meet by planning student schedules and providing door-to-door pickup and drop-off services. While the paratransit solution meets (perhaps excessively) the physical needs of the person with a disability, it may fail that same person emotionally. This can lead people with physical disabilities to feel inferior, incompetent or unable to manage the normal tasks of life without help, thus accentuating the disability. Children with disabilities “may be subjected to therapies which they have never asked for and programmes for development which have goals not of their choosing. They may be sent to places without their consent, and may depend to enormous degrees on adults to enable them to express ideas of their own” (Mason, 1992, pp. 222–228). According to this logic, HSU’s static map and paratransit system may impede the development of independence for people with disabilities.
2.3.4 Student Disability Resource Center

The Student Disability Resources Center (SDRC) at HSU “provides services, support, and resources for students with disabilities to maximize educational opportunities at Humboldt State University” (Student Disability Resource Center, 2009). The services they provide are generally mandated by the California State University (CSU) system. The primary reason for SDRC’s existence is legal mandate. CSU policy states, “In accordance with the provisions of applicable law, no qualified individual with a disability shall, on the basis of disability, be excluded from participation in the services, programs, or activities of the CSU and its campuses. The CSU will provide appropriate accommodations and support services and make reasonable modifications in policies, practices, or procedures when necessary to avoid discrimination on the basis of disability unless it is demonstrated that providing such accommodations, services, or modifications would result in a fundamental alteration in the nature of the service, program, or activity or would create undue financial or administrative burdens” (Spence, 2002). For those with mobility limitations this means that HSU must make all their facilities, resources and services physically accessible wherever it does not put an undue financial burden on the university. For example, there are numerous houses around campus that were built before building accessibility standards were legal requirements. These buildings often have uneven, narrow and/or steep pathways that lead to a doorway too narrow for the average wheelchair to traverse. Modifying the pathways and the buildings themselves
may be unreasonably expensive. The law takes this into consideration, but the mixture of building accessibility makes the campus difficult to navigate for people with physical disabilities.

2.3.5 The Humboldt State University Institute for Cartographic Design.

In their own words, “The purpose of the ICD [Institute for Cartographic Design] is twofold: 1) to provide cartography students with a transition from theoretical to applied map design before graduation; and 2) to provide a centralized cartographic design service, specializing in cartographic and information design in all formats, from paper, to web, to animation” (Institute for Cartographic Design, 2007). The ICD helps to fill an educational void in the business aspect of cartography. These business practices are valuable to anyone seeking to perform contract work where pay comes with an end product or report, particularly a map. At the time when HSU-IAM was developed, the class met once a week and was taught alternate semesters by either Professor Dennis Fitzsimons or Mary Beth Cunha. The students were upper-level undergraduate or graduate students that had chosen to emphasize cartography to enhance their degree. ICD students met each Friday morning for an hour. Projects came in from around the local community and region. Students met with clients to arrange contracts and complete cartography work under instructor supervision. Other students helped provide input, feedback and assistance. Instructors also taught about writing estimates, billing and
managing projects. Whenever possible, students were financially compensated for their work and received one hour of educational credit.

Russavage, an ICD student, came into the project with an undergraduate degree in electrical engineering and academic experience in programming, database development, computational methods, cartography and GIS. In addition, he had several years of work experience with desktop publishing and graphic design. Both the work and academic experience were essential elements for the development of HSU-IAM. This background is exemplary of the interdisciplinary nature of the project.

Professor Fitzsimons originally arranged the project during the Fall of 2004. In the Fall of 2005 Russavage was brought in to arrange the contract and perform the work through ICD. An early meeting with SDRC Director McFarland resulted in an understanding of SDRC’s expectations. The proposal specifically called for “an interactive access map that will supplement and provide additional and more comprehensive access information to existing sources of information.” See Appendix A for the original proposal and Appendix B for the original static accessibility map. The proposal also specifies that the map be accessible and printable online. Indications of accessible elements on campus (accessible routes, accessible automatic doors, accessible elevators, telephone devices for the deaf, multiple forms of parking, and pickup/drop-off locations for the SDRC paratransit bus) are required.
2.3.6 Building Accessibility.

Architectural accessibility is largely defined by two technical standards: The Uniform Federal Accessibility Standard (UFAS), established under the Architectural Barriers Act, and the Americans with Disability Act Accessibility Guidelines, adopted by the Department of Justice for places of public accommodation and commercial facilities covered by Title III of the ADA. Accessibility design standards and research have lead to a design method called “universal design.” Universal design is the design of products, and environments to be usable by all people without the need for adaptation or specialized design (National Council on Disability, 2008). HSU is not entirely designed using universal design. Many buildings and paths on campus were designed and developed long before the Rehabilitation Act of 1973 and have not been subsequently modified. Each building and path harbors accessibility and mobility challenges that may not be immediately apparent to a person with disabilities.

2.4 Postsecondary Education and People with Disabilities

The education of people with disabilities has been given special focus by the government. The Individuals with Disabilities Education Act calls for people with disabilities to be educated in the most normalized way possible. Students with disabilities should have access to the same resources and activities as other students (108th Congress, 2004). It is important for all students to be able to plan activities outside of normal school
hours and locations, and without requiring assistance. “Computers in the classroom hold
great promise for adding to the choices, participation and productivity of disabled
students.” This is the argument made by the authors of the chapter “Issues of Equivalent
Access to Computer Technology for the Disabled Student in the Classroom” (Gerry
Segal, 1988). Accessibility standards for digital information may potentially eliminate
major barriers to digital technologies for people with disabilities.

The author of “An International Perspective on Transition” in Policies for
Diversity in Education writes about the particular importance of higher education in the
transition from childhood to adulthood for a person with disabilities. “Recent
developments have shown that appropriate education, training and direct experience of
work and living away from home, can enable a very significant proportion of those with
severe disabilities to maintain themselves in employment and independent life” (Fish,
1992, p. 130). Higher education provides young people with a chance to take care of
themselves, to learn responsible autonomy and self sufficiency in a reasonably safe and
monitored environment. For over a decade the Centre for Educational Research and
Innovation (CERI) of the Organisation for Economic Co-operation and Development
(OECD) has been studying how to incorporate young people with disabilities into the
general public. One finding has been that in North America people with severe
disabilities rarely integrate into society without higher education and training. OECD has
found that the complex confluence of stakeholders, interests and opinions can lead to
challenges in coordinating the transition of young people with disabilities into adulthood as independent and productive members of society. According to the author (Fish, 1992, p. 132):

The OECD/CERI programme (OECD 1986) has identified four general areas in which detailed objectives should be developed:

- Employment, useful work and valued activity.
- Personal autonomy, independent living and adult status.
- Social interaction, community participation, leisure and recreation.
- Adult roles within the family including marriage.

The research and findings of OECD point to a positive correlation between employability and higher education. Employment often starts with a successful education, especially for people with disabilities. Accessible digital technology is particularly important in education for people with disabilities. Education and accessible digital technology are critical building blocks of autonomy and public participation for people with disabilities. Personal autonomy leading to social interaction, community participation and independent living includes being able to plan outings and move about in society without assistance. Adult roles are improved through the social and educational opportunities provided by postsecondary education (Fish, 1992). In all these ways, HSU-IAM appears to benefit people with physical disabilities.
2.4.1 Ethical and Sociological Questions Regarding People with Disabilities.

Much of the evolution of academic thinking about people with disabilities relevant to this research is summarized in “Insights from a social model of literacy and disability” (Brewster 2004).

A shared identity for disabled people has evolved since the 1970s, alongside the disability movement. Its aim has been to promote the rights of disabled people. Central to this worldwide movement is the social model of disability (Lawson, 2001). This stands in contrast to the medical model, which narrowly defines disability as a de-personalised medical problem, requiring diagnosis and treatment; the person is thus defined by their disability, and sociological and psychological aspects are ignored. The social model, however, is concerned with the lived experience of disability described in the words of disabled people themselves. The environmental and social barriers that exclude people from mainstream society are imposed on top of any impairment experienced. So the blind person finding a lack of reading materials in Braille is disadvantaged and excluded by this aspect of social organisation. It is not the absence of sight per se that creates the barrier to participation (Brewster, 2004, p. 47).

The two primary competing models for a disability, medical and social, lead to some of the same conclusions. Both see a value in technology improving the lives of people with disabilities. As long as a person can participate in society without feeling different than others, both models for disability tend to be satisfied. Services and accommodations which make a person with disabilities feel different than other people; due for example on reliance on a service or accommodation in order to perform a normal
activity in a different way (e.g., requiring SDRC to plan your schedule and pick you up whenever you want to leave your house) are often viewed as innocuous and not beneficial according to proponents of the social model. The social model tends to look with concern at the unintended discriminatory implications of the services and accommodations (Brewster, 2004).

One way that the unintended discriminatory consequences of services and accommodations can be avoided is by encouraging self-determination and autonomy. According to the National Research and Training Center on Psychiatric Disability, “self-determination refers to the right of individuals to have full power over their own lives, regardless of presence of illness or disability.” Specifically, self-determination improves the “individuals’ rights to direct their own services, to make the decisions concerning their health and well-being (with help from others of their choice, if desired), to be free from involuntary treatment, and to have meaningful leadership roles in the design, delivery, and evaluation of services and supports” (National Research and Training Center on Psychiatric Disability, 2002).

Authors Corbett and Barton describe a fundamental flaw in the basic approach many societies have taken to improve the lives of people with disabilities in their chapter titled “The rhetoric and reality of transition to adult life” in Policies for Diversity in Education. “The argument of achieving ‘self-fulfillment’ and of ‘living as normal a life as possible’ is seriously flawed when set against the context of an environment that is
essentially oppressive and unadaptive and in which professional power establishes and perpetuates patterns of dependency. Opportunities for meaningful decision-making on the part of marginalized groups are largely cosmetic” (Barton, 1992, pp. 137-144). The issue that Corbett and Barton focus on is the rigid standard of normalcy that is generally accepted despite the fact that no rigid standard of normalcy accurately reflects reality. The reality is that each person has a different level of ability at every activity, whether physical or mental. A person in a wheelchair, participating in the Special Olympics, may be stronger and healthier than a person that is not qualified as disabled. Thus a rigid definition of disability separates people with certain conditions from other people, regardless of their actual set of abilities (Barton, 1992). Consequently, flexible tools that can be used by anyone regardless of the classification of disability can decrease the sense of being different for people with disabilities, and may benefit even people that are not classified as having disabilities.

For many, college is a period of transition into adulthood. But what does it mean to transition into adulthood? “Enabled to Work: Support into Employment for Young People with Disabilities” suggests that “Adulthood is not recognised as a single evident to everyone. Instead, a number of small changes in status and recognitions of the progress towards adult status takes places over a number of years (Griffiths, 1989). The transition into adulthood includes financial independence. While some people have access to financial resources, others feel inferior because of a lack of personal financial resources
combined with the age requirements of government funded income support which can lead to destitution for young people with disabilities. Increased understanding about and sensitivity to the transition into adulthood may reduce challenges faced by people with disabilities. “Transition is shaped by different opportunities and experiences and is a development which highlights inequalities. For some young people with disabilities which require a high level of care, this stage can be one of experiencing frustration in the limits of housing provision and support services. Their ‘transition’ may be no more than being found a placement in residential care after the completion of an independence training course. “Much of the rhetoric of ‘transition’ fails to recognise the complexity of the social world. It is only within this complexity that ‘transition to adulthood’ can be understood” (Griffiths, 1989). Providing resources that increase a young person’s independence and freedom without emphasizing traditional metrics of the transition period (money, job, and housing) may improve the success of young people with disabilities as they transition into adulthood. A web based interactive map may aid in personal freedom, independence and growth without economic bias and is a reasonable solution proposal for autonomous mobility around campus for young people with disabilities.
2.4.2 The World Wide Web, Digital Interactive Maps and People with Disabilities.

Creativity, innovation and technology are at the heart of improving the lives of people with physical disabilities in the public realm. Research has shown that people generally benefit from postsecondary education (Barton, 1992). People with disabilities show substantially improved effectiveness as productive members of society when they obtain a postsecondary degree (Brewster, 2004). The U.S. government values improving the effectiveness of people with disabilities as productive members of society considering they make up generally underrepresented and misunderstood social groups that will likely always exist. Digital technology is a form of infrastructure that has an extensive set of internationally-recognized “accessibility standards” which detail methods that make it accessible to people of a large variety of disabilities. Digital technology can be changed to improve accessibility often more easily than modifying building architecture or physical infrastructure.

In many cases digital technology can provide a reasonable accommodation where a physical modification may be less feasible or cost prohibitive. HSU-IAM can be seen as a case study in using digital technology to provide a reasonable accommodation for a basic social need that is challenging for people with certain disabilities. The static accessibility map may not be sufficient at providing the information necessary for a person in a wheelchair to experience autonomous mobility around campus. Making all
trails on campus accessible is almost certainly cost prohibitive. A robust and effective
digital accessibility map may be able to provide the information necessary for people
with physical disabilities to have autonomous mobility and personal freedom at the
relatively monitored and safe environment of campus. Such a map may cost a fraction of
the physical modification. In addition, increasing the accessibility of campus has the
potential for increasing the number of people with disabilities that have a higher
education, and improve their effectiveness in society.

Cartography finds itself at a confluence of potentials and possibilities for people
with disabilities. In a time when creating digital infrastructure to understand our world is
often more cost effective than physically changing architecture. There are many standards
for people with disabilities. The popularity of the World Wide Web, online social
networks and GIS-based applications means digital online maps can reach people through
many outlets. As “Putting the ‘Art’ Back into Cartography” says “Cartography has been
defined as the art, science, technology, and craft of making maps and is a discipline going
back 30,000 years to cave paintings locating woolly mammoths. Maps have often been
works of art, but also visualize the results of scientific and historical analysis” (ESRI,
2005). Cartography’s multidisciplinary and user-defined nature make it well suited for
the broad effort to efficiently and effectively accommodate people with disabilities in the
21st Century. The creative and innovative potential of digital maps are currently being
The ESRI White Paper “Comparing Vector and Raster Mapping for Internet Applications,” begins by saying:

Developing Web-based mapping applications involves more choices than it did just a few years ago. Traditionally, Internet maps have been based on raster graphics created on a Web server and delivered to a client browser. More recently, mapping APIs have been using pregenerated raster tiles to enhance the viewing experience. Today, developers are starting to build sophisticated mapping applications using vector graphics (ESRI, 2007, pp. 2–3).

This paper discusses how sophisticated mapping applications using vector graphics have several features: They require a special plug-in (i.e., Flash), can highlight/animate and identify features, are suitable for click, drag and pan, and can switch layers, styles and projections. HSU-IAM has many of these capabilities and was built using Flash, a vector graphics application.

When HSU-IAM was started the development choices considered were:

- Static raster map with rollover image interaction
- Flash and Adobe Illustrator (primarily vector-based)
- GIS (primarily vector-based)

The static raster map with roller image interaction would most likely employ a normal raster image file (commonly .JPG or .GIF) loaded into a standard web browser (Microsoft Internet Explorer, Mozilla Firefox, Google Chrome, Apple Safari, Opera or
Netscape Navigator). New information would appear over the graphic as the user moved the cursor over buildings and routes. There are a number of issues with a system like this. First and foremost, this is a system that requires the usage of a mouse to move the cursor over the raster image. This defies CSU's ATI requirement which specifies that mouse usage must not be required (California State University, 2009). In addition it is difficult to know if all the information necessary to get between any two buildings at HSU could be displayed in this fashion.

GIS as it exists in 2010 presents interesting possibilities for creating a project similar to HSU-IAM. Sobek and Miller’s article “U-Access: A web-based system for routing pedestrians of differing abilities” (J Geography Syst 2006) outlines an approach to solving a problem very similar to the one faced with HSU-IAM. Sobek and Miller’s process automates many elements of the task using GIS. In addition the development of ESRI's ArcGIS and ArcWeb Services make the creation of an online interactive accessibility map more feasible than ever before (Miller, 2006). Were a similar project to be started in 2010 it would be well worth considering these technologies. Some of the ArcWeb Services features that may be useful are:

- Layers visibility manipulation
- Thematic maps based on user data
- Saving and retrieving maps
- URLs for map areas
• Interactivity with markers
• Projection optimization based on current extent
• Vector map access
• Creating, storing, adding and editing data
• Custom map services and styles
• Keyword search for thematic variables
• PDF generation of thematic maps
• Reverse geocoding
• Multipoint route generation
• Route distance determination
• Turn-by-turn route maps
• Route geometry access
• Data access based on proximity
• Conversion between pixel and geographic coordinates
• X,Y coordinates and related location information based on mobile device location
• Determination of current speed and direction

Using these tools it may be possible to import the vector and Flash-based HSU-IAM into a web-based geographic information system (GIS). From there it may be
possible to bring that data into Google Earth or other applications built on standards such as vector graphics and extensible markup language (XML). XML is a digital data standard which can be made from any text file containing properly formatted data. The data behind HSU-IAM is contained in XML files. Because HSU-IAM uses standard software and data formats, and because there is a movement to import as much data as possible into ESRI GIS software and online mapping applications, it may be possible to geocode the HSU-IAM data and import it into a GIS system and/or Google Earth.

The GIS solution is appealing from the perspective of 2010, and may ultimately be an effective and efficient basis for this sort of system. However, there were many barriers to the GIS approach in 2005. The primary issue was the non-compliance of ESRI software (the industry standard GIS software taught at HSU) with federal accessibility requirements. In most cases only the most recent versions of ESRI's software is compliant with Section 508 requirements. Flash on the other hand had the necessary tools for compliance (ESRI, 2009).

Another issue pertains to placing GIS data into a usable and visually articulate web format. The challenge of visual satisfaction in GIS-based maps is described in “Putting the ‘Art’ Back into Cartography”:

> From a cartographic perspective, GIS has great strengths in database-driven symbology, multipurpose mapping, and integrated query and analysis, but map publishers also need rich graphical representation and artistic freedom. So, a set of major software advances in cartographic functionality is
under way for ArcGIS 9.2 that will facilitate and automate high-quality cartographic production while empowering the human cartographer with more creative flexibility (ESRI, 2005, p. 5).

ArcGIS 9.2 was released around the beginning of 2007, when HSU-IAM was nearly complete. Advanced cartographic tools were not available in the most sophisticated GIS development package available for student developers. Some examples of cartographic techniques that are available in Flash that have not been available in ArcGIS include:

- All five stages of symbolization allowing for a range of placing points, lines and polygons in automated and freely represented forms.
- Setting the styles, classes and representation rules for points, lines and polygons in order to differentiate minor variations (such as a road passing through a tunnel, classifying routes, etc.) so that the appearance can be both automated and freely modified.

In addition, web-based GIS tools were just beginning to be discussed and developed among researchers, and Google Earth was just being released in 2005. Over the course of the next several years academic and industrial research in cartography developed substantially due in large part to the proliferation of inexpensive consumer digital cartography tools and services and their subsequent popularity. However, in 2005
HSU did not have any official GIS data developed and a web-based GIS-powered application was not considered feasible.

Near the beginning of 2005 students at HSU primarily learned how to develop digital maps using Adobe Illustrator and Flash. Flash (At the time Flash was owned by Macromedia. Later Macromedia was bought by Adobe) was a widespread tool for developing complex interactive and animated web applications. It is one of the most popular web formats an extensively uses vector graphics. Vector graphics have many benefits, especially for maps, such as:

- Vector graphics look good at any scale because the image quality is lossless and exactly defined (every point, line and polygon is defined by exact coordinates and colors).
- Because only the coordinates of points and the appearance of lines and polygons needs to be recorded in the data file vector files can be quite small compared to raster files.
- Maps and vector graphics are typically made up of points, lines and polygons.

The power of vector graphics for mapping applications combined with Flash's popularity makes Flash an excellent candidate for SDRC’s request. “According to a December 2005 study by the NPD Group, 97.7 percent of Internet users have some version of the Adobe Flash Player installed, with about 50 percent having the latest version” (Adobe, 2005). Flash was, and continues to be, used for many web applications
from filing taxes online to 3D video games. It is powered by a scripting language called ActionScript. ActionScript is a programming language used by Flash to change the program based on user interaction or the passage of time. ActionScript is assigned to objects on the screen or entire frames in a timeline of sequential variations in the program. The timeline can be used in the traditional animation sense: Varying the position or shape of objects slightly in each frame can create the illusion of motion. It can also be used in a programming sense: Each frame can represent a separate state of the program (e.g., what the user sees when an object is selected). In HSU-IAM a user can select two buildings and click on a button labeled “Route.” When that happens, the screen goes from displaying building choices and an overview of campus to a map showing only the route between the two buildings and turn-by-turn text directions all enlarged to fill the screen. Those can be drawn on separate frames and the ActionScript can be instructed to “go to” the frame with the route map and text when the user selects the “Route” button. ActionScript is used by HSU-IAM in many ways which will be detailed later in this report. Users can interact with the interface in the following ways:

- Zoom the map by clicking on a slider handle and dragging.
- Pan the map by selecting the “Move Map” radio button, clicking on the map and dragging.
- Show and hide the legend and its various icons, as well as a help screen by clicking on buttons.
• Menus are populated with most of the buildings on campus using ActionScript to parse XML data files. When users select a building the data file is queried for all the accessibility information related to that building. Floor plans for that specific building can be viewed as well.

• When two buildings are selected ActionScript loads the unique map and text showing the route between the chosen buildings.

• Print any view of the program.

When HSU-IAM was begun Flash with ActionScript appeared to be the most cost-effective solution to the request from SDRC. While GIS presents many opportunities that could be explored, Flash remains a relatively simple, effective and affordable solution.

2.4.3 Using Maps to Tell the Stories of People with Physical Disabilities.

HSU-IAM narrates the experiences of people with physical disabilities around HSU through unconventional cartographic means (relative to traditional paper maps). Pearce discusses the “liberating efficacy of creatively aligned cartographic procedures — Empowered by the flexibility and accessibility of new digital technologies — the resulting critical practices empower individuals and communities” (Pearce, 2008, pp. 20–29). HSU-IAM literally narrates the experience of moving from one building to another around HSU for people with physical disabilities, thus intimately connecting with its
target demographic. Pearce argues that “narrative techniques, which have been useful for creating place in other forms of artistic expression, are also useful for creating narratives in the map,” and that there is “enormous potential of narrativity as a means to expand cartography’s ability to articulate multiple geographies and spaces.”

Using Pearce’s definition of narrative: “Narrative is not merely a story, or the representation of events. It is the combination of story with narrative discourse, the presentation of that story in a particular way.” Experience is the key to narrative because “narrative transcends mere description in the same way that place transcends mere location, by shaping it with meaning.” Meaning is infused in individual experience. Thus a narrative map conveys a unique experience. For a mapmaker “place creates the conditions for narrative to exist. Narrative structure, in turn, gives us a consciousness of place” (Pearce, 2008).

Sociologists have come to view personal narratives as the foundation of personal identities. One sociologist says “to better understand the social and provisional nature of identity it should be viewed as a narrative which is continually under construction, a view which has been endorsed within the mainstream of sociological research into the effects of chronic illness. It can be argued that we need to build stories about ourselves to create a sense of continuity and cohesion and that ‘narrative identity’ is simultaneously a social construction and a means for exercising agency” (Galvin, 2005). The narrative power has a positive effect on identity when the individual feels empowered to act independently in
his or her life without requiring assistance, especially when it involves getting to work (like an on-campus job) or being involved in social activities (e.g., classes and school events).

There are multiple narratives at work in HSU-IAM. The obvious narratives are the text directions that accompany the “mini-map” (a map trimmed to show only the area of the route between the two buildings in question. Extraneous symbols are removed. The route is graphically displayed as a line on this map). There is also the deeper ‘unwritten’ narrative “in the visual syntax between rather than within, the maps.” In other words there is a story about campus accessibility for people with physical disabilities that is told not through words but through the experiences portrayed by HSU-IAM. Much of this story is told one route at a time through the mini-maps and their accompanying text. These are the threads of the larger narrative revealed as the user interacts with HSU-IAM.

The more traditional static accessibility map currently offered by SDRC uses more traditional cartographic practices and results in a fairly standard map. Pearce warns that “the Western map [employing traditional Western cartographic practices] ignores its inherent point of view by presenting a ‘pointless’ portrayal of space.”

2.5 Similar Projects and Project Development Value

Forty-eight different interactive campus maps were examined, but none of them contained all the features of HSU-IAM. Appendix I contains the different maps that were
examined. There are other innovative features that are worth considering. An example of a campus map that uses GIS to auto-generate the walkabout route between campus buildings is the UCSD Campus Map (Michael Kelly, 2005). This map does not provide turn-by-turn directions, nor does it provide for disabilities. The interface is similar to HSU-IAM's. Another innovative GIS-based example comes from University of Oregon (University of Oregon, 2009). This map allows the user to draw a line with many bends and measure the distance in miles and steps between buildings. It uses an interactive “Themes” legend to view all the features related to a particular activity (e.g., bicycle routes). It does not reveal route accessibility, directions or accessibility features. One interactive campus map that includes accessible building information is the University of Arizona’s Interactive Campus Map (University of Arizona, 2007). This map provides no route information. University of Kentucky’s Campus Guide provides similar information (Kentucky, 2009). Southern Methodist University’s interactive online map (Southern Methodist University, 2009) uses Flash and allows the user to interact with the legend similarly to HSU-IAM. From the maps reviewed it was apparent that the needs and concerns of people with physical disabilities were not being addressed.
CHAPTER 3.
PROJECT DEVELOPMENT HISTORY AND PROGRAM ANNOTATION

3.1 Project Development History

HSU-IAM began in January of 2005 when SDRC Director McFarland began discussing the project with ICD Director Fitzsimons. By February, Mr. McFarland emailed a project proposal description to Fitzsimons and Russavage. Shortly thereafter, there was a meeting between Fitzsimons, Russavage, and McFarland, as well as ICD Assistant Director Cunha, Facilities Management Director Schultz, Senior Planner Hopkins, Campus Engineer Perez, Construction Services Drafting Technician Tauzer and Field Data Coordinator McCoy. At this meeting the group discussed the goals and timeline for the project. The primary goal was for any person to be able to access turn-by-turn directions and a map indicating the route one would take to get from any building (point A) to any other building (point B) on campus. This information should be accessible from the Internet, using a standard web browser and freely available applets or plug-ins. At this meeting the group discussed whether to base the program in GIS or Flash. Representatives from Facilities Management and Construction Services suggested that because no GIS data were available at HSU it may be too large a step to try and create this data for the project. The group decided instead to focus on the interactive and graphical power of a Flash based mapping system. McFarland agreed to advise Russavage as to the specific needs of HSU’s community of people with disabilities and
finalize a project proposal with Russavage, Fitzsimons and ICD. Fitzsimons and Cunha agreed to oversee the development of the project through ICD. McFarland agreed to review the progress of the project and inform Schultz for final review when the project neared completion. By May, McFarland approved a project proposal written by Russavage with the assistance of Fitzsimons and Cunha.

3.1.1 Spring 2005 — Preliminary Planning

Throughout Spring semester 2005 the students in ICD helped to guide the preliminary planning for the development of HSU-IAM. In addition, ICD students assisted Russavage with verifying the accessibility of the routes indicated on the original static map. The static map was imported from Adobe Illustrator into Flash. By March, the ICD students began to examine and change the original accessibility map to make it a more cartographically effective base map for an Internet application. Typeface and size, colors, line weights and shape complexity were revised to make the original static accessibility map more visible when viewed on a monitor through the Internet. By the end of the semester Russavage designed the user interface with input from the ICD students. Russavage and another student performed an initial ground-truthing exercise, verifying the location of accessible features and using a clinometer to verify the slope of routes that were indicated accessible on the original map. A prototype was created to demonstrate the basic functionality and layout of the program. This prototype was
modified based on suggestions from ICD and Mr. McFarland. After approval of a final prototype and the revised static map, all that remained before work could begin was planning, structuring and developing the underlying pseudocode. In order to do this an understanding of ActionScript was required.

3.1.2 Summer 2005 — ActionScript Education and Campus Developments.

During the summer of 2005 Russavage built HSU-IAM based on Flash MX 2004 ActionScript: Training from the Source by Franklin and Makar. This book discussed a wide range of Flash development issues, from planning a project and the basics of ActionScript to details about classes and database connectivity as well as specific examples of function implementation (Makar, 2003). HSU-IAM primarily uses a few key Flash features:

1. Graphic Design and Object Assignments: HSU-IAM is made up of a number of objects that can contain data, graphics and text. See Appendix F Figure 2 for a screenshot of the program and its primary areas. The majority of graphic objects in HSU-IAM are made of vector graphics. Vector graphics are the standard graphic format used by Flash. The most common form of vector objects are fonts. The extensive use of the vector format throughout Flash is well suited to maps, which can be very complex graphic objects, requiring enlargement (a.k.a. “zoom”) and repositioning tools in order to center the map
on particular objects of interest. Vector graphics are lightweight and precise, making resizing and repositioning both fast and visually crisp. In addition, raster images may also be assigned to objects. JPG and GIF graphics are used for the HSU logo. The primary typefaces used are Verdana and Copperplate. PDF’s are used to display the floor plans for the buildings around campus.

2. Interactivity and Event Handling: In order for the user to display information of interest and hide the rest the user interacts with the graphical interface of HSU-IAM. Interaction includes clicking on features in the legend in order to hide or reveal symbols on the map portraying the location of HSU’s different accessibility features. For example, the user may wish to display the location of accessible elevators, doors, and SDRC pick-up/drop-off sites and hide the symbols showing staff and resident parking spaces. Feature interaction is specified through event handling. Events are handled using Listener objects, code that is run only after a specified event takes place, such as a button click, moving the cursor over an object or selecting a building name from a menu.

3. Database Connectivity and Queries: The program not only makes use of objects within Flash, it also accesses external files containing data, text and graphics that are loaded into objects within Flash. This allows Flash to work like a database management system. When the user queries HSU-IAM for information about a particular building or route the program searches the data
files for the relevant information, returns the data to the user, and can load the external files containing the map, route text and floor plan.

4. Logical operations and Traditional Programming Elements: Traditional programming elements provide the logic for event handling and interface responses. These elements include loops and switches, as well as logical AND / OR and IF / THEN operations. For example, when a user selects two buildings and asks the program to display the accessible route information between the two routes ActionScript uses logic to determine whether or not an accessible path exists between the two buildings and which files contain the information to be displayed.

3.1.3 Late Summer and Fall 2005 — First Development Work: Building Interface and Data Files and Understanding Campus Accessibility Networks Using GIS.

Throughout July and August the interface for HSU-IAM was developed. First an interactive legend was developed. See Appendix F Figure 3 for a screenshot of HSU-IAM with the legend revealed. The legend includes icons for:

- Staff, student, resident and accessible parking
- Automatically opening accessible doors
- Accessible elevators
- Accessible TDD phones
- SDRC paratransit pickup / drop-off locations
The original static accessibility map included map symbols for most of these features, but ground-truthing revealed that icon placements were inaccurate. Compare Appendix B, the original static accessibility map, with Appendix F Figure 2 Region A, HSU-IAM’s campus map. The icons were moved to more accurate locations. The color and size of the symbols were modified to increase readability. In addition, showing all symbols simultaneously reduces the readability of the map, cluttering the map with dozens of symbols all vying for visual attention. The interactive map addressed this problem by making it possible for the user to hide / reveal any set of map symbols by clicking on that symbol in the legend. See Appendix F Figure 3 for a screenshot of HSU-IAM with the legend revealed. If a user wishes to see only where accessible parking locations are, all other map symbols can be hidden. In addition, the legend itself occupies over 10 percent of the map’s real estate; the interactive map was designed so the legend itself can be hidden, which allows the map to fill more than 80 percent of the screen. The legend can be revealed or hidden by clicking the “legend” button found in the menu bar along the bottom of the screen.

Having developed the majority of the important interface features, the next task was to create data files containing building names and accessibility information. The data files were formatted according to Extensible Markup Language (XML) standards in order to ensure portability of this data. Russavage created files that contain data related to accessibility features available for each building on campus. This file is called
“buildings.xml.” An additional XML file, “paths.xml” was also created. This XML file contains data used to determine whether or not an accessible path map and text file exists for each potential route on campus. If a route map exists that map’s dimensions are also stored in “paths.xml.”

In addition, there are multiple non-connected networks of accessible paths. Appendix D shows the campus nodal networks map. Each building only has an accessible route to a select subset of other buildings around campus. The “buildings.xml” file contains data indicating the accessible route network to which each building belongs, if any. When the user queries HSU-IAM for an accessible route the program examines the data in “buildings.xml” to find out if the two buildings are on the same accessible route network. If an accessible route does exist for two buildings, and the route text and map have been developed then “routes.xml” contains the name and location of the map and text files, as well as the dimensions of the map file for proper page layout and image scaling. See Appendix F Figure 5 to see a route map and text displayed in HSU-IAM with scaling used to fit the map into the map display area.

After the data files were created and populated the next step was importing the data from the files into HSU-IAM and creating means of querying this data. ActionScript code was written to instruct the program to preload the XML files into memory. The building names in the “buildings.xml” file were used to populate the ComboBox objects with which the user interacts to choose a starting and ending location for a route. Other
data in this XML file provide the user with information about the accessibility features of buildings.

In September, Russavage developed a dynamic content region for displaying individual building information as well as the text for route directions. Appendix F Figure 4 shows the dynamic content region displaying information about a building. The dynamic content region takes up approximately the same space and location as the help menu (approximately 1/3 of the right-hand side of the center region filled by the campus map). This allows the map to fill the majority of the screen, while also displaying related information about the map on the right side of the screen. This region includes three tabs at the top. These three tabs are labeled “Start Info (S),” “End Info (E),” and “Route Info (R).” Below these tabs is a box that contains text pertaining to whichever of the three tabs is currently selected. If only a starting or ending location has been selected only the corresponding tab is visible. If both locations have been selected all three tabs are visible. When all three tabs are visible the user can click on any of the tabs in order to reveal the text related to that tab. When a user clicks on the “Start Info (S)” or “End Info (E)” tab the text display object describes the accessible features of the building selected. When the user clicks on the “Route Info (R)” tab, ActionScript examines the two buildings. If the two buildings do not have an accessible route between them the user is notified. Any other possible accessible means of traveling between the two buildings are displayed (e.g., both buildings are near a SDRC paratransit pickup / drop-off location or accessible
parking lot). If an accessible pedestrian route exists between the two buildings, handwritten text delineating the turn-by-turn directions are displayed in the text display region. The rest of the center region occupied by the map is filled with a hand-developed map (a.k.a. “minimap”) only showing the area, path and symbols relevant to the route.

By October 2005 other interface features were created. A dynamic scale was created. When the user magnifies the map, the scale adjusts accordingly. Appendix F Figure 2 shows Region C is where the user can adjust the map display using the tools described above. Text appearance and label placement were thoroughly reviewed and finalized by ICD students. The map was then ready for the North American Cartographic Information Society’s (NACIS’s) Interactive Map Competition.

In late October 2005 Russavage attended the NACIS Annual Meeting in Salt Lake City, Utah. At this meeting Russavage attended numerous relevant seminars regarding interface design, vector graphic development and tools, digital elevation models in GIS, and even a seminar regarding the use of GIS and Flash together for an online interactive campus map developed for the University of Oregon (UO). The UO interactive campus map is available online at http://map.uoregon.edu/. Russavage spoke with UO InfoGraphics Lab Project Manager Erik Steiner and GIS Specialist Blake Andrew. The three discussed the man-hours and background necessary to develop a GIS-based interactive Flash map. Steiner offered to be a resource and provided his email address. HSU-IAM was recognized for participating in the NACIS interactive map competition,
but ultimately a map that was developed by more students over a longer period of time was chosen as the winner of the competition. At this point one of HSU-IAM’s most important features, actually providing the user with the text and map for the accessible route between any two buildings, only contained example data and was not complete.

Toward the end of Fall 2005, for a final project in an intermediate GIS course, Russavage developed an accessibility analysis of HSU. This GIS Accessibility Analysis project (HSU-AA) used ESRI GIS software as well as campus CAD and elevation data. Appendix E shows the original CAD data graphic. These files were used to determine the slope of campus routes and to view the primary problem areas that may keep people with disabilities from using certain campus walking paths. Digital Elevation Models (DEM) were converted into choropleth polygons signifying ranges of slope, from no slope issues, to some slope issues to physical barriers due to steep hills or stairs. In addition, the CAD data was used to generate a layer of all walkable pathways on campus. The choropleth slope data were combined with the walkable pathways layer in order to reveal how well the walkable pathways met ADA slope requirements and restrictions. This information provided verification of campus accessibility routes as they had been indicated on the original static accessibility map which complimented the ground truthing performed the previous semester. Russavage also used this information to understand which buildings on campus were accessible to which other buildings. The information revealed that there are approximately 5 separate networks of accessible paths on campus. Appendix D
indicates the separate networks that existed at HSU at the time of this project. This information was translated to an additional attribute within the building accessibility data set. A number from zero to five was assigned to each building, indicating which of the 5 networks each building was on (zero if a building was not on a network). This also told the developer which routes required an accessible route map and text file.


At this point, HSU-IAM was mostly complete. All that remained was to create the individual route maps and accompanying turn-by-turn text information and HSU-IAM would contain all necessary data. In addition the program needed to be beta tested to find any bugs hiding within the code. Approval from the administration would lead to public release and would mark the project's completion. However, funding had not been procured for this phase of the development. In the Spring of 2006 SDRC Interim Director Newmeyer requested additional funding from Director Schultz for the next phase of development of HSU-IAM. Minor Capital Outlay Funds were approved. The goal was for the final project to be reviewed by June 2006.

Throughout the Summer of 2006 approximately 50% of the route maps and text directions were created. Appendix G provides a list of routes that have been created. At this time, minor improvements to the interface and data structure were developed, and comments were written throughout the ActionScript for future developers. At the end of
the summer a presentation was provided and the program was demonstrated to Director Schultz. At that point, it was decided that a thorough review of the project for accuracy and completeness would be necessary before HSU-IAM could be made available to the public. The concern was that misdirecting a student could lead to injury. Further functionality had been sought; however a project proposal for the additional work necessary has not been developed.

The presentation was also shared with Natural Resources Interpretation Professor Ward. Ward’s Interpretation practicum students were working on campus signage as part of the 2006 Wayfinding Project. Appendix H contains an early publication about the wayfinding project. Russavage and Fitzsimons extended their support to Ward.

During the Fall of 2006 the presentation was turned into the basis for introducing HSU-IAM to beta testers. The software was presented to approximately 60 students: 40 students of Leadership Training for Orientation Counselors (LEAD 350) and 20 students from Resident Life Staff Training (LEAD 380). First Russavage met with Mr. Koelling, Instructor for LEAD 380. Koelling and Russavage developed a plan, with the help of SDRC Director O’Brien. They introduced HSU-IAM to students. Those students were asked to evaluate route accuracy and program functionality.

By Spring 2007 the beta testing plan was fully developed. The students of LEAD 350 and 380 received the presentation. These students took home instructions on how to complete the beta test, as well as route maps and texts associated with three routes, and a
questionnaire for feedback. The results were shared with Dr. Schultz. Schultz was not satisfied by the unofficial and incomplete results of these tests. It was decided to seek a more official and thorough beta testing process.

From Summer 2007 until Fall 2010 little further progress had been made on HSU-IAM. Funding had not been secured for the additional beta testing desired before making the program public. In addition, numerous maps and route texts needed to be developed before the program could be considered complete and ready to share with the public. One or more additional phases appeared to be necessary before HSU-IAM would be ready for the public.

3.2 Program Annotation

3.2.1 User Interface.

Appendix F contains screenshots from HSU-IAM. Figure 2 shows the display regions of HSU-IAM. Figure 2 Region A is the map display region, which fills the majority of the center of the window. This map was initially created in Adobe Illustrator and converted into a Flash file. Compatibility between these programs was supported by both companies. Within Flash the color and shape of objects were edited. In addition, each building and most other map objects were assigned unique names. Assigning names allows ActionScript to prescribe actions to be performed related to this map object. User interaction is the primary reason for object change. For example, when a user selects a
building from a list at the bottom of the screen (Figure 2 Region D) the associated building’s map object changes color to make that building more immediately apparent. The top-left corner of the screen (Figure 2 Region C) contains objects for manipulating the map. These objects include a radio button the user can select using either mouse or keyboard to make the map moveable. In addition, a map zoom tool is provided. Together these tools allow the user to change the scale and position of the of the accessible campus map. The map scale automatically adjusts so the user can approximate the distance between points. This region is informally called the “Map Manipulation Menu” region. The upper-right corner of the screen (Appendix F Figure 2 Region F) shows the campus name, logo, and program name, using standard HSU typeface, logo, gradients and colors. This region is informally called the “HSU Logo” region. The center of the screen contains the campus map. The legend, help, and building information can fill the right center portion of the screen (Appendix F Figure 2 Region B). This area in the program’s graphical user interface is informally called the “Map Information Display” region. Along the bottom of the screen is a menu bar. In the bottom-left corner of the menu bar are two drop-down menus (Appendix F Figure 2 Region D). The user can click on either of these menus to reveal a list of building names. The user can click a building’s name to select either the start or the end a specific route. These menus are populated by an Extensible Markup Language (XML) data file. When a particular starting or ending location is chosen the building floor plan and accessibility information can be revealed by
clicking on the “Floor plan (F)” button or “Info (I)” button. The “Legend (L)” button shows or hides a legend of map symbols with which the user can interact in order to hide or show map symbols, such as the locations of accessible doors and elevators. Finally, a “Print (P)” button allows the user to print the current display. And clicking on the “Help (H)” button shows or hides the help menu that is initially displayed to provide the user with the above information. This region is informally called the “Menu Bar” region, found in Appendix F Figure 2 Region E.

3.2.2 Initial Program Appearance.

Appendix F Figure 2 shows the initial state of HSU-IAM. When a user initially accesses the program the majority of campus map is portrayed on a map on the left side of the screen (Appendix F Figure 2 Region A). On the right side of the screen the “help window” displays information on how to operate the program (Appendix F Figure 2 Region B). In the Map Manipulation Menu region (Appendix F Figure 2 Region C) the zoom control is set to display the map at the smallest scale possible, making as much of the map visible as the designer allowed. The map is not set to be moveable, and the scale reflects the current scale of the map.

These locations were specifically chosen based on graphic design principles. The upper left-corner is traditionally viewed by Americans as the most important and first viewed portion of the screen. The upper right corner is generally considered the portion
of the screen that receives the least amount of viewer focus by people in the United States (Appendix F Figure 2 Region F). The logo space’s eye-catching gradient and graphic are counterbalanced by the large left space revealing the map (Appendix F Figure 2 Region A). The map manipulation tools are innocuous but convenient in the upper-left (Appendix F Figure 2 Region C), and will likely be quickly noticed, after the logo is glanced over, and the user’s eye moves on to the large regions in the center of the screen displaying the map and help information. The menu bar at the bottom of the screen (Appendix F Figure 2 Regions D and E) provides buttons and menus that can be used to reveal text and graphics related to buildings and routes. The menu bar initially lets the user know which menu to select to choose a starting location and ending location. The floorplan and info buttons are not selectable since no building is initially selected. Clicking the Legend button reveals the legend. Clicking the Help button hides the help information. Clicking on the Print button prints the screen as it initially appears. When the page is printed the menu bar along the bottom of the screen is outside of the print region and is not printed, as it does not provide pertinent information that the user might need.

3.2.3 Files and Folders.

HSU-IAM’s graphical interface, programming, graphics, and database management system are all stored in two Flash Files. “HSU-IAM.fla” contains the
current working version of this program as a Flash 8 Document (FLA) file. “HSU-IAM.swf” contains the compiled version of the program as a Shockwave Flash (SWF) file which can be embedded into any hypertext markup language (HTML) document and viewed on any standard web browser with the Shockwave Flash plug-in. This plug-in has been available and free for all major web browsers since 2001.

In addition to the HSU-IAM Flash File and the SWF file, there are many files which make up the data searched and retrieved by HSU-IAM. These files, except for two, are all stored within appropriately-titled sub-folders. At the root folder there are only two other files: “preloader.fla” and “preloader.swf.” The SWF file is a compiled version of the corresponding Flash file, just like the other files in the root directory. These preloader files are provided because HSU-IAM.swf is 447 KB. This may take more than a few seconds to load on a slow Internet connection. Consequently, “preloader.swf” shows a progress bar of the percent of “HSU-IAM.swf” that has loaded. This progress bar is shown in a graphically friendly context to encourage patience and provide some basic information about the time required to wait for the program to finish loading.

On the server-side, only the SWF files and the sub-folders and their contents need to be present. The Flash files are for development purposes only, and are not needed for HSU-IAM to be viewed by the public on a web browser.

The sub-folders are: “floor plans,” “routeMaps,” and “XML.” The “floor plans” subfolder contains 77 portable network graphic (PNG) files and 77 portable document
format (PDF) files. Each file is titled after an abbreviation of a building on campus. For example, Founders Hall’s floor plan can be found in the “floor plans” folder as a file called “foundersFloorplan.pdf.” A corresponding small thumbnail graphic of this floor plan is also found as the corresponding PNG file “foundersThumbnail.png.”

The “routeMaps” folder contains numerous Text Document (TXT) and SWF files. Each file name is a composite of abbreviations of two building names which have an accessible route between each other. For example, the accessible route from Founders Hall to the Natural Resources building is shown as a map with a route path clearly marked in the file “FH-NR.swf.” The corresponding text file consists of turn-by-turn directions that refer to commonly accepted accessible routes. This text is found in a file entitled “FH-NR.txt.”

Within the “XML” folder only two files are used by HSU-IAM: “buildings.xml,” and “routes.xml.” These extensible markup language (XML) files contain the data sets used by HSU-IAM to respond to queries by users regarding the accessibility features found on campus. The file “buildings.xml” contains such information as each building’s name, its abbreviation, whether or not the building has an accessible entrance, elevator, TDD phone, SDRC paratransit stop, and nearby accessible parking. Some of this information is provided to the users in the form of text within the HSU-IAM graphical interface. Some of this information is used to determine whether or not to search for accessible route files to display, or if the user should be notified of potential ways for
going from the selected starting location to the selected ending location. The file “routes.xml” lists every potential route that a user might query. A binary Boolean describes whether or not there is a route between the two listed buildings. If there is a route the corresponding map’s dimensions are also found within this dataset. This information is used to determine how to resize the SWF loader and text display objects in order to display the map and text of the route.

3.2.4 Layers and Objects.

Because there is no animation involving change over time only one scene and one frame is needed for HSU-IAM. There is no animation requiring frame-by-frame changes to the graphical user interface. This single frame is broken down into numerous layers and objects. Layers are used to separate groups of objects and control the overlap of objects. Objects on the screen can display vector or raster graphics or text and can be altered by user interactions.

Layers are for the benefit of the developer exclusively. The user has no awareness of the layers. Layers visually separate and order objects. Objects in layers at the top of the layer list cover objects that occupy the same screen region in layers below. Unless the object in the higher layer moves or reduces its opaqueness the objects beneath it remains unseen to the user. Layers also provide a practical way to group and separate objects. HSU-IAM’s layers are named: “actions,” “legend & scale,” “frames,” “school_logo,”
“help,” “interface,” “bldg_info,” “map,” “layout,” and “hidden.” Each of these layers contains visible screen objects except for “actions.”

The “actions” folder is the only folder that does not contain any objects visible on the screen. Instead it contains all of the ActionScript for HSU-IAM. This was done in order to make it easy to find all the code in the program. This code will be discussed later in this chapter.

The “legend & scale” folder contains the objects representing the scale and the north arrow visible in the upper-left corner of the screen (Appendix F Figure 2 Region C):

- An unnamed grouped graphic object consisting of a triangle and the letter N, indicating that north is roughly toward the top of the map.
- mapScale_mc: A MovieClip object composed of a line that turns 90 degrees up at each end, as well as text reading “100’” that indicates the length of the line segment corresponds to 100 feet on the ground.

In addition to the objects found in the upper-left corner of the screen, this layer also contains objects near the bottom-right corner of the screen (Appendix F Figure 3). These objects make up a map legend describing the point and line symbols which can be found on the map of campus. The legend is the largest object in the bottom-right corner, but it contains a number of other objects:
• **legend_mc**: A MovieClip object containing the legend frame, title and subtitle, map symbols and their descriptions.

• An unnamed grouped shape object providing a frame for the legend

• Unnamed static text objects containing the legend title and subtitle.

• **elevatorCheckIcon_mc**: A MovieClip object containing a graphic map symbol displayed as a dark blue square containing a white “E.”

• **elevators_ch**: Text describing the “E” map symbol as Elevators attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.

• **autodoorCheckIcon_mc**: A MovieClip object containing a graphic map symbol displayed as a dark blue triangle containing a white “A.”

• **autodoors_ch**: Text describing the “A” map symbol as Automatic Doors attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.

• **tddCheckIcon_mc**: A MovieClip object containing a graphic map symbol displayed as a dark blue triangle containing a white “T.”

• **tdd_ch**: Text describing the “T” map symbol as TDD Accessible phones attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.
• vanCheckIcon_mc: A MovieClip object containing a graphic map symbol displayed as a dark blue square containing a white “V.”

• van_ch: Text describing the “V” map symbol as an SDRC paratransit pickup/drop-off location attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.

• parkACheckIcon_mc: A MovieClip object containing a graphic map symbol displayed as a dark blue circle containing a white “P.”

• parkA_ch: Text describing the previous map symbol as accessible parking attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.

• parkGCheckIcon_mc: A MovieClip object containing a graphic map symbol displayed as a light green circle containing a white “P.”

• parkG_ch: Text describing the previous map symbol as general parking attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.

• parkRCheckIcon_mc: A MovieClip object containing a graphic map symbol displayed as a light green circle containing a white “R.”
• parkR_ch: Text describing the previous map symbol as resident parking attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.

• parkSCheckIcon_mc: A MovieClip object containing a graphic map symbol displayed as a light green circle containing a white “S.”

• parkS_ch: Text describing the previous map symbol as staff parking attached to a CheckBox object which allows the user to display or hide the corresponding map symbol.

• An unnamed group of lines and texts showing the line map symbols for normally accepted accessible paths and accessible paths that contain sections in excess of 5 degrees

Map symbols were chosen after deliberation between Russavage and ICD students based on cartographic and graphic design communication principles. Map symbols representing objects related to accessibility were colored dark blue. Objects not related to accessibility were colored light green. All parking map symbols used the same shape but a different letter within the shape to distinguish the different types of parking. The one form of parking that is considered accessible also differs from the other parking map symbols by being dark blue. The rest of the symbols shown directly relate to accessibility and are portrayed in dark blue. Each has a different shape and letter within
the shape making it easily distinguishable and quickly discernable on a map that can become crowded by the many instances of each symbol when all symbols are visible.

The “frames” layer contains a folder with three sub-layers. These layers contain vector graphic objects used to frame the program’s content:

- **mapFrame** is a layer that contains mapFrame_mc, a MovieClip object that frames the region that displays the map of campus. A large portion of the right side of this framed region initially contains help information to get users started. This right portion of the frame also may contain other pieces of information at different times.
- **printFrame** is a layer that contains printFrame_mc, a MovieClip object that frames a square region with a section obscured in the middle, so that the frame can contain information that properly fits on either portrait or landscape oriented letter size paper.
- **outsideBorder** is a layer that contains an unnamed Shape object that simply provides a white border around the maximum extent that is displayed in any format. This is primarily a development aid.

The “school_logo” layer contains a folder with three sub-layers. These sub-layers contain objects that are unnamed because they are static and are never changed or hidden in response to user interaction. These objects are the graphics that make up the logo in the upper-right corner of HSU-IAM (Appendix F Figure 2 Region F):

- **LogoText** is a layer that contains two unnamed grouped Shape objects. One group contains the three trees logo of HSU. The other group contains two lines of text:
“HUMBOLDT STATE UNIVERSITY” and “INTERACTIVE ACCESSIBILITY MAP”

- treeshadows is a layer that contains three unnamed Shape objects that are the shadows behind the trees in the HSU logo.

- logobackground is a layer that contains a single unnamed Bitmap object which references a gradient created using HSU standard colors. This gradient provides fitting but attractive teal color behind the white and gray text and objects that compose the entire logo.

The “Help” layer contains the MovieClip object help_mc. This object contains Dynamic Text and Shape objects that explain how to interact with HSU-IAM (Appendix F Figure 2 Region B).

The “Interface” folder contains four sub-layers used by HSU-IAM. These sub-layers contain the interactive elements of HSU-IAM that are not part of the legend:

- buttons: This sub-layer contains the buttons used to change HSU-IAM to another state (Appendix F Figure 2 Region E):
  
  - newRoute_cbu: A Button object that is only visible when the user is looking at the route map and text directions for two particular buildings. This button is used to reset HSU-IAM back to its initial state, except for the help information which is kept hidden. This enables the user to examine more buildings and routes.
o placeFloorplanButton: This Button object is visible when the user has selected either a beginning or ending location. Clicking on this button brings up the PDF file containing the selected building’s floor plans.

o Info_cbu: A Button object visible when the user has selected a beginning and/or an ending location. Clicking on this button toggles the visibility of the accessibility information about the currently selected building.

o mapPrint_cbu: A Button object can be used at any time to print whatever is visible within the window displaying HSU-IAM.

The “mapzoom” sub-layer contains magnify_mc. magnify_mc is a MovieClip object containing an unnamed Dynamic Text object declaring the vector graphic objects above to be a zoom slider. It also contains an unnamed Shape object and a MovieClip object named sliderZoom_mc. This object can be moved by the user. Its movement is limited to only horizontal movement over a short range, approximately 11% of the program’s horizontal extent. Moving sliderZoom_mc to the right enlarges the size of the map of campus. Moving sliderZoom_mc to the left decreases the size of the map of campus.

The “options” sub-layer contains a variety of objects used to change a variety of aspects of HSU-IAM:
- panMap_rb: A Radio Button object used to specify whether or not the map can be repositioned by further user interaction. When the Radio Button is selected the map can be repositioned. Otherwise the map is stationary.
- startPlace_cb: A ComboBox object is used to display a list of all the student-accessible buildings at HSU so that the user can select a building as the starting point for an accessible route.
- endPlace_cb: A ComboBox object used to display a list of all the student-accessible buildings at HSU so that the user can select a building as the ending place for an accessible route.
- showLegend_cbu: A Button object that the user can click at any time to show or hide the legend of map symbols.
- help_cbu: A Button object that the user can click at any time to show or hide the help information.
- halos: A sub-layer containing a couple of MovieClip objects that appear as glowing halos around the currently selected ComboBox object. This provides the user with a visual cue as to which list of buildings is currently selected.

The “bldgs_info” layer contains a folder with two sub-layers. These sub-layers contain the objects which display information about the currently selected building. There
is also a tab button which the user can select to view the route map and corresponding
text directions for a particular route once a beginning and ending location is selected.

- **tabs**: This sub-layer contains objects for the user to interact with to view the starting
  and ending buildings' accessibility information as well as the route map and text for
  any two selected buildings (Appendix F Figure 4). Within this sub-layer are found the
  following objects:

  - An unnamed grouped graphic object that creates a border between the upper
    region’s interactive elements, the HSU logo, the map and the controls beneath.
    This helps the building accessibility information tabs to appear natural within
    the interface.

  - **tabStartOn_btn**: A custom object made to look like a highlighted tab, a
    common HTML interface graphic interactivity object found on many web
    pages. This object operates like a standard Button object. This particular
    object appears when a starting location building has been selected more
    recently than an ending location building and the Info region is currently
    visible.

  - **tabStartOff_btn**: A custom object that serves as a counterpart to
    **tabStartOn_btn**. This object appears when a building meant to be the ending
    point of a route is currently selected to show its accessibility information. It
    creates the appearance that the tab is not currently selected and is obscured in
a shadow. Clicking on this object causes this object to hide and makes

`tabStartOn_btn` visible as well as the accessibility information of the starting
building, but only if a starting building has been selected from the drop-down
menus at the bottom of the screen. If no starting location has been selected by
the user neither this object nor `tabStartOn_btn` are visible.

- `tabEndOn_btn`: A custom object made to look like a highlighted tab, a
  common HTML interface graphic interactivity object found on many web
  pages. This object operates like a standard Button object. This particular
  object appears when the building at the end of a route has been selected more
  recently than a starting location building and the Info region is visible.

- `tabEndOff_btn`: A custom object that serves as a counterpart to `tabEndOn_btn`. This object appears when the building to be the starting point of a route is currently selected and its accessibility information is visible. It creates the appearance that the tab is not currently selected and is obscured in a shadow. Clicking on this object causes this object to hide and makes `tabEndOn_btn` visible as well as the accessibility information of the building at the end of the route but only if an ending building has been selected from the drop-down menus at the bottom of the screen. If no ending location has been selected by the user neither this object nor the `tabEndOn_btn` are visible.
- tabPathOn_btn: This custom object appears only when the user has clicked on the tabPathOff_btn. It indicates that the accessible path information for the currently selected starting and ending locations is visible.

- tabPathOff_btn. This custom object appears only if the user has selected a starting and ending location and is currently looking at the accessibility information for either the starting or ending location. Clicking on this object hides itself and reveals the accessible path information for the currently selected starting and ending location, as well as tabPathOn_btn.

- bldg_info: This sub-layer contains objects used to display information about whichever building is currently selected (Appendix F Figures 4 and 5): The starting location, the ending location or the path between them. Within this sub-layer are a couple of objects:
  - placeNameUpper_txt is a Dynamic Text object used to display the name of the current information being displayed.
  - placeInfo_ta is a TextArea object used to display the accessibility information for the currently selected building, which can be the starting location or the ending location.

Map: This layer contains a single folder. This folder contains a number of sub-folders with objects related to the proper display of the campus map as well and route maps (Appendix F Figure 2 Region A and Figure 5).
- RouteText is a sub-layer containing a single Dynamic Text object called routeText_txt. This object is populated with the contents of whichever text file corresponds to the route directions for the currently queried route.

- Mask is a sub-layer containing a single MovieClip object entitled myHitMask_mc. This layer has been specified as a mask layer. Consequently the object on this layer is used as a mask for all objects visible beneath this object. All objects on sub-layers within this sub-layer are only visible within the region of myHitMask_mc. Therefore myHitMask_mc limits the visibility of all objects on all sub-layers within this folder to the region defined by myHitMask_mc. This makes resizing the map with the zoom tool appear to be magnifying the map and not simply enlarging the graphic. All the remaining layers in this bulleted list are within this sub-layer.

- routeMap is a sub-layer that contains only one object. This object, called routeMap_ldr, is a Loader Object. When a specific route is requested by a user this object is populated with the corresponding SWF file containing the map of the route requested. The object is also resized to best fit the route map requested, based on the dimensions specified in “routes.xml.”

- hideAll is a sub-layer that contains only one object. This object, called curtain_mc, is a MovieClip object. This object is made visible, hiding everything beneath it, when a route is requested. This keeps the campus map from appearing beneath the currently selected route map.
map is a layer that contains only one object. This object, called mapFull_mc, contains the complete campus map and all its symbols (Appendix F Figure 2 Region A). Many of the elements on the campus map are specified as named objects making the campus map changeable due to user interactivity. The layers and objects within mapFull_mc are listed as part of Appendix J.

- building_names is a sub-layer containing a single MovieClip Object called buildingNamesInMap_mc. This Movies Clip is a group of all the Dynamic Text objects of building names within this map.
- field_names is a layer containing a single MovieClip called fieldNamesInMap_mc. This MovieClip contains a grouped collection of the Dynamic Text objects used to label the fields around campus.
- streetnames is a layer containing unnamed grouped text objects that label the names of the streets.
- elevators is a layer containing a single MovieClip object called elevatorsAllInMap_mc. This object is a group of MovieClip instances of the elevator_mc graphic object used as the map symbol for the location of elevators.
- autodoors is a layer containing a single MovieClip object called autodoorsAllInMap_mc. This object is a group of MovieClip instances of the
autodoorsInMap_mc graphic object used as the map symbol for the location of automatic doors.

- 12-tdd is a layer containing a single MovieClip object called tddAllInMap_mc. This object is a group of MovieClip instances of the tddinMap_mc graphic object used as the map symbol for the location of TDD accessible phones.

- 10-vans is a layer containing a single MovieClip object called vansAllInMap_mc. This object is a group of MovieClip instances of the vansInMap_mc graphic object used as the map symbol for the location of SDRC paratransit pickup and drop-off locations.

- 09-parking-a is a layer containing a single MovieClip object called parkAAllInMap_mc. This object is a group of MovieClip instances of the parkA_mc graphic object used as the map symbol for the location of accessible parking spaces.

- 16-parking-g is a layer containing a single MovieClip object called parkGAllInMap_mc. This object is a group of MovieClip instances of the parkGInMap_mc graphic object used as the map symbol for the location of general parking spaces.

- 15-parking-r is a layer containing a single MovieClip object called parkRAAllInMap_mc. This object is a group of MovieClip instances of the
parkRlnMap_mc graphic object used as the map symbol for the location of resident parking spaces.

- 16-parking-s is a layer containing a single MovieClip object called parkSAllInMap_mc. This object is a group of MovieClip instances of the parkSInMap_mc graphic object used as the map symbol for the location of staff parking spaces.

- 06-a-paths is a layer containing a collection of unnamed vector line Shape objects used as the map symbols for the location of accessible pathways.

- buildings is a layer containing a single MovieClip object called buildingsInMap_mc. This object is a group of 85 MovieClip objects. Each object represents a different building on campus. The buildings are named similarly to their associated text fields. For example, the MovieClip object representing Founders Hall is labeled founders-bldg_mc, an instance of foundersBldg_mc (See Appendix J for a list of all layers and object names).

- field_details is a layer containing all the vector line Shape objects making up the details on the fields (e.g., white lines detailing the baseball field)

- fields is a layer containing a single MovieClip object called fieldsInMap_mc. This object contains the MovieClip objects representing the fields on campus. These objects are named using the same convention as the text fields labeling
each field. For example, the object representing Redwood Bowl is called rbField_mc.

- 02-sidestreets is a layer containing the lines and polygonal vector Shape objects representing streets around campus.
- undefined area is a layer containing the polygonal vector Shape objects representing the green space between and surrounding the map objects.
- background is a layer containing the polygonal vector Shape objects creating the white regions representing roads, pathways and parking areas.

The “Layout” layer is a folder containing three sub-layers. These sub-layers contain the unnamed vector polygon Shape objects that make up the whitespace and background for the interface.

The “Hidden” layer contains a few unused objects. The purpose of the layer is a hidden space to test out objects before moving them to a visible layer.

3.2.5 ActionScript.

All objects, files, responses to user interaction, logical processing, and data retrieval take place through the ActionScript code stored in the Actions Frame on the “actions” layer. This code is provided in its entirety in Appendix J. The script was written using a mixture of procedural and object-oriented methods. Russavage’s education of
object oriented programming methodology largely began with studying ActionScript for HSU-IAM.

HSU-IAM’s ActionScript is mostly structured in a traditional procedural manner. First a set of comments are provided and a list of global variables are declared. After that the variables and graphical objects are initialized to the proper settings for first using the program. In addition, the buildings.xml file is loaded into HSU-IAM. The data in the XML file is used to populate the startPlace_cb and endPlace_cb ComboBox objects so the user can select a building as a starting and ending location. The routes.xml file is also loaded into the program in anticipation of a user query. Next a variety of Listener objects are created to monitor for user interactions and invoke the corresponding functions when a user interacts with an object that has a listener. Once all the necessary code objects have been created or loaded and initialized the program’s functionality is coded into a list of functions. Finally, a few commands are assigned to screen objects. Functions specific to the Listener objects are the last elements stored in the code. The code is further described below.

Pre-Code Comments and Global Variable Declarations: The initial comments primarily describe how most of the variables are used, as well as other notes the developer left for those that work on this program. The first variables to be declared store the furthest left and furthest right x-coordinate location values for the map zoom slider object. This slider only moves along the x-axis and is limited by the defined coordinates.
The next couple of variables store the position of the slider at the beginning and after it has been used. This allows the program to remember the appearance of the campus map when the user switches to view a route map instead of the campus map. A Boolean variable is used to track whether or not the zoom feature has been used. The map and scale’s initial width are stored in variables, as well as the map’s initial height. A variable called lastColor is used to remember the color of a building before its color is changed to highlight it. String variables store the names of the files containing route maps and text directions. These variables are used to load route information into objects like the routeText_lv LoadVars object. A Number variable called resizeRatio is used to keep track of how a route map should be resized to fit into the region provided by HSU-IAM. titleLineCount is used to reposition the text box that displays accessibility and route information depending on how much vertical space the title text occupies. altLegend is a Boolean variable that tracks whether or not the legend is currently visible. Several objects keep track of which building is currently selected as the starting and ending location, which of the two currently has focus, and which building had focus previously. The format of the text for the currently selected and previously selected buildings are also stored. All the data for the current and previously selected buildings are also stored in arrays. A variety of XML objects are used to load the data from the XML files into HSU-IAM. The last variables declared keep track of which info tabs are currently visible and/or selected, and whether or not the user is viewing a routes text and map.
Initializations: Before the code can really begin, many initializations must occur. Some interface elements need to be visible, while others must be hidden. And those elements which are visible and active must be set with initial states. Many of the non-visible objects need to their initial states to be specified.

Buttons: Initially, the help information and button (help_mc) are visible. The button for viewing a new route (newRoute_cbu) is not relevant and is not visible. Since the user is interacting with the program, and not printing the current view, the frame for the print region (printFrame_mc) is not visible.

Initially the only the map symbols shown are those considered most relevant to a person with a physical disability. TDD phones for people with hearing disabilities are not visible. General parking spots are not indicated. Neither Residential parking nor Staff parking icons are initially visible.

In addition, a halo is not shown around the Starting Location or the Ending Location ComboBox. This is because Neither ComboBox is currently selected by the user. The Info button is not visible, because no building has been selected. There is no information to show, so the frames and content delivery objects are hidden. There is no floor plan to show, so that button is hidden as well. A sample text object that can be found on the “hidden” layer (sample_txt) is used to provide an initial format style for text objects. The object that holds information (placeInfo_ta) is set to allow HTML formatted
text files. Visible text in this region is set to wrap onto the next line when the current line
space is fully occupied.

Next the Start Tab (tabStartOn_btn and tabStartOff_btn), End Tab (tabEndOn_btn
and tabEndOff_btn), and Path Tab (tabPathOn_btn and tabPathOff_btn) are set to
initially not be visible. This is because no buildings are selected initially so there is no
information to show nor tabs to select.

Finally, the XML objects are loaded and initialized. The white space within the
XML files is ignored. A small function is loaded once the XML files are loaded
successfully. These functions populates the ComboBox objects that the user interacts
with in order to select a starting and ending location. It also creates instances of the
classes used to store the data for the current item selected in the XML node. Initially the
first item in the XML file is visible. This item reads “Starting Location (@)” for the first
ComboBox (startPlace_cb) and “Ending Location (!)” for the second ComboBox
(endPlace_cb).

Listener Objects: Next, Listener objects are created as well as some functions
used to give these objects purpose. A Listener called showLegendListenerObject is
created. If the Legend button (showLegend_cbu) is clicked the state of the legend is
changed from visible to invisible, or vice-versa. A similar Listener is created for the Info
button (info_cbu) and the Help button (help_cbu). Another Listener is needed for the
Print button (mapPrint_cbu). This listener uses a map Frame to make the document fit
onto a landscape-oriented letter-size paper. The last button requiring a Listener is the New Route button. When a route map is visible and the user presses the “New Route” button this Listener resets most of the features on the map to its original state. But it also maintains the last selected starting and ending buildings.

Listener objects are also created for the starting and ending ComboBox objects. When the user moves the cursor over these objects a green halo surrounds the ComboBox. Once the user selects an item from either the starting ComboBox (startPlace_cb) or the ending ComboBox (endPlace_cb) a Listener is used to change the state of a number of objects. The appropriate tab is made visible and highlighted. The other tabs are made to appear de-selected (grayed out). The graphic and text objects corresponding to the building that has been selected become highlighted. Information is displayed about the currently selected building.

To make HSU-IAM works entirely based on keyboard input a keyListener object is created to react when certain keys have been selected. If the “move map” radio button has been selected then the arrow keys move the map up, down, left and right. A different key corresponds to a mouse-driven interaction (e.g., clicking on a button or dragging the map). Of course pressing these keyboard keys only elicits a response if the button is enabled. Similar keyboard shortcuts exist for switching between each of the tabs. A keyboard shortcut for changing the visibility of each item in the legend is also created. These shortcuts do not require the legend to be visible for the state of the map symbol to
be altered. Finally, the map is enlarged or shrunk if the user clicks on the plus or minus keys. For every key representing a letter identical code must be created for the equivalent of the upper-case and lower-case version of the letter. All of these potential reactions to key presses are stored in a single Listener (keyListener).

A simple function is used to place the text for a route into the proper object (placeInfo_ta) once route text has fully loaded into the system. This only occurs after the Route tab has been selected.

Tab functionality is next in the code. When the user moves the cursor over one of the tabs the cursor changes from an arrow into a pointing hand. This visually indicates that these tabs can be pressed. When any of the tabs is pressed it appears “selected” and the other tabs appear “de-selected.” The appropriate information is loaded into placeInfo_ta. For the starting and ending location this invokes a function that places the appropriate text depending on the data provided by the XML file. The route tab requires extra logic in order to provide the right response. When the Route button is pressed the floor plan button is disabled since no single building is currently selected. A string (route_str) generates a title for the route information being displayed based on the name of the starting location (currentStartXMLNode.attributes.abbreviation) and the ending location (currentEndXMLNode.attributes.abbreviation). Next a While Loop is created to search the array storing all the routes data (routesArray). When the array reaches an item whose name is the same as the starting location and the ending location name
abbreviations concatenated with a hyphen in the middle the While Loop is ended. For example, if the starting location selected is Founders Hall and the ending location selected is the Natural Resources building the While Loop searches until it finds a route XML data node with the name “founders-nr.” Once this entry has been found the accessibility Boolean is examined. If this Boolean is “1” it means that there are accessible route map and text objects to display. When this happens the campus map (mapFull_mc) is hidden. The object that displays the route map (routeMap_ldr) is made visible. Next a resize ratio is determined. It is determined whether the route map’s height or width is closer to the edge of the frame of routeMap_ldr. Whichever value is smaller, the space between the route map’s height and the top of the Loader object or the route map’s width and the side of the Loader object, that value is used to determine the resize ratio for the route map to fit into the Loader. The map scale and the route map itself are resized according to this number (resizeRatio). Next the appropriate text file is loaded into the text loader object (routeText_lv). The ComboBoxes are hidden, as is the legend. The New Route Button is made visible. If there is no accessible route between the two buildings there is further detail that must be provided. A separate function (showRoute) is called, giving more information about the connection between the starting and ending locations. This function will be described later in this chapter.

Functions: A number of functions are used to complete the functionality of HSU-IAM. A function (parseFor) is used for parsing the array storing the names of the
buildings (currentCBAArray) to determine the position of the building currently selected by the user.

A function called hideAttributes sets all of the information display regions to not be visible. This includes the place Name text space, the buttons related to building information, and all of the tabs. Conversely, the function showAttributes reveals the information which the user most recently queried through the interface. The showAttributes function is more complicated than the hideAttributes function because it needs to access the last known information displayed. The size of the title of the information must be determined so the rest of the text can be positioned appropriately beneath the title. Next a series of If Statements are used to generate text telling the user about the accessibility features of each object. The data for the building selected is queried from the XML file. Based on this information the user is told whether or not there are automatic doors, elevators, TDD phones, SDRC paratransit pickup/drop-off locations, as well as which types of parking are nearby. In addition whichever building was last selected must be returned to its original appearance, and the currently selected building’s object and text must be highlighted by altering the color of the building and the size of the text.

Next a function called showRoute is defined. This function provides information about any route available between two buildings that do not have an accessible sidewalk-based route between them. The title is generated first. Then all the different scenarios for
alternate accessible routes are examined and the appropriate message is served. If the user selected the same location as both the starting and the ending location a special message is generated stating this. Other special circumstances include: If both buildings are off campus or inaccessible the user is notified. If both buildings are accessible to each other but no map or text has been generated the user is told generically that there is an accessible route between these two buildings. Next if buildings are on different accessible route networks and these networks are connected through a building the user is notified of this connection. If accessible parking spaces are available at both locations the user is notified of this. Otherwise, if there is an SDRC paratransit pickup / drop-off location near both the starting and the ending location the user is notified that this is a potential means for going from one building to the other. Finally, if there is no accessibility between the starting and ending location the user is informed. Text and object formatting are also tracked in this function

Commands and Final Listener Objects: A couple of commands are specified. One specifies that an object named myHitMask_mc is the mask for the map. Thus no part of the map graphic outside of this mask is visible. In addition accessibility features are enabled for the legend items. The legend’s other listener objects are specified here as well. A single Listener object (checkBoxListenerObject) listens to all the CheckBox objects within the legend. If the user clicks on any of these objects the appropriate map symbol are either shown or hidden.
The Listener object for the radio button specifying the movability of the map is declared next. The movement of the map is limited so the map can never be dragged entirely beyond visibility. Finally a listener object is created for the map zoom slider (sliderZoom_mc). If the object is moved to the right the map is enlarged. If the object is moved to the right the map is shrunk.
CHAPTER 4.
RESULTS AND DISCUSSION

4.1 Results

HSU-IAM’s primary functionality and the majority of all necessary data sets are complete as of April 2010. Appendix F shows screenshots of the program’s interface. Appendix G provides a list of all maps and route text data that have been developed. Appendix J shows the code that makes the program function. A user can access all accessibility information about any building on campus. The locations of all accessibility features on campus are clearly indicated in HSU-IAM, including accessible paths, doors, elevators, TDD phones, paratransit pickup / dropoff locations, and all forms of parking (accessible, general, residential, and staff parking). The campus map can be zoomed in and out and moved to display any location on campus at close proximity. Selecting any building from the drop-down menus reveals the accessibility details of that building. This includes the architectural schematics for every building, as well as whether or not there are within the building one or more accessible entrances, elevators, TDD phones, and nearby paratransit pickup / dropoff and parking. Selecting a starting and ending location on campus can provide the route text directions and map of the path between two buildings for routes where all the data has been completed and the program’s functionality for this route has been verified.
HSU-IAM recognizes 94 buildings on campus. This creates potentially 8,836 potential routes. Subtracting the 94 redundant routes (e.g., From Library to Library) and the 7,175 potential routes that are not accessible due to one of the buildings not being on an accessible path or no accessible path existing between two buildings, this leaves 1,567 route maps and text files that need to be generated for full functionality of HSU-IAM. A route map or text file has been created for 841 of these routes. Both a route map and text file have been created for 736 routes. 726 routes have no information created. An additional 29 routes have only a route or text map, but not both. 76 routes are fully working within HSU-IAM, meaning there are 660 routes in which all data have been generated but coding elements need to be reviewed and completed for the route information to appear in HSU-IAM. This information is tabulated and summarized in Appendix G. In addition all building accessibility information has been compiled into an XML file. That data is in Appendix J.

4.2 Conclusions

As of April 2010, HSU-IAM has not been completed to the point of public release. However, the completion of the project is not necessary for the project to have value. Creating HSU-IAM has resulted in the development of information and documentation necessary to understand HSU’s complicated accessibility. This work could be the foundation of future efforts to inform people with disabilities at HSU about
the accessibility of the campus. With this understanding and the GIS work that has been developed in conjunction with this project, there is a long term potential for this project to be re-developed into something more readily completed, modified and sustained. The decisions that resulted in HSU-IAM were sufficient for developing this project, understanding the complexities of the issue, and building a set of data useful for future efforts. The up-front costs in time and money were rather small when compared to the potential cost of completing the project using other means.

4.2.1 Cost, Time and Results.

The project has thus far cost $5043.15. This represents 408 hours worth of labor (See Appendix A for project descriptions), though many more hours (estimated as approximately twice as many hours in total) were required to perform the work than were funded in the original contracts. This extra time was spent on meetings, independent or directed studies, as well as data and document development. In addition, Russavage also donated countless undocumented hours knowing that he benefited in a number of ways from completing the work.

While the project has not ultimately resulted in the initially discussed desired outcome, the process has been valuable in many ways. The project is nearly complete, but is not ready to be posted to the web for the following reasons:

- The map needs to be modified to represent recent changes to campus.
• Buildings need to be added to and removed from the database
• Hundreds of maps and route texts need to be created in order for all possible user route queries to return the proper results.
• The program needs to be thoroughly beta-tested, improved and verified to the satisfaction of SDRC and Facilities Management.

The research, data and documents developed for HSU-IAM contribute to understanding the campus’ unique accessibility challenges. The XML data files containing building accessibility information and route data are standard data files ready to be used in other applications, such as a GIS product. Other files and documents discuss the networks of buildings on campus, making it clear which buildings are currently connected to which other buildings. These data may need some updating, but they could provide a foundation for any similar project at HSU. The presentations developed for this project can be used to help others understand how the program works. They can also be used to help train people to beta-test and modify the program, or to better understand the campus and the challenges faced by people with physical disabilities at HSU. There are also documents outlining where errors have been noted as well as potential additional features. Appendices K and L include these documents. This thesis and its appendices could potentially serve as a training manual for anyone trying to understand HSU-IAM in order to complete the work, modify it, or build a similar project.
In addition, the GIS analyses performed have potentially laid the foundation for a GIS based version of HSU-IAM. The slope analysis of the campus’ pathways could be the basis for a raster analysis in a GIS model. The GIS model could have multiple parameters such as starting location, ending location, which map symbols to display, maximum slope, stair-capable, accessible parking, general parking and SDRC van pickup/drop-off. Running the model could result in a map displaying the best pedestrian route between the two buildings based on how the user sets the parameters for his or her specific needs.

A project to find the best route using route parameters and GIS has been proposed by the creator of HSU-IAM for a Raster GIS Modeling Techniques Seminar. The proposal for this new method is in Appendix M. The proposal provides a more thorough description of this raster analysis project.

Russavage believes that the results of the GIS project may be potentially ported to an Internet application. This might have numerous benefits. Performing the route analysis using GIS and campus data would allow for relatively simple changes to the map without affecting route analysis. This should substantially reduce what has become the primary barrier to adoption of HSU-IAM, the need to fully test the program before releasing it to the public. If the underlying data are considered satisfactory, and the process by which the data are manipulated is generally accepted as resulting in adequate solutions, the routes do not need to be verified as thoroughly. In addition, the challenge of sorting out
the affects of changes to the campus layout is left to the GIS software and algorithms. Completing the GIS version of HSU-IAM would not require starting from scratch. Creating a model using the GIS layers that were created for HSU-IAM’s GIS analysis appears to be a natural extension of these datasets.

4.2.2 Short-term Value.

In the short term, this thesis assists in passing on the information necessary to finish the project with some additional funding and effort. In addition, it may not be long before a GIS version of HSU-IAM is ready to be published online. This case study is a thoroughly documented and analyzed example of a project that could be implemented anywhere campuses with route accessibility challenges exist.

4.2.3 Long-term Potential.

The long term potential of the results includes possible proliferation of accessibility maps for people with disabilities to use to navigate around areas with confusing route accessibility. If the GIS version of HSU-IAM is successful then it may be possible to convert the GIS based project into something that functions in Google Maps. If the project works in Google Maps and is duplicated elsewhere these projects could be connected via paratransit routes and roads. This could be the beginning of a comprehensive system of freely available accessibility mobility tools available on the World Wide Web. Over the long term it may be as easy for a person with a physical
disability to plan a trip using Google Maps as it is for any other person. This would be in the spirit of the Americans with Disabilities Act and consistent with current disability research and academic thinking.
REFERENCES


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http://www.hud.gov/offices/fheo/progdesc/title8.cfm


http://www.fta.dot.gov/funding/grants/grants_financing_7184.html


APPENDIX A.

HSU-IAM PROJECT PROPOSALS

HSU Interactive Accessibility Map

Objective
The nature of the HSU campus geography proves difficult for many with mobility limitations to navigate. Although a version of an access map exists, it does not guide the use to a more comprehensive, suggested path of travel. In other words, users unfamiliar with the campus terrain and paths of travel may have to rely on their own ingenuity to navigate an accessible route.

A student worker, with the direction of faculty and staff, will design and help to implement an interactive access map that will supplement and provide additional and more comprehensive access information to existing sources of information. The initial phase of this mapping process will include designating the current SDRC Trans/Van/Electric cart pick-up and drop-off locations as key reference points (currently there are nearly 50 designated SDRC pickup and drop-off points). This may should be accessible and printable from the HSU website and provide the user with an accessible route from the initial reference points to a destination point of choice. The accessible route products might include left/right turn instructions, distance, slope, existing stairwell, ramp, and elevator information, and automatic door operators sites. Additional phases might include other reference points such as all campus parking lots with corresponding ADA stalls, routes to the designated campus Emergency Assembly Points (EAPS), Emergency Blue Light Phones, and routes from Telecommunication Devices for the Deaf (TTD) phone locations.

Contacts:
Students: Joseph Russavage, jar74@humboldt.edu
Kosmos: Mary Beth Cunha, Geography, mbc7001@humboldt.edu
Client: Ralph McFarland, Director, HSU Student Disabilities Resource Center, rlm/001@humboldt.edu

Budget Estimate

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* Student hourly wage up to (and equal to) $10.50 requires additional 8% for benefits, 
  @ > $10.50, requires 15% additional for benefits.
HSU Interactive Accessibility Map

Objective

HSU’s interactive accessibility map is nearly complete. However, the final critical details remain to be completed. The reason for this is due to the size of the final task: route maps for every potential route on campus must be created. There are roughly 1000 routes that need to be created. Given 12 minutes per map, this process will take roughly 200 hours to complete.

After this task is complete, the tool will be ready for beta testing and formative evaluation. The interface will be cleaned and simplified for maximum usability.

Contacts

Students: Joseph Russavage, jmr74@humboldt.edu
Kosmos: Mary Beth Oihna, Geography, mbc7001@humboldt.edu
Client: Ward Newmeyer, Director, HSU SDRc, wn10@humboldt.edu

Budget Estimate

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* Student hourly wage up to (and equal to) $10.50 requires additional 8% for benefits, over $10.50, requires 15% additional for benefits.
APPENDIX B.

ORIGINAL STATIC ACCESSIBILITY MAP
APPENDIX C.

GOVERNMENT CODES PERTAINING TO HSU-IAM

Federal Codes

The Rehabilitation Act of 1973: Section 508
* Subpart A -- General
  o 1194.1 Purpose.
  o 1194.2 Application.
  o 1194.3 General exceptions.
  o 1194.4 Definitions.
  o 1194.5 Equivalent facilitation.
* Subpart B -- Technical Standards
  o 1194.21 Software applications and operating systems.
  o 1194.22 Web-based intranet and Internet information and applications. 16 rules.
  o 1194.23 Telecommunications products.
  o 1194.24 Video and multimedia products.
  o 1194.25 Self contained, closed products.
  o 1194.26 Desktop and portable computers.
* Subpart C -- Functional Performance Criteria
  o 1194.31 Functional performance criteria.
* Subpart D -- Information, Documentation, and Support
  o 1194.41 Information, documentation, and support.

* Figures to Part 1194

Authority: 29 U.S.C. 794d.

Subpart A -- General

§ 1194.1 Purpose.

The purpose of this part is to implement section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d). Section 508 requires that when Federal agencies
develop, procure, maintain, or use electronic and information technology, Federal employees with disabilities have access to and use of information and data that is comparable to the access and use by Federal employees who are not individuals with disabilities, unless an undue burden would be imposed on the agency. Section 508 also requires that individuals with disabilities, who are members of the public seeking information or services from a Federal agency, have access to and use of information and data that is comparable to that provided to the public who are not individuals with disabilities, unless an undue burden would be imposed on the agency.

§ 1194.2 Application.

(a) Products covered by this part shall comply with all applicable provisions of this part. When developing, procuring, maintaining, or using electronic and information technology, each agency shall ensure that the products comply with the applicable provisions of this part, unless an undue burden would be imposed on the agency.

(1) When compliance with the provisions of this part imposes an undue burden, agencies shall provide individuals with disabilities with the information and data involved by an alternative means of access that allows the individual to use the information and data.

(2) When procuring a product, if an agency determines that compliance with any provision of this part imposes an undue burden, the documentation by the agency supporting the procurement shall explain why, and to what extent, compliance with each such provision creates an undue burden.

(b) When procuring a product, each agency shall procure products which comply with the provisions in this part when such products are available in the commercial marketplace or when such products are developed in response to a Government solicitation. Agencies cannot claim a product as a whole is not commercially available because no product in the marketplace meets all the standards. If products are commercially available that meet some but not all of the standards, the agency must procure the product that best meets the standards.

(c) Except as provided by §1194.3(b), this part applies to electronic and information technology developed, procured, maintained, or used by agencies directly or used by a contractor under a contract with an agency which requires the use of such product, or requires the use, to a significant extent, of such product in the performance of a service or the furnishing of a product.
§ 1194.3 General exceptions.

(a) This part does not apply to any electronic and information technology operated by agencies, the function, operation, or use of which involves intelligence activities, cryptologic activities related to national security, command and control of military forces, equipment that is an integral part of a weapon or weapons system, or systems which are critical to the direct fulfillment of military or intelligence missions. Systems which are critical to the direct fulfillment of military or intelligence missions do not include a system that is to be used for routine administrative and business applications (including payroll, finance, logistics, and personnel management applications).

(b) This part does not apply to electronic and information technology that is acquired by a contractor incidental to a contract.

(c) Except as required to comply with the provisions in this part, this part does not require the installation of specific accessibility-related software or the attachment of an assistive technology device at a workstation of a Federal employee who is not an individual with a disability.

(d) When agencies provide access to the public to information or data through electronic and information technology, agencies are not required to make products owned by the agency available for access and use by individuals with disabilities at a location other than that where the electronic and information technology is provided to the public, or to purchase products for access and use by individuals with disabilities at a location other than that where the electronic and information technology is provided to the public.

(e) This part shall not be construed to require a fundamental alteration in the nature of a product or its components.

(f) Products located in spaces frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment are not required to comply with this part.

§ 1194.4 Definitions.

The following definitions apply to this part:
Agency. Any Federal department or agency, including the United States Postal Service.

Alternate formats. Alternate formats usable by people with disabilities may include, but are not limited to, Braille, ASCII text, large print, recorded audio, and electronic formats that comply with this part.

Alternate methods. Different means of providing information, including product documentation, to people with disabilities. Alternate methods may include, but are not limited to, voice, fax, relay service, TTY, Internet posting, captioning, text-to-speech synthesis, and audio description.

Assistive technology. Any item, piece of equipment, or system, whether acquired commercially, modified, or customized, that is commonly used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Electronic and information technology. Includes information technology and any equipment or interconnected system or subsystem of equipment, that is used in the creation, conversion, or duplication of data or information. The term electronic and information technology includes, but is not limited to, telecommunications products (such as telephones), information kiosks and transaction machines, World Wide Web sites, multimedia, and office equipment such as copiers and fax machines. The term does not include any equipment that contains embedded information technology that is used as an integral part of the product, but the principal function of which is not the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. For example, HVAC (heating, ventilation, and air conditioning) equipment such as thermostats or temperature control devices, and medical equipment where information technology is integral to its operation, are not information technology.

Information technology. Any equipment or interconnected system or subsystem of equipment, that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. The term information technology includes computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources.
Operable controls. A component of a product that requires physical contact for normal operation. Operable controls include, but are not limited to, mechanically operated controls, input and output trays, card slots, keyboards, or keypads.

Product. Electronic and information technology.

Self Contained, Closed Products. Products that generally have embedded software and are commonly designed in such a fashion that a user cannot easily attach or install assistive technology. These products include, but are not limited to, information kiosks and information transaction machines, copiers, printers, calculators, fax machines, and other similar types of products.

Telecommunications. The transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received.

TTY. An abbreviation for teletypewriter. Machinery or equipment that employs interactive text based communications through the transmission of coded signals across the telephone network. TTYs may include, for example, devices known as TDDs (telecommunication display devices or telecommunication devices for deaf persons) or computers with special modems. TTYs are also called text telephones.

Undue burden. Undue burden means significant difficulty or expense. In determining whether an action would result in an undue burden, an agency shall consider all agency resources available to the program or component for which the product is being developed, procured, maintained, or used.

§ 1194.5 Equivalent facilitation.

Nothing in this part is intended to prevent the use of designs or technologies as alternatives to those prescribed in this part provided they result in substantially equivalent or greater access to and use of a product for people with disabilities.

Subpart B -- Technical Standards

§ 1194.21 Software applications and operating systems.
(a) When software is designed to run on a system that has a keyboard, product functions shall be executable from a keyboard where the function itself or the result of performing a function can be discerned textually.

(b) Applications shall not disrupt or disable activated features of other products that are identified as accessibility features, where those features are developed and documented according to industry standards. Applications also shall not disrupt or disable activated features of any operating system that are identified as accessibility features where the application programming interface for those accessibility features has been documented by the manufacturer of the operating system and is available to the product developer.

(c) A well-defined on-screen indication of the current focus shall be provided that moves among interactive interface elements as the input focus changes. The focus shall be programmatically exposed so that assistive technology can track focus and focus changes.

(d) Sufficient information about a user interface element including the identity, operation and state of the element shall be available to assistive technology. When an image represents a program element, the information conveyed by the image must also be available in text.

(e) When bitmap images are used to identify controls, status indicators, or other programmatic elements, the meaning assigned to those images shall be consistent throughout an application's performance.

(f) Textual information shall be provided through operating system functions for displaying text. The minimum information that shall be made available is text content, text input caret location, and text attributes.

(g) Applications shall not override user selected contrast and color selections and other individual display attributes.

(h) When animation is displayed, the information shall be displayable in at least one non-animated presentation mode at the option of the user.

(i) Color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.
(j) When a product permits a user to adjust color and contrast settings, a variety of color selections capable of producing a range of contrast levels shall be provided.

(k) Software shall not use flashing or blinking text, objects, or other elements having a flash or blink frequency greater than 2 Hz and lower than 55 Hz.

(l) When electronic forms are used, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

§ 1194.22 Web-based intranet and Internet information and applications.

(a) A text equivalent for every non-text element shall be provided (e.g., via "alt," "longdesc," or in element content).

(b) Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.

(c) Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.

(d) Documents shall be organized so they are readable without requiring an associated style sheet.

(e) Redundant text links shall be provided for each active region of a server-side image map.

(f) Client-side image maps shall be provided instead of server-side image maps except where the regions cannot be defined with an available geometric shape.

(g) Row and column headers shall be identified for data tables.

(h) Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.

(i) Frames shall be titled with text that facilitates frame identification and navigation.
(j) Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.

(k) A text-only page, with equivalent information or functionality, shall be provided to make a web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.

(l) When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.

(m) When a web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with §1194.21(a) through (l).

(n) When electronic forms are designed to be completed on-line, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

(o) A method shall be provided that permits users to skip repetitive navigation links.

(p) When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.

Note to §1194.22:

1. The Board interprets paragraphs (a) through (k) of this section as consistent with the following priority 1 Checkpoints of the Web Content Accessibility Guidelines 1.0 (WCAG 1.0) (May 5, 1999) published by the Web Accessibility Initiative of the World Wide Web Consortium:

2. Paragraphs (l), (m), (n), (o), and (p) of this section are different from WCAG 1.0. Web pages that conform to WCAG 1.0, level A (i.e., all priority 1 checkpoints) must also meet paragraphs (l), (m), (n), (o), and (p) of this section to comply with this section. WCAG 1.0 is available at http://www.w3.org/TR/1999/WAI-WEBCONTENT-19990505.
Appendix A of ADA Title 3 codifies federal standards for accessible design. The Access Board created a document called "The Americans With Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; State and Local Government Facilities (ADAAG)." The Department of Justice "stated that it anticipated that it would amend its title II regulations to adopt ADAAG as the accessibility standards for State and local government facilities after the Access Board supplemented ADAAG. 56 FR 35694, 35711 (July 26, 1991)." ADAAG is the final authority on accessibility guidelines for Federal, State and local government facilities. The document even makes non-substantive editorial changes to the ADA Standards for Accessible Design. According to ADAAG (Federal Register Vol. 63, No. 8, Tuesday January 13, 1998, Rules and Regulations pp. 2030-2034)

Accessible sites require:

* Curbs:
  * 4.7.2 Slope. Slopes of curb ramps shall comply with 4.8.2. The slope shall be measured as shown in Fig. 11. Transitions from ramps to walks, gutters, or streets shall be flush and free of abrupt changes. Maximum slopes of adjoining gutters, road surface immediately adjacent to the curb ramp, or accessible route shall not exceed 1:20.
  * 4.7.3 Width. The minimum width of a curb ramp shall be 36 in (915 mm), exclusive of flared sides.
  * 4.7.5 Sides of Curb Ramps. If a curb ramp is located where pedestrians must walk across the ramp, or where it is not protected by handrails or guardrails, it shall have flared sides; the maximum slope of the flare shall be 1:10 (see Fig. 12(a)). Curb ramps with returned curbs may be used where pedestrians would not normally walk across the ramp (see Fig. 12(b)).
  * 4.7.6 Built-up Curb Ramps. Built-up curb ramps shall be located so that they do not project into vehicular traffic lanes (see Fig. 13).
  * 4.7.10 Diagonal Curb Ramps. If diagonal (or corner type) curb ramps have returned curbs or other well-defined edges, such edges shall be parallel to the direction of pedestrian flow. The bottom of diagonal curb ramps shall have 48 in (1220 mm) minimum clear space as shown in Fig. 15(c) and (d). If diagonal curb ramps are provided at marked crossings, the 48 in (1220 mm) clear space shall be within the markings (see Fig. 15(c) and (d)). If diagonal curb ramps have flared sides, they shall also have at least a 24 in (610 mm) long segment of straight curb located on each side of the curb ramp and within the marked crossing (see Fig. 15(c)).
  * 4.7.11 Islands. Any raised islands in crossings shall be cut through level with the street or have curb ramps at both sides and a level area at least 48 in (1220 mm) long between the curb ramps in the part of the island intersected by the crossings (see Fig. 15(a) and (b)).
* Doors:
  * 4.13.5 Clear Width. Doorways shall have a minimum clear opening of 32 in (815 mm) with the door open 90 degrees, measured between the face of the door and the opposite stop (see Fig. 24(a), (b), (c), and (d)). Openings more than 24 in (610 mm) in depth shall comply with 4.2.1 and 4.3.3 (see Fig. 24(e)).
  * EXCEPTION: Doors not requiring full user passage, such as shallow closets, may have the clear opening reduced to 20 in (510 mm) minimum.
  * 4.13.6 Maneuvering Clearances at Doors. Minimum maneuvering clearances at doors that are not automatic or power-assisted shall be as shown in Fig. 25. The floor or ground area within the required clearances shall be level and clear.
  * EXCEPTION: Entry doors to acute care hospital bedrooms for in-patients shall be exempted from the requirement for space at the latch side of the door (see dimension "x" in Fig. 25) if the door is at least 44 in (1120 mm) wide.
  * 4.13.7 Two Doors in Series. The minimum space between two hinged or pivoted doors in series shall be 48 in (1220 mm) plus the width of any door swinging into the space. Doors in series shall swing either in the same direction or away from the space between the doors (see Fig. 26).
  * 4.13.8 Thresholds at Doorways. Thresholds at doorways shall not exceed 3/4 in (19 mm) in height for exterior sliding doors or 1/2 in (13 mm) for other types of doors. Raised thresholds and floor level changes at accessible doorways shall be beveled with a slope no greater than 1:2 (see 4.5.2).
  * 4.13.10 Door Closers. If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 in (75 mm) from the latch, measured to the leading edge of the door.

* Floor Surfaces:
  * 4.5.2 Changes in Level. Changes in level up to 1/4 in (6 mm) may be vertical and without edge treatment (see Fig. 7(c)). Changes in level between 1/4 in and 1/2 in (6 mm and 13 mm) shall be beveled with a slope no greater than 1:2 (see Fig. 7(d)). Changes in level greater than 1/2 in (13 mm) shall be accomplished by means of a ramp that complies with 4.7 or 4.8.

* Handrails:
  * 4.8.5 Handrails. If a ramp run has a rise greater than 6 in (150 mm) or a horizontal projection greater than 72 in (1830 mm), then it shall have handrails on both sides. Handrails are not required on curb ramps or adjacent to seating in assembly areas. Handrails shall comply with 4.26 and shall have the following features:
    1. Handrails shall be provided along both sides of ramp segments. The inside handrail on switchback or dogleg ramps shall always be continuous.
2. If handrails are not continuous, they shall extend at least 12 in (305 mm) beyond the top and bottom of the ramp segment and shall be parallel with the floor or ground surface (see Fig. 17).
3. The clear space between the handrail and the wall shall be 1 - 1/2 in (38 mm).
4. Gripping surfaces shall be continuous.
5. Top of handrail gripping surfaces shall be mounted between 34 in and 38 in (865 mm and 965 mm) above ramp surfaces.
* Ramps:
  * 4.1.6.3.a.ii: A slope between 1:8 and 1:10 is allowed for a maximum rise of 3 in A slope steeper than 1:8 is not allowed
  * 4.1.6.3.a.i: A slope between 1:10 and 1:12 is allowed for a maximum rise of 6 in
  * 4.2.3.a Exception: A ramp with a slope no greater than 1:6 for a run not to exceed 2 ft may be used as part of an accessible route to an entrance.
  * 4.8.1*General. Any part of an accessible route with a slope greater than 1:20 shall be considered a ramp and shall comply with 4.8.
  * 4.8.2* Slope and Rise. The least possible slope shall be used for any ramp. The maximum slope of a ramp in new construction shall be 1:12. The maximum rise for any run shall be 30 in (760 mm) (see Fig. 16). Curb ramps and ramps to be constructed on existing sites or in existing buildings or facilities may have slopes and rises as allowed in 4.1.6(3)(a) if space limitations prohibit the use of a 1:12 slope or less.
  * 4.8.3 Clear Width. The minimum clear width of a ramp shall be 36 in (915 mm).
  * 4.8.4* Landings. Ramps shall have level landings at bottom and top of each ramp and each ramp run. Landings shall have the following features:
    1. The landing shall be at least as wide as the ramp run leading to it.
    2. The landing length shall be a minimum of 60 in (1525 mm) clear.
    3. If ramps change direction at landings, the minimum landing size shall be 60 in by 60 in (1525 mm by 1525 mm).
* Routes:
  * 4.3.3 Width. The minimum clear width of an accessible route shall be 36 in except at doors.
  * 4.3.4 Passing Space. If an accessible route has less than 60 in (1525 mm) clear width, then passing spaces at least 60 in by 60 in (1525 mm by 1525 mm) shall be located at reasonable intervals not to exceed 200 ft (61 m). A T-intersection of two corridors or walks is an acceptable passing place
  * 4.3.7 Slope. An accessible route with a running slope greater than 1:20 is a ramp and shall comply with 4.8. Nowhere shall the cross slope of an accessible route exceed 1:50
  * 4.3.8 Changes in Levels. Changes in levels along an accessible route shall comply with 4.5.2. If an accessible route has changes in level greater than 1/2 in (13 mm), then a
curb ramp, ramp, elevator, or platform lift (as permitted in 4.1.3 and 4.1.6) shall be provided that complies with 4.7, 4.8, 4.10, or 4.11, respectively. An accessible route does not include stairs, steps, or escalators. See definition of "egress, means of" in 3.5.

* Space and Reach Requirements:
  * 4.2.1: Wheelchair Passage Width. The minimum clear width for single wheelchair passage shall be 32 in at a point and 36 in continuously.

  * 4.2.2: Width for Wheelchair Passing. The minimum width for two wheelchairs to pass is 60 in.

  * 4.2.3: Wheelchair Turning Space. The space required for a wheelchair to make a 180-degree turn is a clear space of 60 in diameter or a T-shaped space.

  * 4.2.4.1: Size and Approach. The minimum floor or ground space required to accommodate a single, stationary wheelchair and occupant is 30 in by 48 in. The minimum clear floor or ground space for wheelchairs may be positioned for forward or parallel approach to an object.

  * 4.2.4.2: Relationship of Maneuvering Clearance to Wheelchair Spaces. One full unobstructed side of the clear floor or ground space for a wheelchair shall adjoin another wheelchair clear floor space. If a clear floor space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearances shall be provided.

  * 4.2.5: Forward Reach. In the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 48 in.

  * 4.2.6: Side Reach. If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach shall be 54 in and the low side reach shall be no less than 9 in above the floor.

* Stairs:
  * 4.9.2 Treads and Risers. On any given flight of stairs, all steps shall have uniform riser heights and uniform tread widths. Stair treads shall be no less than 11 in (280 mm) wide, measured from riser to riser (see Fig. 18(a)). Open risers are not permitted.

  * 4.9.3 Nosings. The undersides of nosings shall not be abrupt. The radius of curvature at the leading edge of the tread shall be no greater than 1/2 in (13 mm). Risers shall be sloped or the underside of the nosing shall have an angle not less than 60 degrees from the horizontal. Nosings shall project no more than 1-1/2 in (38 mm) (see Fig. 18).

* Other:
* 4.1.6.3.c.ii: In no case shall inside elevator car areas be smaller than 48 in by 48 in.
* 4.2.3.e: Displays and written information, documents, etc., should be located where they can be seen by a seated person. Exhibits and signage displayed horizontally should be no higher than 44 in. above the floor surface.
* 4.3.11.2 Size. Each area of rescue assistance shall provide at least two accessible areas each being not less than 30 inches by 48 inches (760 mm by 1220 mm). The area of rescue assistance shall not encroach on any required exit width. The total number of such 30-inch by 48-inch (760 mm by 1220 mm) areas per story shall be not less than one for every 200 persons of calculated occupant load served by the area of rescue assistance.

* EXCEPTION: The appropriate local authority may reduce the minimum number of 30-inch by 48-inch (760 mm by 1220 mm) areas to one for each area of rescue assistance on floors where the occupant load is less than 200.
* 4.3.11.3* Stairway Width. Each stairway adjacent to an area of rescue assistance shall have a minimum clear width of 48 inches between handrails.
* 4.4.1*General. Objects projecting from walls (for example, telephones) with their leading edges between 27 in and 80 in (685 mm and 2030 mm) above the finished floor shall protrude no more than 4 in (100 mm) into walks, halls, corridors, passageways, or aisles (see Fig. 8(a)). Objects mounted with their leading edges at or below 27 in (685 mm) above the finished floor may protrude any amount (see Fig. 8(a) and (b)). Free-standing objects mounted on posts or pylons may overhang 12 in (305 mm) maximum from 27 in to 80 in (685 mm to 2030 mm) above the ground or finished floor (see Fig. 8(c) and (d)). Protruding objects shall not reduce the clear width of an accessible route or maneuvering space (see Fig. 8(e)).
* 4.4.2 Head Room. Walks, halls, corridors, passageways, aisles, or other circulation spaces shall have 80 in (2030 mm) minimum clear head room (see Fig. 8(a)). If vertical clearance of an area adjoining an accessible route is reduced to less than 80 in (nominal dimension), a barrier to warn blind or visually-impaired persons shall be provided (see Fig. 8(c-1)).
* 4.6.6 Passenger Loading Zones. Passenger loading zones shall provide an access aisle at least 60 in (1525 mm) wide and 20 ft (240 in)(6100 mm) long adjacent and parallel to the vehicle pull-up space (see Fig. 10). If there are curbs between the access aisle and the vehicle pull-up space, then a curb ramp complying with 4.7 shall be provided. Vehicle standing spaces and access aisles shall be level with surface slopes not exceeding 1:50 (2%) in all directions.
* 4.8.6 Cross Slope and Surfaces. The cross slope of ramp surfaces shall be no greater than 1:50.
4.8.7 Edge Protection. Ramps and landings with drop-offs shall have curbs, walls, railings, or projecting surfaces that prevent people from slipping off the ramp. Curbs shall be a minimum of 2 in (50 mm) high (see Fig. 17).

California Building Codes contain the majority of accessibility specifications found in state law. California Building Code, Title 24, Part 2, Volume 1, Chapter 11A, B and C, and parts of Chapter 10, covers state regulations for accommodating people with physical and sensory disabilities. They are designed to meet the requirements set forth by ADA.

California Building Codes

CBC Â§ 1102B: Definition of Accessibility
CBC Â§ 1106B et. seq: Educational and library facilities must be accessible
CBC Â§ 1111B et seq: Some public living space must be accessible
CBC Â§ 1115B.4.1: Restrooms, drinking fountains and public telephones must be accessible
CBC Â§ 1116B et seq: Elevators must be able to accommodate wheelchairs. No more than 1/2" gap between elevator and floor.
CBC Â§ 1117B.1.2: Some water fountains must be accessible
CBC Â§ 1118B: Building floor space must allow for clear movement and maneuvering of wheelchairs
CBC Â§ 1127B et seq: Exterior routes of travel must be accessible
CBC Â§ 1128B: Pedestrian grade separations must be accessible
CBC Â§ 1129B et seq: Parking spaces and structures must be accessible
CBC Â§ 1130B: Passenger drop-offs must be accessible
CBC Â§ 1131B et seq: Loading zones must be accessible
CBC Â§ 1132B: Parking lots, rest areas and other public places must be accessible
CBC Â§ 1133B.1.1.1.1: Paths of travel must be accessible
CBC Â§ 1133B.2: Doors must be accessible
CBC Â§ 1133B.3: Corridors, hallways and exterior exit balconies must be accessible
CBC Â§ 1133B.4: Ramps must be accessible
CBC Â§ 1133B.5: Wheel guides must be accessible
CBC Â§ 1133B.6: Aisles must be accessible
CBC Â§ 1133B.7: Walks and sidewalks must be accessible
CBC Â§ 1133B.8.6: Building design should not cause problems for people with visual impairments
Health and Safety Codes
Health & Saf. Code Â§ 13011: Curbs and sidewalks must be accessible
Health & Saf. Code Â§ 19956.5: Curbs and sidewalks must be accessible

Government Codes
Gov. Code Â§ 4450: Curbs and sidewalks must be accessible
Gov. Code Â§ 4455.5: Elevators must be near public paths and include braille
Gov. Code Â§ 4460: Both sets of double doors must be kept unlocked during business hours.

Public Resources Codes
Pub.Resources Code Â§ 5070.5: It is California policy to increase accessibility to all scenic, natural, historic, and cultural resources. This includes walking trails, bikeways, horseback riding trails, public roads, boat docks, picnic areas, cross country ski-trails, and heritage corridors
Pub.Resources Code Â§ 5411: Some playground equipment should be accessible

Vehicle Codes
Veh. Code Â§ 22522: No parking within 3 feet of any designated sidewalk access ramp next to a crosswalk

California Legal Opinions

California Supreme Court Rulings
People ex rel. Deukmegian v. CHE, Inc. (1983): Food service and preparation areas must be accessible
Berkeley Center for Independent Living v. Coyle (1996): Some public living space must be accessible

Accessible Technology Initiative

The Accessible Technology Initiative is based on Section 508 of the Rehabilitation Act. Coded Memorandum AA-2007-04 "sets forth revised timelines and clarifies the tasks and deliverables associated with the implementation of the Accessible Technology Initiative." (CSU Office of the Chancellor Coded Memo AA-2007-04 by Gary W. Reichard) CSU has developed a number of Web Standards for the Accessible Technology Initiative. These standards are:
(a) A text equivalent for every non-text element shall be provided.

(b) Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.

(c) Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.

(d) Documents shall be organized so they are readable without requiring an associated style sheet.

(e) Redundant text links shall be provided for each active region of a server-side image map.

(f) Client-side image maps shall be provided instead of server-side image maps except where the regions cannot be defined with an available geometric shape.

(g) Row and column headers shall be identified for data tables.

(h) Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.

(i) Frames shall be titled with text that facilitates frame identification and navigation.

(j) Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hertz (cycles per second) and lower than 55 Hertz.

(k) A text-only page, with equivalent information or functionality, shall be provided to make a web site comply with the provisions of these standards, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.

(l) When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.
(m) When a web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with Â§ 1194.21(a) through (l).

(n) When electronic forms are designed to be completed on-line, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

(o) A method shall be provided that permits users to skip repetitive navigation links or very long lists of links.

(p) When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.
Outlined regions of the same color indicate buildings that are inaccessible to buildings of a different color.
APPENDIX E.

CAMPUS CAD AND ELEVATION DATA

Figure 1: Raw CAD .DWG Import
APPENDIX F.

HSU-IAM SCREENSHOTS AND DETAILS

Figure 1. HSU-IAM Preloader

Figure 2. HSU-IAM screenshot of initial state with outlines of major areas. A) Map Display Area. B) Information Display Area. C) Map Manipulation Area. D) Building Selector Drop-down Menus. E) Map Buttons
Figure 3: Legend View

Figure 4: Building Information View
Figure 5: Route Info View
## APPENDIX G.

**ROUTE MAPS AND TEXT DIRECTIONS WORK COMPLETED**

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| WLDF-SCIB.txt | ARTB-SCID.txt | CYPRES-SCIC.txt | FH-SH.txt | FR-UC.txt |
| WLDF-VMH.txt | ARTB-RBE.txt | CYPRES-SCIB.txt | FH-SUNSET.txt | FR-VMH.txt |
| WLDF-WFB.txt | ARTB-RAIB.txt | CYPRES-SCIC.txt | FH-SUNSET.txt | FR-VMH.txt |
| ARTA-ARTB.txt | ARTB- | CYPRES-SCID.txt | FH-UC.txt | FR-WFB.txt |
| ARTA-AC.txt | ARTB- | CYPRES-SCIE.txt | FH-WFB.txt | FR-WLF.txt |
| ARTA-FLDH.txt | ARTB-SCIC.txt | SUNSET.txt | FLDH-ARTA.txt | H36-H73.txt |
| ARTA-FC.txt | ARTB-SCID.txt | CYPRES-UC.txt | FLDH-CYPRES.txt | H36-H93.txt |
| ARTA-H71.txt | ARTB-SCIE.txt | CYPRES-VMH.txt | FLDH-FC.txt | H36-STO.txt |
| ARTA-H91.txt | ARTB-SH.txt | CYPRES-WFB.txt | FLDH-FR.txt | H36-UGS.txt |
| ARTA-H93.txt | ARTB-UC.txt | CYPRES- | FLDH-H71.txt | H37-H36.txt |
| ARTA-JGC.txt | ARTB-VMH.txt | WLD.txt | FLDH-JGC.txt | H37-H38.txt |
| ARTA-ARTB.txt | ARTB-WFB.txt | FC-ARTA.txt | FLDH-MUSA.txt | H37-H39.txt |
| ARTA-MUSA.txt | ARTB-WLD.txt | FC-ARTB.txt | FLDH-MUSB.txt | H37-STO.txt |
| ARTA-MUSB.txt | CDL-H81.txt | FC-CYPRES.txt | FLDH-NHW.txt | H37-UGS.txt |
| ARTA-NHE.txt | CDL-H83.txt | FC-FH.txt | FLDH-NR.txt | H38-H36.txt |
| ARTA-NHE.txt | CDL-H85.txt | FC-FR.txt | FLDH-SCIA.txt | H38-H37.txt |
| ARTA-NH.txt | CDL-H9G.txt | FC-H71.txt | FLDH-SH.txt | H38-H39.txt |
| ARTA-RBE.txt | CDL-SBS.txt | FC-H93.txt | FLDH-SUNSET.txt | H38-STO.txt |
| ARTA-RC.txt | CEDAR_FCOld.txt | FC-JGC.txt | FLDH-UC.txt | H38-UGS.txt |
| REDWO0.txt | CEDAR-FC.txt | FC-MUSA.txt | FLDH-VMH.txt | H39-H36.txt |
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| ARTA-SCIB.txt | CYPRES- | FC-NHW.txt | FR-CYPRES.txt | H39-STO.txt |
| ARTA-SCID.txt | ARTB.txt | FC-NR.txt | FR-FC.txt | H39-UGS.txt |
| ARTA-SCID.txt | CYPRES-FC.txt | FC-SH.txt | FR-FH.txt | H52-GH.txt |
| ARTA-FC.txt | CYPRES-FH.txt | FC-SUNSET.txt | FR-FLDH.txt | H54-H55.txt |
| ARTA-UC.txt | CYPRES-FLDH.txt | FC-UC.txt | FR-H71.txt | H54-H71.txt |
SCIE-SCIA.txt SUNSET-JGC.txt UGS-H37.txt WFB-RBW.txt
SCIE-SCIB.txt SUNSET-NHE.txt UGS-H38.txt WFB-SCIA.txt
SCIE-SCIC.txt SUNSET-NHW.txt UGS-H39.txt WFB-SCIB.txt
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SCIE-UC.txt SUNSET- VDT-LIBANX.txt WFB-SH.txt
SCIE-VMH.txt REDWOO.txt VMH-ARTA.txt WFB-SUNSET.txt
SCIE-WFB.txt SUNSET-SCIA.txt VMH-ARTB.txt WFB-UC.txt
SCIE-WLDF.txt SUNSET-SCIB.txt VMH-CYPRES.txt WFB-VMH.txt
SH-ARTA.txt SUNSET-SCIC.txt VMH-FR.txt WFB-WLDF.txt
SH-CYPRES.txt SUNSET-SCID.txt VMH-H71.txt WLDF-ARTA.txt
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SUNSET-H93.txt UC-WLDF.txt WFB-NR.txt
SUNSET-HC.txt UGS-H36.txt WFB-RBE.txt
Table of Route Completion Information: Rows indicate starting location. Columns indicate ending locations. Cells are populated with the following data:

- **M**: Route map file created
- **T**: Route text file created
- **W**: Route map and text appears when route is selected in HSU-IAM
- **Gray Block**: No accessible route exists
- **Black Block**: Not a potential route

<p>| Start | Alder | Ault | Artis | Col | Cedar | Chino | Cypres | Eva | FC | Fern | FT | FL | HGH | Jac | Juv | Laje | Lab | LBK | MDC | MDN | Min | Maple | MUS | MUSB | MCC | NKL | NLM | TLM |
|-------|-------|------|-------|-----|-------|-------|--------|-----|----|------|----|----|-----|-----|-----|-----|-----|-----|----|------|-----|-----|----|-----|-----|----|
| Alder |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Ault  |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Artis |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Col   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Cedar |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Chino |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Cypres|       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Eva   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| FC    |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Fern  |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| FT    |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| FL    |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| HGH   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Jac   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Juv   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Laje  |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Lab   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| LBK   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| MDC   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| MDN   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Min   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| Maple |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| MUS   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| MUSB  |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| MCC   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| NKL   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| NLM   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
| TLM   |       |      |       |     |       |       |        |     |    |      |    |    |     |     |     |     |     |     |   |      |     |     |   |     |     |   |
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Total cells: 8836
Black cells: 94
Gray cells: 7175
White cells: 1567
Empty white cells: 726
Cells containing map and/or text files: 841
Cells containing map and text files: 736
Routes working fully in HSU-IAM: 76
APPENDIX H.

2006 CAMPUS WAYFINDING PROJECT DESCRIPTION

Taken from article “HSU Projects in Progress: 2006 Wayfinding Project” in The Lumberjack, April 20, 2006

Accessible Signage & Campus Wayfinding

The 2006 Accessible Signage and Campus Wayfinding is actually two separate but related projects, funded by State General Obligation bonds. The $166,000 Campus ADA Wayfinding Project and the $400,000 Campus Signage Project were both funded as part of the Campus's 2005/2006 Minor Capital Outlay Program. An audit of campus accommodations for individuals with disabilities identified a lack of available wayfinding as a significant barrier to campus access by individuals with disabilities. This project will address that shortcoming by a variety of information sources. The biggest component of the program is a series of kiosks across the campus that provide a map of accessible paths of travel to all the buildings on campus. Additional signage will be provided in selected buildings on campus that serve as an access route for the larger campus. And finally, the Student Disability Resource Center will be working with the Geography Department to develop a web based map tool to provide greater levels of detail and information for individuals with disabilities. The Campus Signage Project will provide vehicular and pedestrian information signage across the campus to provide clearer and
more consistent wayfinding for our students and visitors. The Capital Outlay funds that are
being used for these projects are allocated from voter-approved Capital Outlay Bond funds,
and cannot be used for campus operations or instructional purposes. As with all signage on
campus, the design standards were established in 2005 by the Selbert Perkins
Design Group as part of Humboldt State's comprehensive signage standards.
Quiz Administered:

Instructions: “Interactive Map and Accessibility Routes Survey Beta Testing the Interactive Map and Considering Building / Route Accessibility By completing this survey you help our community to know itself. You are also helping the Interactive Accessibility Map get online so it can be available to all students. Thank you! For the first question please indicate what route you traveled (The 3 buildings you visited). The next section alternates between a likert scale questions (5-point scale indicating the enthusiasm of your response), and an open response for you to elaborate as much as you like.

For each 5-point scale question, please indicate 5 for the most positive response (i.e., everything went perfectly), and 1 for the least positive response (i.e., The route was impossible to traverse). For the open response questions, any thoughts, questions and comments are welcomed!”

Questions Asked:

1. What 3 buildings were on your route?

2. How easily did you find the starting and ending locations using the interactive map?
3. How useful was the information the interactive map provided about the buildings?

4. How useful was the route information?

5. How clear and useful was the route map?

6. Distance aside, how accessible were the paths that you traversed?

7. How well did the route map and text inform you of all necessary accessibility considerations for your trip?

8. How do you rate your overall experience using the interactive accessibility map to find your way around campus?

9. Please describe any other issues not addressed by this survey regarding problems with the software or inconsistencies between the information provided and your experience traveling the route.

10. Would you use this web application and/or recommend it to other people on campus?

11. Assuming it worked perfectly, why would / wouldn't you recommend the interactive map to other people on campus?

12. How could this be more useful to people at HSU?

13. Please rate how effective this activity was at helping you to understand ableism and campus accessibility

14. Please elaborate on the positive and negative aspects of this activity.
Scene 1
actions
  Frame 1
   Actions for Frame 1
   /****************************************GLOBAL VARIABLE & OBJECT DECLARATIONS-----------
   - numSliderFirstX: Stores initial X coordinate of the sliderZoom_mc
     (Y coordinate not pertinent because Y does not change - horizontal slider)
   - boolMapZoom: Stores whether or not map is currently set to be draggable
   - buildingsXML: XML objects created to store online XML data about the campus.
     - fieldsXML
     - parkingsXML
   - currentXML: One of the above 3 XML files copied into this variable for loadCurrent function
   - currentCBArray: Array used to load XML data into ComboBoxes
   - currentCBNode: Stores all the XML data about the place currently selected
   - floorplanThumb_mc: An empty MovieClip initially used to help initialize other variables (the Color objects)
     It will ultimately be used to store a thumbnail of the floorplan of the currently selected building
   - lastColor: A hex number of the original color of the currently selected map place
   - currentMapObject: A MovieClip that connects the XML reference to the currently selected map place's MovieClip
     - currentMapObject_color: A Color object for changing the color of the currently selected map place.
   - lastMapObject: These two variables are for reverting graphical property changes of selected buildings
     - lastMapObject_color: as the user selects different buildings.
   - lastTextObject_txt: An empty TextField object used to store original text properties of the currently selected map place
   - previousTextFormat: A TextFormat Object used to store the graphical properties of the Dynamic Text Field associated to the currently selected map place.
   - strongTextFormat: The TextFormat for a selected map place (CURRENTLY UNUSED)
SEE HACK IN SHOWATTRIBUTES FUNCTIONS

```javascript
var SliderXStart:Number = magnify_mc.sliderZoom_mc._x;
var SliderXEnd:Number = magnify_mc.sliderZoom_mc._x+80;
var LastZoom:Number = SliderXStart;
var NextZoom:Number = new Number();
var boolMapZoom:Boolean = false;
var OriginalScaleWidth:Number = mapScale_mc._width;
var OriginalMapWidth:Number = mapFull_mc._width;
var OriginalMapHeight:Number = mapFull_mc._height;
var lastColor:Number = (0xFFFFFF);
var route_str = new String();
var routeMap_str = new String();
var routeText_str = new String();
var routeText_lv:LoadVars = new LoadVars();
var resizeRatio:Number = new Number();
var titleLineCount:Number = new Number();
var altLegend:Boolean = false;
var currentMapObject:MovieClip = new MovieClip();
var lastMapObject:MovieClip = new MovieClip();
var lastStartMapObject:MovieClip = new MovieClip();
var lastEndMapObject:MovieClip = new MovieClip();
var lastMapObjectType:String = new String;
var lastStartMapObjectType:String = new String;
var lastEndMapObjectType:String = new String;
var currentTextObject_txt:TextField = new TextField();
var lastStartTextObject_txt:TextField = new TextField();
var lastEndTextObject_txt:TextField = new TextField();
var myTextFormat:TextFormat = sample_txt.getTextFormat();
var previousTextFormat:TextFormat = new TextFormat();
var previousStartTextFormat:TextFormat = new TextFormat();
var previousEndTextFormat:TextFormat = new TextFormat();
var currentCBArray:Array = new Array();
var currentStartCBArray:Array = new Array();
var currentEndCBArray:Array = new Array();
var currentEndXMLNode:XMLNode = new XMLNode();
var currentStartXMLNode:XMLNode = new XMLNode();
var currentXMLNode:XMLNode = new XMLNode();
var buildingsXML:XML = new XML();
var fieldsXML:XML = new XML();
var parkingsXML:XML = new XML();
var routesXML:XML = new XML();
var routesXMLNode:XMLNode = new XMLNode();
var routesArray:Array = new Array();
```

```javascript
tabStartEnabled = new Boolean();
tabEndEnabled = new Boolean();
```
tabStartReady = new Boolean();
tabEndReady = new Boolean();
infoShowing = new Boolean();
var showRouteCalled:Boolean = false;

------------------------
INITIALIZATIONS
------------------------

-----Initialize Floorplan Thumbnail Holder
legend_mc._visible = false;
altLegend_mc._visible = false;
curtain_mc._visible = false;
focus_cbu._visible = false;

-----Initialize Buttons
help_mc._visible = true;
newRoute_cbu._visible = false;

-----Initialize Visible Map Objects & Symbol Toggles
//Hide frame for nice print output until print time
printFrame_mc._visible = false;
//Initially hides TDDs and non-accessible parking
mapFull_mc.tddAllInMap_mc._visible = false;
legend_mc.tddCheckIcon_mc._visible = false;
legend_mc.tdd_ch.selected = false;
mapFull_mc.parkGAAllInMap_mc._visible = false;
legend_mc.parkGCheckIcon_mc._visible = false;
legend_mc.parkG_ch.selected = false;
mapFull_mc.parkRAAllInMap_mc._visible = false;
legend_mc.parkRCheckIcon_mc._visible = false;
legend_mc.parkR_ch.selected = false;
mapFull_mc.parkSAAllInMap_mc._visible = false;
legend_mc.parkSCheckIcon_mc._visible = false;
legend_mc.parkS_ch.selected = false;
panMap_rb.toggle = true;
startPlaceHalo_mc._visible = false;
startTypeHalo_mc._visible = false;
endPlaceHalo_mc._visible = false;
endTypeHalo_mc._visible = false;
info_cbu.enabled = false;
infoShowing = false;
placeFloorplanButton.enabled = false;
placeInfo_ta._visible = false;

-----Initialize Text Formats
lastTextObject_txt = sample_txt;
placeInfo_ta.html = true;
placeInfo_ta.wordWrap = true;
var my_fmt:TextFormat = dyn_txt.getTextFormat();

-----Initialize Tabs-----
//Initially hides all tabs
//Tabs: "Starting From..." "Ending At..." and "My Route" 3 x 2
("on" and "off") = 6 buttons total
//This could be cleaned up by setting the "off" object within the
"on" object for each...
currentTextObject._x = -999;
tabStartOn_btn._visible = false;
tabEndOn_btn._visible = false;
tabPathOn_btn._visible = false;
tabStartOff_btn._visible = false;
tabEndOff_btn._visible = false;
tabPathOff_btn._visible = false;
//-----Initialize XML-----
//Initially sets each XML object to ignore any spaces in whatever
file it reads
//and specifies the file to load
//3 files for 3 objects - buildings, fields and parking areas
//the last XML file "routes" is for info about the routes between
all buildings, fields and parking areas.
buildingsXML.ignoreWhite = true;
fieldsXML.ignoreWhite = true;
parkingsXML.ignoreWhite = true;
routesXML.ignoreWhite = true;
buildingsXML.load("XML/buildings.xml");
fieldsXML.load("XML/fields.xml");
parkingsXML.load("XML/parkings.xml");
routesXML.load("XML/routes.xml");
//-----Initialize ComboBoxes with Buildings XML File
buildingsXML.onLoad = function(success) {
    //Load Construct for first loaded XML object - buildings.xml
    //If the file was successfully loaded...
    //set all initial variables needed to load the "current places"
    if (success) {
        currentXMLNode = buildingsXML.cloneNode(true);
        currentCBArray = currentXMLNode.firstChild.childNodes;
        currentStartCBArray = currentCBArray;
        currentEndCBArray = currentCBArray;
        currentStartCBArray[0].attributes.name = "Starting Location (!)";
        currentEndCBArray[0].attributes.name = "Ending Location (@)";
        for (var i:Number = 0; i<currentStartCBArray.length; i++) {
            startPlace_cb.addItemAt(i, currentStartCBArray[i].attributes.name);
        }
        for (var i:Number = 0; i<currentEndCBArray.length; i++) {
endPlace_cb.addItemAt(i, currentEndCBArray[i].attributes.name);
}
tabStartEnabled = false;
tabEndEnabled = false;
tabStartReady = false;
tabEndReady = false;
}
}
routesXML.onLoad = function(success) {
    // If the file was successfully loaded...
    // set all initial variables needed to load the "current places"
    ComboBox
    if (success) {
        routesXMLNode = routesXML.cloneNode(true);
        routesArray = routesXMLNode.firstChild.childNodes;
        trace("array has "+routesArray.length+" items");
    } else {
        trace("Routes XML failed to load");
    }
    
    //---------------LISTENER OBJECTS---------------------
    //-----Button Listener Objects
    showLegendListenerObject = new Object();
    showLegendListenerObject.click = function(eventObject) {
        showLegend_cbu.setFocus();
        if (altLegend) {
            if (altLegend_mc._visible == false) {
                altLegend_mc._visible = true;
            } else {
                altLegend_mc._visible = false;
            }
        } else {
            if (legend_mc._visible == false) {
                legend_mc._visible = true;
            } else {
                legend_mc._visible = false;
            }
        }
    }
    showLegend_cbu.addEventListener("click", showLegendListenerObject);
    showInfoListenerObject = new Object();
    showInfoListenerObject.click = function(eventObject) {
        info_cbu.setFocus();
    trace("ShowInfo Called");
}
if (tabStartOff_btn._visible == false && tabEndOff_btn._visible == false) {
    if (tabStartEnabled) {
        tabStartOff_btn._visible = true;
    } else {
        tabStartOff_btn._visible = false;
    }
    if (tabEndEnabled) {
        tabEndOff_btn._visible = true;
    } else {
        tabEndOff_btn._visible = false;
    }
    if (tabStartEnabled && tabEndEnabled) {
        tabPathOff_btn._visible = true;
    } else {
        tabPathOff_btn._visible = false;
    }
    infoShowing = true;
} else {
    tabStartOff_btn._visible = false;
    tabEndOff_btn._visible = false;
    tabPathOff_btn._visible = false;
    tabStartOn_btn._visible = false;
    tabEndOn_btn._visible = false;
    tabPathOn_btn._visible = false;
    hideAttributes();
    infoShowing = false;
}

info_cbu.addEventListener("click", showInfoListenerObject);
helpListenerObject = new Object();
helpListenerObject.click = function(eventObject) {
    help_cbu.setFocus();
    if (help_mc._visible == true) {
        help_mc._visible = false;
    } else {
        help_mc._visible = true;
    }
}

help_cbu.addEventListener("click", helpListenerObject);
helpUIShowListenerObject = new Object();
helpUIShowListenerObject.click = function(eventObject) {
    helpUIShow_cbu.enabled = false;
    tabStartOn_btn._visible = false;
    tabStartOff_btn._visible = false;
    tabEndOn_btn._visible = false;
    tabEndOff_btn._visible = false;
    tabPathOn_btn._visible = false;
    tabPathOff_btn._visible = false;
    helpUIHide_cbu._visible = true;
    helpUI_mc._visible = true;
};
helpUIShow_cbu.addEventListener("click",
helpUIShowListenerObject);

helpInfoHideListe
listeners = new Object();
helpInfoHideListe
listeners.click = function(eventObject) {
    helpInfoShow_cbu.enabled = true;
    helpInfoHide_cbu._visible = false;
    helpInfo_mc._visible = false;
};

helpInfoHide_cbu.addEventListener("click",
helpInfoHideListe
listenersObject);

helpInfoShowListe
listeners = new Object();
helpInfoShowListe
listeners.click = function(eventObject) {
    helpInfoShow_cbu.enabled = false;
    helpInfoHide_cbu._visible = true;
    helpInfo_mc._visible = true;
};

helpInfoShow_cbu.addEventListener("click",
helpInfoShowListe
listenersObject);

mapPrintListener
Object = new Object();
mapPrintListenerObject.listen
click = function(eventObject) {
    mapPrint_cbu.setFocus();
    mapFrame_mc._height = mapFrame_mc._height+159;
    myHitMask_mc._visible = false;
    mapFrame_mc._x = 3.9;
    mapFrame_mc._y = 44.8;
    printFrame_mc._visible = true;
    var mapPrintJob:PrintJob = new PrintJob();
    var mapPrintResult:Boolean = mapPrintJob.start();
    if (mapPrintResult) {
        mapPrintJob.addPage(0, 0, 760, 0, 640);
        mapPrintJob.send();
        delete mapPrintJob;
        trace("Job Printed and deleted");
    }
    mapFrame_mc._height = mapFrame_mc._height-154;
    mapFrame_mc._x = 3.9;
    mapFrame_mc._y = 44.8;
    printFrame_mc._visible = false;
};

mapPrint_cbu.addEventListener("click", mapPrintListenerObject);

//----BUTTON FOR FINDING ANOTHER ROUTE
newRouteListenerObject = new Object();
newRouteListenerObject.click = function(eventObject) {
    // Show initial map objects...
    newRoute_cbu.setFocus();
    magnify_mc._visible = true;
    panMap_rb._visible = true;
startPlace_cb._visible = true;
startType_cb._visible = true;
endPlace_cb._visible = true;
endType_cb._visible = true;
mapFull_mc._visible = true;
mapScale_mc._width = OriginalScaleWidth;

// Hide this button and the route Map and Text, "raise the
curtain", use the normal Legend, and resize layout
routeMap_ldr._visible = false;
routeText_txt._visible = false;
newRoute_cbu._visible = false;
mapFrame_mc._height = 406;
curtain_mc._visible = false;
altLegend = false;

// Hide tabs
hideAttributes();

// Turn map building and text highlights off
switch (lastStartMapObjectType) {
    case "Buildings" :
        trace("Start Building Called");
        lastStartMapObject_color.setRGB(0xF2944E);
        break;
    case "Fields" :
        lastStartMapObject_color.setRGB(0xF3C384);
        break;
    case "Parkings" :
        lastStartMapObject_color.setRGB(0xFFFFFF);
        break;
}

switch (lastEndMapObjectType) {
    case "Buildings" :
        trace("End Building Called");
        lastEndMapObject_color.setRGB(0xF2944E);
        break;
    case "Fields" :
        lastEndMapObject_color.setRGB(0xF3C384);
        break;
    case "Parkings" :
        lastEndMapObject_color.setRGB(0xFFFFFF);
        break;
}

showRouteCalled = false;
lastStartTextObject_txt.setTextFormat(previousStartTextFormat);
lastEndTextObject_txt.setTextFormat(previousEndTextFormat);

newRoute_cbu.addEventListener("click", newRouteListenerObject);

//--XML / Menu Listener Objects
//Can we consolidate this function and the next by using one listener object for both ComboBoxes, changing "startPlace_cb" to "this", and adding a function to load either curentStartCBArray or currentEndCBArray?

/*
startTypeListenerObject = new Object();
startTypeListenerObject.focusIn = function(eventObject) {
    trace("StatPlace has focus");
    startTypeHalo_mc._visible = true;
}
startType_cb.addEventListener("focusIn", 
startTypeListenerObject);
startTypeListenerObject.focusOut = function(eventObject) {
    trace("StatPlace does not have focus");
    startPlaceListenerObject.change();
    startTypeHalo_mc._visible = false;
}
startType_cb.addEventListener("focusOut", 
startTypeListenerObject);
startTypeListenerObject.close = function(eventObject) {
    switch(startType_cb.selectedIndex) {
        case 1:
            currentXMLNode = buildingsXML.cloneNode(true);
            currentStartCBArray = currentXMLNode.firstChild.childNodes;
            var tempXMLNode:XMLNode = new XMLNode();
            var tempCBArray:Array = new Array();
            tempXMLNode = parkingsXML.cloneNode(true);
            tempCBArray = tempXMLNode.firstChild.childNodes;
            for (var i:Number = 1; i < tempCBArray.length; i++) {
                currentStartCBArray[currentStartCBArray.length] = tempCBArray[i];
            }
            tempXMLNode = fieldsXML.cloneNode(true);
            tempCBArray = tempXMLNode.firstChild.childNodes;
            for (var i:Number = 1; i < tempCBArray.length; i++) {
                currentStartCBArray[currentStartCBArray.length] = tempCBArray[i];
            }
            currentStartCBArray[0].attributes.name = "Select Place from List"
            currentCBArray = currentStartCBArray;
            break;
        case 2:
            currentXMLNode = buildingsXML.cloneNode(true);
            currentStartCBArray = currentXMLNode.firstChild.childNodes;
            currentCBArray = currentStartCBArray;
            break;
        case 3:
            currentXMLNode = buildingsXML.cloneNode(true);
            currentStartCBArray = currentXMLNode.firstChild.childNodes;
            break;
        default:
            currentXMLNode = buildingsXML.cloneNode(true);
            currentStartCBArray = currentXMLNode.firstChild.childNodes;
            break;
    }
*/
currentCBAArray = currentStartCBAArray;
parseFor("Administrative");
break;
case 4:
currentXMLNode = buildingsXML.cloneNode(true);
currentStartCBAArray = currentXMLNode.firstChild.childNodes;
currentCBAArray = currentStartCBAArray;
parseFor("Athletics");
break;
case 5:
currentXMLNode = buildingsXML.cloneNode(true);
currentStartCBAArray = currentXMLNode.firstChild.childNodes;
currentCBAArray = currentStartCBAArray;
parseFor("House");
break;
case 6:
currentXMLNode = buildingsXML.cloneNode(true);
currentStartCBAArray = currentXMLNode.firstChild.childNodes;
currentCBAArray = currentStartCBAArray;
parseFor("House");
var tempXMLNode:XMLNode = new XMLNode();
//add house numbers to names
for (var i:Number=1; i < currentCBAArray.length; i++) {
currentCBAArray[i].attributes.name =
currentCBAArray[i].attributes.abreviation + ": " +
currentStartCBAArray[i].attributes.name;
}
//sort the array
for (var i:Number = 2; i < currentCBAArray.length; ++i) {
if (currentCBAArray[i].attributes.abreviation < currentCBAArray[i-1].attributes.abreviation) {
    tempXMLNode = currentCBAArray[i-1];
currentCBAArray[i-1] = currentCBAArray[i];
currentCBAArray[i] = tempXMLNode;
i--;
}
}
break;
case 7:
currentXMLNode = buildingsXML.cloneNode(true);
currentStartCBAArray = currentXMLNode.firstChild.childNodes;
currentCBAArray = currentStartCBAArray;
parseFor("Learning");
break;
case 8:
currentXMLNode = buildingsXML.cloneNode(true);
currentStartCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentStartCBArray;
parseFor("Residential");
break;

case 9:
currentXMLNode = buildingsXML.cloneNode(true);
currentStartCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentStartCBArray;
parseFor("Services");
break;

case 10:
currentXMLNode = fieldsXML.cloneNode(true);
currentStartCBArray = currentXMLNode.firstChild.childNodes;
currentStartCBArray[0].attributes.name = "Select Field from List"
currentCBArray = currentStartCBArray;
break;

case 11:
currentXMLNode = parkingsXML.cloneNode(true);
currentStartCBArray = currentXMLNode.firstChild.childNodes;
currentStartCBArray[0].attributes.name = "Select Parking Area from List"
currentCBArray = currentStartCBArray;
break;

case 12:
currentXMLNode = buildingsXML.cloneNode(true);
currentStartCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentStartCBArray;
parseFor("Off Campus");
break;
}

// Add that new currentStartCBArray into startPlace_cb
currentStartCBArray = currentCBArray;
currentStartCBArray[0].attributes.name = "Starting Location (!)"
startPlace_cb.removeAll();
for (var i:Number = 0; i < currentStartCBArray.length; i++) {
startPlace_cb.addItemAt(i, currentStartCBArray[i].attributes.name);
}

startType_cb.addEventListener("close", startTypeListenerObject);
endTypeListenerObject = new Object();
endTypeListenerObject.focusIn = function(eventObject) {
trace("StatPlace has focus");
endTypeHalo_mc._visible = true;
}
endType_cb.addEventListener("focusIn", endTypeListenerObject);  
endTypeListenerObject.focusOut = function(eventObject) {  
  trace("StatPlace does not have focus");  
  endTypeHalo_mc._visible = false;  
};  
endType_cb.addEventListener("focusOut", endTypeListenerObject);  
endTypeListenerObject.close = function(eventObject) {  
  switch(endType_cb.selectedIndex) {  
    case 1:  
      currentXMLNode = buildingsXML.cloneNode(true);  
      currentEndCBArray = currentXMLNode.firstChild.childNodes;  
      var tempXMLNode:XMLNode = new XMLNode();  
      var tempCBArray:Array = new Array();  
      tempXMLNode = parkingsXML.cloneNode(true);  
      tempCBArray = tempXMLNode.firstChild.childNodes;  
      for (var i:.Number = 1; i < tempCBArray.length; i++) {  
        currentEndCBArray[currentEndCBArray.length] = tempCBArray[i];  
      }  
      tempXMLNode = fieldsXML.cloneNode(true);  
      tempCBArray = tempXMLNode.firstChild.childNodes;  
      for (var i:Number = 1; i < tempCBArray.length; i++) {  
        currentEndCBArray[currentEndCBArray.length] = tempCBArray[i];  
      }  
      currentEndCBArray[0].attributes.name = "Select Place from List";  
      currentCBArray = currentEndCBArray;  
      break;  
    case 2:  
      currentXMLNode = buildingsXML.cloneNode(true);  
      currentEndCBArray = currentXMLNode.firstChild.childNodes;  
      currentCBArray = currentEndCBArray;  
      break;  
    case 3:  
      currentXMLNode = buildingsXML.cloneNode(true);  
      currentEndCBArray = currentXMLNode.firstChild.childNodes;  
      currentCBArray = currentEndCBArray;  
      parseFor("Administrative");  
      break;  
    case 4:  
      currentXMLNode = buildingsXML.cloneNode(true);  
      currentEndCBArray = currentXMLNode.firstChild.childNodes;  
      currentCBArray = currentEndCBArray;  
      parseFor("Athletics");  
      break;  
    case 5:  
      currentXMLNode = buildingsXML.cloneNode(true);  
      currentEndCBArray = currentXMLNode.firstChild.childNodes;  
      currentCBArray = currentEndCBArray;  
      break;  
  }
parseFor("House");
break;
case 6:
currentXMLNode = buildingsXML.cloneNode(true);
currentEndCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentEndCBArray;
parseFor("House");
var tempXMLNode:XMLNode = new XMLNode();
//add house numbers to names
for (var i:Number=1; i < currentCBArray.length; i++) {
    currentCBArray[i].attributes.name =
currentCBArray[i].attributes.abreviation + ": " +
currentEndCBArray[i].attributes.name;
}
//sort the array
for (var i:Number = 2; i < currentCBArray.length; ++i) {
    if (currentCBArray[i].attributes.abreviation < currentCBArray[i-1].attributes.abreviation) {
        while (i > 1 && currentCBArray[i].attributes.abreviation <
currentCBArray[i-1].attributes.abreviation) {
            tempXMLNode = currentCBArray[i-1];
currentCBArray[i-1] = currentCBArray[i];
currentCBArray[i] = tempXMLNode;
i--;
}
}
break;
case 7:
currentXMLNode = buildingsXML.cloneNode(true);
currentEndCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentEndCBArray;
parseFor("Learning");
break;
case 8:
currentXMLNode = buildingsXML.cloneNode(true);
currentEndCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentEndCBArray;
parseFor("Residential");
break;
case 9:
currentXMLNode = buildingsXML.cloneNode(true);
currentEndCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentEndCBArray;
parseFor("Services");
break;
case 10:
currentXMLNode = fieldsXML.cloneNode(true);
currentEndCBArray = currentXMLNode.firstChild.childNodes;
currentEndCBArray[0].attributes.name = "Select Field from List"
currentCBArray = currentEndCBArray;
break;
case 11:
    currentXMLNode = parkingsXML.cloneNode(true);
currentEndCBArray = currentXMLNode.firstChild.childNodes;
currentEndCBArray[0].attributes.name = "Select Parking Area from List"
currentCBArray = currentEndCBArray;
break;
case 12:
    currentXMLNode = buildingsXML.cloneNode(true);
currentEndCBArray = currentXMLNode.firstChild.childNodes;
currentCBArray = currentEndCBArray;
parseFor("Off Campus");
break;
}
//Add that new currentEndCBArray into endPlace_cb
currentEndCBArray = currentCBArray;
currentEndCBArray[0].attributes.name = "Ending Location (@)"
endPlace_cb.removeAll();
for (var i:Number = 0; i < currentEndCBArray.length; i++) {
    endPlace_cb.addItemAt(i, currentEndCBArray[i].attributes.name);
}
endType_cb.addEventListener("close", endTypeListenerObject);
*/
startPlaceListenerObject = new Object();
startPlaceListenerObject.focusIn = function(eventObject) {
    trace("StatPlace has focus");
    // startPlaceHalo_mc._visible = true;
};
startPlace_cb.addEventListener("focusIn", startPlaceListenerObject);
startPlaceListenerObject.focusOut = function(eventObject) {
    trace("StatPlace does not have focus");
    startPlaceHalo_mc._visible = false;
};
startPlace_cb.addEventListener("focusOut", startPlaceListenerObject);
/*
startPlaceListenerObject.change = function(eventObject) {
    trace("Current Start index is "+startPlace_cb.selectedIndex);
currentStartXMLNode =
currentStartCBArray[startPlace_cb.selectedIndex];
currentXMLNode = currentStartXMLNode.cloneNode(true);
if (startPlace_cb.selectedIndex != 0) {
  tempFix_mc._visible = false;
tabStartEnabled = true;
  if (infoShowing) {
    tabStartOff_btn._visible = true;
    if (tabEndEnabled) {
      tabPathOff_btn._visible = true;
    }
  } else {
    info_cbu.enabled = true;
  }
tabStartOff_btn._visible = true;
tabEndOn_btn._visible = false;
tabPathOn_btn._visible = false;
  if (tabEndEnabled) {
    tabEndOff_btn._visible = true;
    tabPathOff_btn._visible = true;
  }
tabStartOn_btn._visible = true;
infoShowing = true;
help_mc._visible = false;
} else {
  tabStartOff_btn._visible = false;
tabPathOff_btn._visible = false;
tabStartOn_btn._visible = false;
tabPathOn_btn._visible = false;
tabStartEnabled = false;
  // hideAttributes();
  // infoShowing = false;
}
showAttributes();
};
startPlace_cb.addEventListener("change",
startPlaceListenerObject);
*/
startPlaceListenerObject.close = function(eventObject) {
  trace("Current Start index is "+startPlace_cb.selectedIndex);
currentStartXMLNode = currentStartCBArray[startPlace_cb.selectedIndex];
currentXMLNode = currentStartXMLNode.cloneNode(true);
if (startPlace_cb.selectedIndex != 0) {
  tempFix_mc._visible = false;
tabStartEnabled = true;
  if (infoShowing) {
    tabStartOff_btn._visible = true;
  } else {
    info_cbu.enabled = true;
  }
tabStartOff_btn._visible = true;
tabEndOn_btn._visible = false;
tabPathOn_btn._visible = false;
  if (tabEndEnabled) {
    tabEndOff_btn._visible = true;
    tabPathOff_btn._visible = true;
  } else {
    tabStartOff_btn._visible = false;
tabPathOff_btn._visible = false;
tabStartOn_btn._visible = false;
tabPathOn_btn._visible = false;
tabStartEnabled = false;
  // hideAttributes();
  // infoShowing = false;
}
showAttributes();
};
tabPathOff_btn._visible = true;
} else {
    info_cbu.enabled = true;
}

if (tabEndEnabled) {
    tabEndOff_btn._visible = true;
    tabPathOff_btn._visible = true;
}

infoShowing = true;
help_mc._visible = false;
else {
    tabStartOff_btn._visible = false;
    tabPathOff_btn._visible = false;
    tabStartOn_btn._visible = false;
    tabPathOn_btn._visible = false;
    tabStartEnabled = false;
    // hideAttributes();
    // infoShowing = false;
}

if (showRouteCalled) {
    switch (lastStartMapObjectType) {
    case "Buildings":
        trace("Start Building Called");
        lastStartMapObject_color.setRGB(0xF2944E);
        break;
    case "Fields":
        lastStartMapObject_color.setRGB(0xF3C384);
        break;
    case "Parkings":
        lastStartMapObject_color.setRGB(0xFFFFFF);
        break;
    }

    switch (lastEndMapObjectType) {
    case "Buildings":
        trace("End Building Called");
        lastEndMapObject_color.setRGB(0xF2944E);
        break;
    case "Fields":
        lastEndMapObject_color.setRGB(0xF3C384);
        break;
    case "Parkings":
        lastEndMapObject_color.setRGB(0xFFFFFF);
break;
}
showRouteCalled = false;
}
lastStartTextObject_txt.setTextFormat(previousStartTextFormat);
lastEndTextObject_txt.setTextFormat(previousEndTextFormat);
lastStartTextObject_txt = eval(currentStartXMLNode.attributes.maptext);
previousStartTextFormat = lastStartTextObject_txt.getTextFormat();
lastStartMapObject_color = new Color(eval(currentStartXMLNode.attributes.mapobject));
lastStartMapObjectType = currentStartXMLNode.attributes.type;
showRouteCalled = false;
showAttributes();
};
startPlace_cb.addEventListener("close",
startPlaceListenerObject);
endPlaceListenerObject = new Object();
endPlaceListenerObject.focusIn = function(eventObject) {
    trace("StatPlace has focus");
    endPlaceHalo_mc._visible = true;
};
endPlace_cb.addEventListener("focusIn", endPlaceListenerObject);
endPlaceListenerObject.focusOut = function(eventObject) {
    trace("StatPlace does not have focus");
    // endPlaceListenerObject.change();
    endPlaceHalo_mc._visible = false;
};
endPlace_cb.addEventListener("focusOut", endPlaceListenerObject);
/*endPlaceListenerObject.change = function(eventObject) {
    trace("Current End index is "+endPlace_cb.selectedIndex);
    currentEndXMLNode = currentEndCBArray[endPlace_cb.selectedIndex];
    currentXMLNode = currentEndXMLNode.cloneNode(true);
    if (endPlace_cb.selectedIndex != 0) {
        tabEndEnabled = true;
        if (infoShowing) {
            tabEndOff_btn._visible = true;
            if (tabStartEnabled) {
                tabPathOff_btn._visible = true;
            }
        } else {
            info_cbu.enabled = true;
        }
    }
    tabEndOff_btn._visible = true;
    tabStartOn_btn._visible = false;
*/
tabPathOn_btn._visible = false;
if (tabStartEnabled) {
    tabStartOff_btn._visible = true;
    tabPathOff_btn._visible = true;
}
tabEndOn_btn._visible = true;
infoShowing = true;
help_mc._visible = false;
} else {
    tabEndOff_btn._visible = false;
    tabPathOff_btn._visible = false;
    tabEndOn_btn._visible = false;
    tabPathOn_btn._visible = false;
    tabEndEnabled = false;
    // hideAttributes();
    // infoShowing = false;
}
lastEndTextObject_txt = eval(currentEndXMLNode.attributes.maptext);
previousEndTextFormat = lastEndTextObject_txt.getTextFormat();
showAttributes();
};
endPlace_cb.addEventListener("change", endPlaceListenerObject);
*/
endPlaceListenerObject.close = function(eventObject) {
    trace("Current End index is "+endPlace_cb.selectedIndex);
    currentEndXMLNode = currentEndCBAarray[endPlace_cb.selectedIndex];
currentXMLNode = currentEndXMLNode.cloneNode(true);
if (endPlace_cb.selectedIndex != 0) {
    tabEndEnabled = true;
    if (infoShowing) {
        tabEndOff_btn._visible = true;
        if (tabStartEnabled) {
            tabPathOff_btn._visible = true;
        }
    } else {
        info_cbu.enabled = true;
    }
    tabEndOff_btn._visible = true;
    tabStartOn_btn._visible = false;
    tabPathOn_btn._visible = false;
    if (tabStartEnabled) {
        tabStartOff_btn._visible = true;
        tabPathOff_btn._visible = true;
    }
    tabEndOn_btn._visible = true;
infoShowing = true;
help_mc._visible = false;
} else {
    tabEndOff_btn._visible = false;
tabPathOff_btn._visible = false;
tabEndOn_btn._visible = false;
tabPathOn_btn._visible = false;
tabEndEnabled = false;
    // hideAttributes();
    // infoShowing = false;
}
if(showRouteCalled) {
switch (lastStartMapObjectType) {
    case "Buildings":
        trace("Start Building Called");
        lastStartMapObject_color.setRGB(0xF2944E);
        break;
    case "Fields":
        lastStartMapObject_color.setRGB(0xF3C384);
        break;
    case "Parkings":
        lastStartMapObject_color.setRGB(0xFFFFFF);
        break;
}
switch (lastEndMapObjectType) {
    case "Buildings":
        trace("End Building Called");
        lastEndMapObject_color.setRGB(0xF2944E);
        break;
    case "Fields":
        lastEndMapObject_color.setRGB(0xF3C384);
        break;
    case "Parkings":
        lastEndMapObject_color.setRGB(0xFFFFFF);
        break;
}
showRouteCalled = false;
} lastStartTextObject_txt.setTextFormat(previousStartTextFormat);
lastEndTextObject_txt.setTextFormat(previousEndTextFormat);
lastEndTextObject_txt = 
    eval(currentEndXMLNode.attributes.maptext);
previousEndTextFormat = lastEndTextObject_txt.getTextFormat();
lastEndMapObject_color = new
Color(eval(currentEndXMLNode.attributes.mapobject));
lastEndMapObjectType = currentEndXMLNode.attributes.type;
showAttributes();
};
endPlace_cb.addEventListener("close", endPlaceListenerObject);
//----Key Press Listener
keyListener = new Object();
keyListener.onKeyDown = function() {
  if (Key.getCode() == Key.UP || Key.getCode() == Key.DOWN ||
    Key.getCode() == Key.LEFT || Key.getCode() == Key.RIGHT) {
    if (panMap_rb.selected) {
      switch (Key.getCode()) {
        case Key.UP:
          mapFull_mc._y -= 20;
          break;
        case Key.DOWN:
          mapFull_mc._y += 20;
          break;
        case Key.LEFT:
          mapFull_mc._x -= 20;
          break;
        case Key.RIGHT:
          mapFull_mc._x += 20;
          break;
      }
    } else {
      focus_cbu.setFocus();
      trace("ASCII: " + Key.getAscii());
      switch (Key.getAscii()) {
        case 76:
          showLegendListenerObject.click();
          break;
        case 108:
          showLegendListenerObject.click();
          break;
        case 72:
          helpListenerObject.click();
          break;
        case 104:
          helpListenerObject.click();
          break;
        case 80:
          mapPrintListenerObject.click();
          break;
        case 112:
          mapPrintListenerObject.click();
          break;
        case 33:
          trace("startPlace called");
startPlace_cb.setFocus();
startPlace_cb.open();
break;
/*
   case 35:
   trace("startType called");
   startType_cb.setFocus();
   startType_cb.open();
   break;
*/
case 64:
   trace("endPlace called");
   endPlace_cb.setFocus();
   endPlace_cb.open();
   break;
   /*
   case 36:
   trace("endType called");
   endType_cb.setFocus();
   endType_cb.open();
   break;
*/
case 70:
   if (placeFloorplanButton.enabled) {
      floorplanButtonListenerObject.click();
   }
   break;
case 102:
   if (placeFloorplanButton.enabled) {
      floorplanButtonListenerObject.click();
   }
   break;
case 73:
   if (info_cbu.enabled) {
      showInfoListenerObject.click();
   }
   break;
case 105:
   if (info_cbu.enabled) {
      showInfoListenerObject.click();
   }
   break;
case 78:
   if (newRoute_cbu._visible) {
      newRouteListenerObject.click();
   }
   break;
case 110:
   if (newRoute_cbu._visible) {

newRouteListenerObject.click();
}
break;
case 83 :
    trace("tabStartCalled");
    if (tabStartOff_btn._visible) {
        trace("In Start Tab If Function...");
        tabStartOff_btn.onPress();
    } else {
        ("Start Denied");
    }
break;
case 115 :
    trace("tabStartCalled");
    if (tabStartOff_btn._visible) {
        tabStartOff_btn.onPress();
    } else {
        ("Start Denied");
    }
break;
case 69 :
    trace("tabEndCalled");
    if (tabEndOff_btn._visible) {
        tabEndOff_btn.onPress();
    } else {
        ("End Denied");
    }
break;
case 101 :
    trace("tabEndCalled");
    if (tabEndOff_btn._visible) {
        tabEndOff_btn.onPress();
    } else {
        ("End Denied");
    }
break;
case 82 :
    trace("tabPathCalled");
    if (tabPathOff_btn._visible) {
        tabPathOff_btn.onPress();
    } else {
        ("Path Denied");
    }
break;
case 114 :
    trace("tabPathCalled");
    if (tabPathOff_btn._visible) {
tabPathOff_btn.onPress();
} else {
  ("Path Denied");
}
break;
case 49 :
  trace("***Now in case 49***");
  trace("Visible? "+elevatorCheckIcon_mc._visible);
  if (legend_mc.elevatorCheckIcon_mc._visible) {
    trace("elevatorCheckIcon_mc is visible");
    mapFull_mc.elevatorsAllInMap_mc._visible = false;
    legend_mc.elevatorCheckIcon_mc._visible = false;
    legend_mc.elevators_ch.selected = false;
  } else {
    trace("Icon not displayed");
    mapFull_mc.elevatorsAllInMap_mc._visible = true;
    legend_mc.elevatorCheckIcon_mc._visible = true;
    legend_mc.elevators_ch.selected = false;
  }
  //else {trace ("...doing nothing...");
  break;
case 50 :
  if (legend_mc.autodoorCheckIcon_mc._visible) {
    mapFull_mc.autodoorsAllInMap_mc._visible = false;
    legend_mc.autodoorCheckIcon_mc._visible = false;
    legend_mc.autodoors_ch.selected = false;
  } else {
    mapFull_mc.autodoorsAllInMap_mc._visible = true;
    legend_mc.autodoorCheckIcon_mc._visible = true;
    legend_mc.autodoors_ch.selected = false;
  }
  break;
case 51 :
  if (legend_mc.tddCheckIcon_mc._visible) {
    mapFull_mc.tddAllInMap_mc._visible = false;
    legend_mc.tddCheckIcon_mc._visible = false;
    legend_mc.tdd_ch.selected = false;
  } else {
    mapFull_mc.tddAllInMap_mc._visible = true;
    legend_mc.tddCheckIcon_mc._visible = true;
    legend_mc.tdd_ch.selected = false;
  }
  break;
case 52 :
  if (legend_mc.vanCheckIcon_mc._visible) {
    mapFull_mc.vansAllInMap_mc._visible = false;
    legend_mc.vanCheckIcon_mc._visible = false;
legend_mc.van_ch.selected = false;
} else {
    mapFull_mc.vansAllInMap_mc._visible = true;
    legend_mc.vanCheckIcon_mc._visible = true;
    legend_mc.van_ch.selected = false;
}
break;
case 53 :
    if (legend_mc.parkACheckIcon_mc._visible) {
        mapFull_mc.parkAAllInMap_mc._visible = false;
        legend_mc.parkACheckIcon_mc._visible = false;
        legend_mc.parkA_ch.selected = false;
    } else {
        mapFull_mc.parkAAllInMap_mc._visible = true;
        legend_mc.parkACheckIcon_mc._visible = true;
        legend_mc.parkA_ch.selected = false;
    }
    break;
case 54 :
    if (legend_mc.parkGCheckIcon_mc._visible) {
        mapFull_mc.parkGAllInMap_mc._visible = false;
        legend_mc.parkGCheckIcon_mc._visible = false;
        legend_mc.parkG_ch.selected = false;
    } else {
        mapFull_mc.parkGAllInMap_mc._visible = true;
        legend_mc.parkGCheckIcon_mc._visible = true;
        legend_mc.parkG_ch.selected = false;
    }
    break;
case 55 :
    if (legend_mc.parkRCheckIcon_mc._visible) {
        mapFull_mc.parkRAllInMap_mc._visible = false;
        legend_mc.parkRCheckIcon_mc._visible = false;
        legend_mc.parkR_ch.selected = false;
    } else {
        mapFull_mc.parkRAllInMap_mc._visible = true;
        legend_mc.parkRCheckIcon_mc._visible = true;
        legend_mc.parkR_ch.selected = false;
    }
    break;
case 56 :
    if (legend_mc.parkSCheckIcon_mc._visible) {
        mapFull_mc.parkSAllInMap_mc._visible = false;
        legend_mc.parkSCheckIcon_mc._visible = false;
        legend_mc.parkS_ch.selected = false;
    } else {
        mapFull_mc.parkSAllInMap_mc._visible = true;
legend mc.parkSCheckIcon mc._visible = true;
legend mc.parkS_ch.selected = false;
}
break;
case 77 :
if (panMap_rb.selected) {
  panMap_rb.selected = false;
focus_cbu.setFocus;
} else {
  panMap_rb.selected = true;
  panMap_rb.setFocus;
}
break;
case 109 :
if (panMap_rb.selected) {
  panMap_rb.selected = false;
focus_cbu.setFocus;
} else {
  panMap_rb.selected = true;
  panMap_rb.setFocus;
}
break;
case 43 :
if (magnify mc.sliderZoom mc._x<SliderXEnd) {
  magnify mc.sliderZoom mc._x += 5;
  NextZoom = magnify mc.sliderZoom mc._x-SliderXStart;
  mapFull mc._width = OriginalMapWidth+(20*NextZoom);
  mapFull mc._height = OriginalMapHeight+(20*NextZoom);
  mapScale mc._width = OriginalScaleWidth+(1.08*NextZoom);
}
break;
case 45 :
if (magnify mc.sliderZoom mc._x>SliderXStart) {
  magnify mc.sliderZoom mc._x -= 5;
  NextZoom = magnify mc.sliderZoom mc._x-SliderXStart;
  mapFull mc._width = OriginalMapWidth+(20*NextZoom);
  mapFull mc._height = OriginalMapHeight+(20*NextZoom);
  mapScale mc._width = OriginalScaleWidth+(1.08*NextZoom);
}
break;

Key.addListener(keyListener);

//****************************************************************************FUNCTIONS**************************************************************************
//-------------------------------------------------ROUTE TEXT FUNCTION--------------------------------------
routeText_lv.onLoad = function() {

placeInfo_ta.text = routeText_lv.routeHTML;
}

//-----------------------------TAB FUNCTIONS-----------------------------
tabStartOff_btn.onRollOver = function() {
    if (tabStartEnabled) {
        this.useHandCursor;
        tabStartReady = true;
        tabEndReady = false;
    }
};
tabEndOff_btn.onRollOver = function() {
    if (tabEndEnabled) {
        this.useHandCursor;
        tabStartReady = false;
        tabEndReady = true;
    }
};
tabPathOff_btn.onRollOver = function() {
    if (tabStartEnabled && tabEndEnabled) {
        this.useHandCursor;
        tabStartReady = false;
        tabEndReady = false;
    }
};
tabStartOff_btn.onPress = function() {
    trace("tabStartOff_btn.onPress Called");
    tabStartOn_btn._visible = true;
    tabEndOn_btn._visible = false;
    tabPathOn_btn._visible = false;
    currentXMLNode = currentStartXMLNode.cloneNode(true);
    placeNameUpper_txt.text = ";
    placeNameUpper_txt.autoSize = "center";
    if (showRouteCalled) {
        switch (lastStartMapObjectType) {
        case "Buildings":
            trace("Start Building Called");
            lastStartMapObject_color.setRGB(0xF2944E);
            break;
        case "Fields":
            lastStartMapObject_color.setRGB(0xF3C384);
            break;
        case "Parkings":
            lastStartMapObject_color.setRGB(0xFFFFFF);
            break;
        }
        switch (lastEndMapObjectType) {
        case "Buildings":
            }
trace("End Building Called");
lastEndMapObject_color.setRGB(0xF2944E);
break;
case "Fields" :
    lastEndMapObject_color.setRGB(0xF3C384);
break;
case "Parkings" :
    lastEndMapObject_color.setRGB(0xFFFFFF);
break;
}
showRouteCalled = false;
)
lastStartTextObject_txt.setTextFormat(previousStartTextFormat);
lastEndTextObject_txt.setTextFormat(previousEndTextFormat);
showAttributes();
};
tabEndOff_btn.onPress = function() {
tabStartOn_btn._visible = false;
tabEndOn_btn._visible = true;
tabPathOn_btn._visible = false;
currentXMLNode = currentEndXMLNode.cloneNode(true);
placeNameUpper_txt.text = "";
placeNameUpper_txt.autoSize = "center";
if (showRouteCalled) {
    switch (lastStartMapObjectType) {
    case "Buildings" :
        trace("Start Building Called");
        lastStartMapObject_color.setRGB(0xF2944E);
break;
    case "Fields" :
        lastStartMapObject_color.setRGB(0xF3C384);
break;
    case "Parkings" :
        lastStartMapObject_color.setRGB(0xFFFFFF);
break;
    }
    switch (lastEndMapObjectType) {
    case "Buildings" :
        trace("End Building Called");
        lastEndMapObject_color.setRGB(0xF2944E);
break;
    case "Fields" :
        lastEndMapObject_color.setRGB(0xF3C384);
break;
    case "Parkings" :
        lastEndMapObject_color.setRGB(0xFFFFFF);
break;
    }
tabPathOff_btn.onPress = function() {
  tabStartOn_btn._visible = false;
  tabEndOn_btn._visible = false;
  tabPathOn_btn._visible = true;
  placeFloorplanButton.enabled = false;
  var routeNum:Number = 0;
  route_str = currentStartXMLNode.attributes.abreviation + "-" +currentEndXMLNode.attributes.abreviation;
  while ((routesArray[routeNum].attributes.name != route_str) && routeNum<routesArray.length) {
    routeNum++;
  }
  routeMap_str = "routeMaps/"+currentStartXMLNode.attributes.abreviation + "-" +currentEndXMLNode.attributes.abreviation + ".swf";
  trace("Now finding "+route_str);
  if (routesArray[routeNum].attributes.accessibility == "1") {
    // First hide the main map and building info
    mapFull_mc._visible = false;
    // placeInfo_ta._visible = false;
    trace(routesArray[routeNum].attributes.name + " is an accessible path...");
    // Then load the route map with the loader component and
    adjust scale to appropriate size...
    routeMap_ldr._visible = true;
    routeMap_ldr.contentPath = routeMap_str;
    trace("Loader Height: "+routeMap_ldr.height+", Width: "+routeMap_ldr.width);
    trace("Initial Map Height: "+routesArray[routeNum].attributes.height+", Width: " +routesArray[routeNum].attributes.width);
    if ((routeMap_ldr.height/parseInt(routesArray[routeNum].attributes.height)) < (routeMap_ldr.width/parseInt(routesArray[routeNum].attributes.width))) {
      trace("resize by height");
      resizeRatio = routeMap_ldr.height/parseInt(routesArray[routeNum].attributes.height);
    } else {
      trace("resize by width");
      resizeRatio = routeMap_ldr.width/parseInt(routesArray[routeNum].attributes.width);
    }
  } else {
resizeRatio =
routeMap_ldr.width/parseInt(routesArray[routeNum].attributes.width);
}
trace("Resize Ratio: "+resizeRatio);
// routeMap_ldr._x = 9;
/*
if ((routeMap_ldr.height / parseInt(routesArray[routeNum].attributes.height)) <
(routeMap_ldr.width / parseInt(routesArray[routeNum].attributes.width))) {
routeMap_ldr._x -= (routeMap_ldr.width - (parseInt(routesArray[routeNum].attributes.width) * resizeRatio) / 2);
}*/
trace("routeMap at "+routeMap_ldr._x", "+routeMap_ldr._y);
mapScale_mc.width = OriginalScaleWidth*resizeRatio*.55;
// Load and position the route text
trace("routeMap Width: "+routeMap_ldr.width+" & X: "+routeMap_ldr._x);
placeInfo_ta.x = 5+(parseInt(routesArray[routeNum].attributes.width)*resizeRatio);
// placeInfo_ta.width = myHitMask_mc.width -
(placeInt(routesArray[routeNum].attributes.width)*resizeRatio)+20);
trace("route Text X: "+placeInfo_ta._x", Width: "+placeInfo_ta._width);
// Hide unimportant objects...
// hideAttributes();
placeNameUpper_txt.text = ";
startPlaceHalo_mc.visible = false;
endPlaceHalo_mc.visible = false;
magnify_mc.visible = false;
panMap_rb.visible = false;
startPlace_cb.visible = false;
startType_cb.visible = false;
endPlace_cb.visible = false;
endType_cb.visible = false;
// Reveal the button for finding a new route, enable the
alternate legend and resize layout
newRoute_cbu.visible = true;
// mapFrame_mc.height = 406;
curtain_mc.visible = true;
legend_mc.visible = false;
altLegend = true;
} else {
trace("inaccessible path...");
showRoute();
}

// ------------------------ OTHER INFO FUNCTIONS -----------------------------

function parseFor(parseTerm: String) {
    if (parseTerm == "Off Campus") {
        currentCBArray[0].attributes.name = "Off Campus Building List";
        for (var i: Number = 1; i < currentCBArray.length; i++) {
            if (currentCBArray[i].attributes.path != "-2") {
                currentCBArray.splice(i, 1);
            }
        }
    } else {
        for (var i: Number = 1; i < currentCBArray.length; i++) {
            if (currentCBArray[i].attributes.group != parseTerm) {
                currentCBArray.splice(i, 1);
            }
        }
    }
    // trace("finished parsing, currentCBArray length = " + currentCBArray.length);
}

function hideAttributes() {
    placeNameUpper_txt.text = ";
    placeNameUpper_txt.autoSize = "center";
    placeInfo_ta._visible = false;
    placeFloorplanButton.enabled = false;
    tabStartOn_btn._visible = false;
    tabStartOff_btn._visible = false;
    tabEndOn_btn._visible = false;
    tabEndOff_btn._visible = false;
    tabPathOn_btn._visible = false;
    tabPathOff_btn._visible = false;
}

function showAttributes() {
    // Show Name and Title of Currently Selected Building
    placeFloorplanButton.enabled = true;
    placeNameUpper_txt.text = currentXMLNode.attributes.name + "(
        " + currentXMLNode.attributes.abreviation + ")");
    placeNameUpper_txt.autoSize = "center";
    trace("Building Title Height: " + placeNameUpper_txt.height + 
        " = " + (Math.floor((placeNameUpper_txt.height / 15)) + " lines");
for (var i = 0; i <= (Math.floor((placeNameUpper_txt._height / 15))); i++) {
  placeInfo_ta.text = placeInfo_ta.text + newline;
}

//Fill in Detail text of Current Building
trace("Place Type is "+currentXMLNode.attributes.type);
trace("and we have... " + lastMapObjectType);
placeInfo_ta._visible = true;
switch (currentXMLNode.attributes.type) {
  case "Blank" :
    placeNameUpper_txt.text = ";
    placeInfo_ta.text = ""
    placeInfo_ta._visible = false;
    placeFloorplanButton.enabled = false;
    break;
  case "Buildings" :
    placeInfo_ta.text = newline+newline+currentXMLNode.attributes.name+
    ""+currentXMLNode.attributes.group+" facility.";
    if (currentXMLNode.attributes.subgroup != undefined) {
      placeInfo_ta.text = placeInfo_ta.text+" It is part of the 
      "+currentXMLNode.attributes.subgroup+"."
    }
    if (currentXMLNode.attributes.autodoor == "true") {
      placeInfo_ta.text = placeInfo_ta.text+" There are automatic 
      doors."
    } else {
      placeInfo_ta.text = placeInfo_ta.text+" There are no 
      automatic doors."
    }
    if (currentXMLNode.attributes.elevator == "true") {
      placeInfo_ta.text = placeInfo_ta.text+" There is an 
      elevator."
    } else {
      placeInfo_ta.text = placeInfo_ta.text+" There is no 
      elevator."
    }
    if (currentXMLNode.attributes.tdd == "true") {
      placeInfo_ta.text = placeInfo_ta.text+" TDD can be found 
      here."
    }
    if (currentXMLNode.attributes.van == "true") {
      placeInfo_ta.text = placeInfo_ta.text+" An SDRC van can drop 
      you off here."
    }
    if (currentXMLNode.attributes.park_a == "true") {

placeInfo_ta.text = placeInfo_ta.text" Accessible parking can be found here.";
} else {
    placeInfo_ta.text = placeInfo_ta.text" General parking can be found here.";
} else {
    placeInfo_ta.text = placeInfo_ta.text" Residential parking can be found here.";
} else {
    placeInfo_ta.text = placeInfo_ta.text" Staff parking can be found here.";
}
break;
}

case "Parkings" :
    placeInfo_ta.text = newline+newline+"The "+currentXMLNode.attributes.name;
    if (currentXMLNode.attributes.park_a == "true") {
        placeInfo_ta.text = placeInfo_ta.text" has parking for students with accessibility concerns.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" has no special parking for students with accessibility concerns.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" An SDRC van can drop you off here.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" General parking can be found here.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" Residential parking can be found here.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" Staff parking can be found here.";
}
break;

case "Fields" :
    placeInfo_ta.text = newline+newline+"The "+currentXMLNode.attributes.name;
    if (currentXMLNode.attributes.park_a == "true") {
        placeInfo_ta.text = placeInfo_ta.text" has parking for students with accessibility concerns.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" has no special parking for students with accessibility concerns.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" An SDRC van can drop you off here.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" General parking can be found here.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" Residential parking can be found here.";
    } else {
        placeInfo_ta.text = placeInfo_ta.text" Staff parking can be found here.";
}
break;
placeInfo_ta.text = placeInfo_ta.text+" has parking for students with accessibility concerns.");

} else {
    placeInfo_ta.text = placeInfo_ta.text+" has no special parking for students with accessibility concerns.");
}
if (currentXMLNode.attributes.van == "true") {
    placeInfo_ta.text = placeInfo_ta.text+" An SDRC van can drop you off here."
}
if (currentXMLNode.attributes.park_g == "true") {
    placeInfo_ta.text = placeInfo_ta.text+" General parking can be found here."
}
if (currentXMLNode.attributes.park_r == "true") {
    placeInfo_ta.text = placeInfo_ta.text+" Residential parking can be found here.";
}
if (currentXMLNode.attributes.park_s == "true") {
    placeInfo_ta.text = placeInfo_ta.text+" Staff parking can be found here.";
}
break;
//END SWITCH STATEMENT

-----Highlight MapImage of Current Building-----
// if (lastColor != 0x000000) {
trace("and finally we have... " + lastMapObjectType);
switch (lastMapObjectType) {
  case "Buildings" :
    trace("Building Color Changed");
    lastMapObject_color.setRGB(0xF2944E);
    break;
  case "Fields" :
    trace("Building Color Changed");
    lastMapObject_color.setRGB(0xF3C384);
    break;
  case "Parkings" :
    trace("Building Color Changed");
    lastMapObject_color.setRGB(0xFFFFFF);
    break;
}
//-----Highlight Current Building-----
currentMapObject = eval(currentXMLNode.attributes.mapobject);
lastMapObject = currentMapObject;
lastMapObjectType = currentXMLNode.attributes.type;
trace(currentXMLNode.attributes.type + "?");

lastMapObject_color = new Color(lastMapObject);
currentMapObject_color = new Color(currentMapObject);
currentMapObject_color.setRGB(0xFF0000);

mapFull_mc.buildingsInMap_mc.foundersBldg_mc.setR

currentMapObject_color = new Color(currentMapObject);

trace("currentColor is " + currentMapObject_color.getRGB().toString(16));

lastTextObject_txt.setTextFormat(previousTextFormat);

if (showRouteCalled) {
} else if (lastTextObject_txt.text != "*****") {

lastTextObject_txt.setTextFormat(previousTextFormat);

trace("Previous text format set");

} } } }

lastTextObject_txt = eval(currentXMLNode.attributes.maptext);

lastTextObject_txt = currentTextObject_txt;

trace("...Now last text object reads " + lastTextObject_txt.text);

previousTextFormat = currentTextObject_txt.getTextFormat();
currentTextObject_txt.setTextFormat(myTextFormat);
currentTextObject_txt.autoSize = "center";

placeFloorplanButton.enabled = true;

placeFloorplanButton.label = "Floorplan (F)";

floorplanButtonListenerObject = new Object();

floorplanButtonListenerObject.click = function(eventObject) {

placeFloorplanButton.setFocus();

if (placeFloorplanButton.enabled) {

getURL(currentXMLNode.attributes.floorplan, "_blank");

}

placeFloorplanButton.addEventListener("click",

floorplanButtonListenerObject);

showRouteCalled = false;

}

function showRoute() {

loadMovie("ALDER-FC.swf");
placeNameUpper_txt.text = "";
trace("showRoute called...");
showRouteCalled = true;
// Show Name and Title of Currently Selected Building
placeInfo_ta._visible = true;
placeInfo_ta.Text = "<p align="center">"
+currentStartXMLNode.attributes.name+"</b>
+
+newline+
+currentEndXMLNode.attributes.name+"
+
+newline+
+currentEndXMLNode.attributes.abreviation+</p></br><br>";

// placeNameUpper_txt.text = "From"
+currentStartXMLNode.attributes.name+""
+currentStartXMLNode.attributes.abreviation+
+newline+
+currentEndXMLNode.attributes.name+""
+currentEndXMLNode.attributes.abreviation+
+newline+
+currentEndXMLNode.attributes.name+"
+currentEndXMLNode.attributes.abreviation+
+newline+
+currentEndXMLNode.attributes.name+"
+currentEndXMLNode.attributes.abreviation+
+newline+
+currentEndXMLNode.attributes.name+"
+currentEndXMLNode.attributes.abreviation+"");

// Fill in Detail Text of Current Building
// first clear placeInfo_ta.text
placeInfo_ta.text = placeInfo_ta.text + "<p align="left">";

// titleLineCount = Math.floor(placeNameUpper_txt._height / 15.0);

// trace("Route Title Height: " + placeNameUpper_txt._height + " = " + titleLineCount + " lines");
// for (var i = 0; i <= titleLineCount; i++) {
// trace("NEWLINE ADDED");
// placeInfo_ta.text = placeInfo_ta.text + newline;
// }

// trace("***Height: "+placeNameUpper_txt._height);
// trace("Text Height: "+placeNameUpper_txt.textHeight);
// placeInfo_ta.text = newline+newline+newline+newline+newline;

// check to see if both places are off campus
if (currentStartXMLNode.attributes.name ==
currentEndXMLNode.attributes.name) {
    placeInfo_ta.text = placeInfo_ta.text + "Both the Starting and
the ending location are the same place. Please select two different
buildings.";
} else if (currentStartXMLNode.attributes.path ==
currentEndXMLNode.attributes.path &
currentStartXMLNode.attributes.path == "-2") {
    placeInfo_ta.text = placeInfo_ta.text + "Both buildings are
off campus. A normal vehicle is the only way to get between these
buildings.";
} else if (currentStartXMLNode.attributes.path ==
currentEndXMLNode.attributes.path &
currentStartXMLNode.attributes.path == "-1"
&
currentEndXMLNode.attributes.path == "-1") {
Both locations are inaccessible to students with particular accessibility concerns.

//If both places are on the same path
} else if (currentStartXMLNode.attributes.path == currentEndXMLNode.attributes.path) {
    placeInfo_ta.text = placeInfo_ta.text + "There is an accessible route that connects "+currentStartXMLNode.attributes.name+" with "+currentEndXMLNode.attributes.name+. This route should be accessible for all students without need for a vehicle."
    //If either place is on path 1
} else if (currentStartXMLNode.attributes.path == "1" ||
    currentEndXMLNode.attributes.path == "1") {
    //If the other location is on path 2
    if (currentStartXMLNode.attributes.path == "2" ||
        currentEndXMLNode.attributes.path == "2") {
        placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Siemens Hall. Travel along the main corridor until you come to an exit on the other side of the building. The accessible path from here will take you to "+currentEndXMLNode.attributes.name+."
    //If the other place is on path 3
} else if (currentStartXMLNode.attributes.path == "3" ||
    currentEndXMLNode.attributes.path == "3") {
        placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Siemens Hall. Travel along the main corridor until you come to an elevator near the middle of the building. Take the elevator to the next floor. Pollor the corridor East until you reach the building's exit. The accessible path from here will take you to "+currentEndXMLNode.attributes.name+."
    //If the starting place is on path 9
} else if (currentStartXMLNode.attributes.path == "9") {
        placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Science B. There is an elevator at the beginning of the main corridor for this building. Take the elevator to the 2nd floor. Follow the main corridor across the catwalk into Science A. Take a right at the end of the corridor and follow this to either exit on your left. Through the exit the accessible path will take you to "+currentEndXMLNode.attributes.name+"."
    //If the ending place is on path 9
} else if (currentEndXMLNode.attributes.path == "9") {
        placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Science A. Upon entering the building, follow the main corridor to the right until the first juncture on your left. Take this juncture across the catwalk into Science B. Continue ahead until you reach the"
elevator. Take this to the 1st floor. Exit the building to your right as you leave the elevator. Through the exit the accessible path will take you to "+currentEndXMLNode.attributes.name+.";

    //If the other place is off campus
    } else if (currentStartXMLNode.attributes.path == "-2" ||
    currentEndXMLNode.attributes.path == "-2") {
        placeInfo_ta.text = placeInfo_ta.text + "Students may drive a car from "+currentStartXMLNode.attributes.name+" to "+currentEndXMLNode.attributes.name+".";
        //If the other place is inaccessible
    } else if (currentStartXMLNode.attributes.path == "-1" ||
    currentEndXMLNode.attributes.path == "-1") {
        placeInfo_ta.text = placeInfo_ta.text + "There is no accessible path between these two buildings.";
        //Catch-all
    } else {
        placeInfo_ta.text = placeInfo_ta.text + "There is no accessible path between these two buildings.";
    }
    //2) If either place is on path 2
    } else if (currentStartXMLNode.attributes.path == "2" ||
    currentEndXMLNode.attributes.path == "2") {
        //If the other place is on path 3
        if (currentStartXMLNode.attributes.path == "3" ||
            currentEndXMLNode.attributes.path == "3") {
            placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Siemens Hall. Travel along the main corridor until you come to an elevator near the middle of the building. Take the elevator to the next floor. Follow the corridor until you reach the building's exit. The accessible path from here will take you to "+currentEndXMLNode.attributes.name+".";
        //If the starting place is on path 9
        } else if (currentStartXMLNode.attributes.path == "9") {
            placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Science B. There is an elevator at the beginning of the main corridor for this building. Take the elevator to the 2nd floor. Follow the main corridor across the catwalk into Science A. Take a right at the end of the corridor and follow this to either exit on your left. Take the accessible path to Siemens Hall. Walk through the main corridor to the opposite end. There you will find an exit that can take you to "+currentEndXMLNode.attributes.name+".";
        //If the ending place is on path 9
        } else if (currentEndXMLNode.attributes.path == "9") {
            placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to
Siemens Hall. Enter Siemens Hall and walk all the way through the main corridor. The exit on the other side connects to an accessible pathway that leads to Science A. Upon entering the building, follow the main corridor to the right until the first juncture on your left. Take this juncture across the catwalk into Science B. Continue ahead until you reach the elevator. Take this to the 1st floor. Exit the building to your right as you leave the elevator. Through the exit the accessible path will take you to "+currentEndXMLNode.attributes.name+".

//If the other place is off campus
} else if (currentStartXMLNode.attributes.path == "-2" ||
currentEndXMLNode.attributes.path == "-2") {
  placeInfo_ta.text = placeInfo_ta.text + "Students may drive a car from "+currentStartXMLNode.attributes.name+" to "+currentEndXMLNode.attributes.name+".
  //If the other place is inaccessible
} else if (currentStartXMLNode.attributes.path == "-1" ||
currentEndXMLNode.attributes.path == "-1") {
  placeInfo_ta.text = placeInfo_ta.text + "There is no accessible path between these two buildings."
  //Catch-all
} else {
  placeInfo_ta.text = placeInfo_ta.text + "There is no accessible path between these two buildings.";
}

//If either place is on path 3
} else if (currentStartXMLNode.attributes.path == "3" ||
currentEndXMLNode.attributes.path == "3") {
  //If the starting place is on path 9
  if (currentStartXMLNode.attributes.path == "9") {
    placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Science B. There is an elevator at the beginning of the main corridor for this building. Take the elevator to the the 2nd floor. Follow the main corridor across the catwalk into Science A. Take a right at the end of the corridor and follow this to either exit on your left. Take the accessible path to Siemens Hall. Walk through the main corridor to the elevator near the middle of the building. Take this elevator to the lower floor. There you will find an exit that you can take to get to "+currentEndXMLNode.attributes.name+".
    //If the ending place is on path 9
  } else if (currentEndXMLNode.attributes.path == "9") {
    placeInfo_ta.text = placeInfo_ta.text + "Follow the accessible trail from "+currentStartXMLNode.attributes.name+" to Siemens Hall. Enter Siemens Hall and walk all the way through the main corridor. Take the elevator here up to the next level. Follow the main corridor right to an accessible pathway that leads to Science A. Upon
entering the building, follow the main corridor to the right until the first juncture on your left. Take this juncture across the catwalk into Science B. Continue ahead until you reach the elevator. Take this to the 1st floor. Exit the building to your right as you leave the elevator. Through the exit the accessible path will take you to "+currentEndXMLNode.attributes.name+";
   //If the other place is off campus
 } else if (currentStartXMLNode.attributes.path == "-2" || currentEndXMLNode.attributes.path == "-2") {
   placeInfo_ta.text = placeInfo_ta.text + "Students may drive a car from "+currentStartXMLNode.attributes.name+" to "+currentEndXMLNode.attributes.name+";
   //If the other place is inaccessible
 } else if (currentStartXMLNode.attributes.path == "-1" || currentEndXMLNode.attributes.path == "-1") {
   placeInfo_ta.text = placeInfo_ta.text + "There is no accessible path between these two buildings.";
   //Catch-all
 } else {
   placeInfo_ta.text = placeInfo_ta.text + "There is no accessible path between these two buildings.";
 }
//If both places have an SDRC van pickup/dropoff location
if (currentStartXMLNode.attributes.name != currentEndXMLNode.attributes.name) {
   if (currentStartXMLNode.attributes.van == "true" && currentEndXMLNode.attributes.van == "true") {
      placeInfo_ta.text = placeInfo_ta.text + " You can catch an SDRC van from "+currentStartXMLNode.attributes.name+" to "+currentEndXMLNode.attributes.name+" at the locations marked with a V on this map.";
      //If accessible parking is at both places
   } else if (currentStartXMLNode.attributes.park_a == "true" && currentEndXMLNode.attributes.park_a == "true") {
      placeInfo_ta.text = placeInfo_ta.text + " There are accessible parking spaces at both locations. Students may drive a car from "+currentStartXMLNode.attributes.name+" to "+currentEndXMLNode.attributes.name+".");
      //Final Catch-all
   } else if (placeInfo_ta.text == "") {
      placeInfo_ta.text = placeInfo_ta.text + "There is no accessible path between these two buildings.";
   }
}
Please contact the Student Disability Resource Center for more information. We can be reached at (707) 826-4678. We are located in House 71, just north of Library Circle. Email us at sdrc@humboldt.edu.

//-----Highlight MapImage of Start Building-----
trace("last start Object: " + lastStartMapObject);
lastStartMapObject_color.setRGB(0xFF0000);
lastEndMapObject_color.setRGB(0xFF0000);
showRouteCalled = true;
//-----Highlight Text of Start Building-----
lastStartTextObject_txt.setTextFormat(myTextFormat);
lastEndTextObject_txt.setTextFormat(myTextFormat);
//-----Highlight MapImage of End Building-----
// trace(lastColor);
// trace(lastMapObject);
/* currentMapObject =
eval(currentEndXMLNode.attributes.mapobject);
currentMapObject_color = new Color(currentMapObject);
// trace("currentColor is " +
currentMapObject_color.getRGB().toString(16));
lastColor = currentMapObject_color.getRGB();
// trace("lastColor set to " + lastColor.toString(16));
currentMapObject_color.setRGB(0xFF0000);
lastMapObject = currentMapObject;
lastMapObject_color = new Color(currentEndMapObject);*/
//-----Highlight Text of End Building-----
}
/*
//-----Load Button with PDF-----
placeFloorplanButton.enabled = true;
PlaceFloorplanButton.label = "Download Floorplan";
floorplanButtonListenerObject = new Object();
floorplanButtonListenerObject.click = function(eventObject){
if (placeFloorplanButton.enabled) {
getURL(currentXMLNode.attributes.floorplan, "_blank");
}
}
placeFloorplanButton.addEventListener("click",
floorplanButtonListenerObject);
*/

/*------------------------------COMMANDS----------------------------*/

//-- Set map's hit area to its visible area only
}
map_mc.hitArea = _root.myHitMask_mc;
//Enable checkBox components' accessibility
mx.accessibility.CheckBoxAccImpl.enableAccessibility();
//placeFloorplanButton.enabled = false;
//*------------------------LISTENER OBJECTS------------------------
-----
/*
======checkBox Listeners======
- Enable checkBox functionality to display / show corresponding
map symbols and checkBox icons
*** THIS CODE CAN BE SIMPLIFIED... By attaching a string
variable to each CheckBox Object, and
concatonating that string - i.e. theseMapIcons =
eval("mapFull_mc." + chString)...
*/
checkBoxListenerObject = new Object();
checkBoxListenerObject.click = function(eventObject) {
    //if elevator checkBox is selected, show all elevator symbols +
icon
    if (legend_mc.elevators_ch.selected) {
        mapFull_mc.elevatorsAllInMap_mc._visible = true;
        legend_mc.elevatorCheckIcon_mc._visible = true;
        legend_mc.elevators_ch.selected = false;
    }
    //if automatic doors checkBox is selected, show all automatic
door symbols + icon
    if (legend_mc.autodoors_ch.selected) {
        mapFull_mc.autodoorsAllInMap_mc._visible = true;
        legend_mc.autodoorCheckIcon_mc._visible = true;
        legend_mc.autodoors_ch.selected = false;
    }
    //if TDD checkBox is selected, show all TDD symbols + icon
    if (legend_mc.tdd_ch.selected) {
        mapFull_mc.tddAllInMap_mc._visible = true;
        legend_mc.tddCheckIcon_mc._visible = true;
        legend_mc.tdd_ch.selected = false;
    }
    //if SDRC Van checkBox is selected, show all SDRC Van symbols +
icon
    if (legend_mc.van_ch.selected) {
        mapFull_mc.vansAllInMap_mc._visible = true;
        legend_mc.vanCheckIcon_mc._visible = true;
        legend_mc.van_ch.selected = false;
    }
    //if Accessible Parking checkBox is selected, show all
Accessible Parking symbols + icon
    if (legend_mc.parkA_ch.selected) {
        mapFull_mc.parkAAllInMap_mc._visible = true;
        legend_mc.parkACheckIcon_mc._visible = true;
        legend_mc.parkA_ch.selected = false;
    }
mapFull_mc.parkAAllInMap_mc._visible = true;
legend_mc.parkACheckIcon_mc._visible = true;
legend_mc.parkA_ch.selected = false;
}
//if General Parking checkBox is selected, show all General Parking symbols + icon
if (legend_mc.parkG_ch.selected) {
mapFull_mc.parkGAllInMap_mc._visible = true;
legend_mc.parkGCheckIcon_mc._visible = true;
legend_mc.parkG_ch.selected = false;
}
//if Resident Parking checkBox is selected, show all General Parking symbols + icon
if (legend_mc.parkR_ch.selected) {
mapFull_mc.parkRAllInMap_mc._visible = true;
legend_mc.parkRCheckIcon_mc._visible = true;
legend_mc.parkR_ch.selected = false;
}
//if Staff Parking checkBox is selected, show all Staff Parking symbols + icon
if (legend_mc.parkS_ch.selected) {
mapFull_mc.parkSAllInMap_mc._visible = true;
legend_mc.parkSCheckIcon_mc._visible = true;
legend_mc.parkS_ch.selected = false;
}
};
//Register listener events with all corresponding objects
legend_mc.elevators_ch.addEventListener("click", checkBoxListenerObject);
legend_mc.autodoors_ch.addEventListener("click", checkBoxListenerObject);
legend_mc.tdd_ch.addEventListener("click", checkBoxListenerObject);
legend_mc.van_ch.addEventListener("click", checkBoxListenerObject);
legend_mc.parkA_ch.addEventListener("click", checkBoxListenerObject);
legend_mc.parkG_ch.addEventListener("click", checkBoxListenerObject);
legend_mc.parkR_ch.addEventListener("click", checkBoxListenerObject);
legend_mc.parkS_ch.addEventListener("click", checkBoxListenerObject);
//=====Radio Button Listeners=====
//Enable radioButton functionality to pan map or select buildings
radioButtonListenerObject = new Object();
radioButtonListenerObject.click = function(eventObject) {

// trace("panMap called");
if (panMap_rb.selected) {
    mapFull_mc.onPress = function() {
        if (panMap_rb.selected) {
            mapFull_mc.startDrag(false, -(mapFull_mc._width/1.05), -
            (mapFull_mc._height/1.2), (mapFull_mc._width/2),
            (mapFull_mc._height/2));
            // mapFull_mc.startDrag();
            // trace("map dragable");
            } else {
            mapFull_mc.stopDrag();
            }
    };
    mapFull_mc.onRelease = function() {
        mapFull_mc.stopDrag();
        // trace("map not dragable");
    };
    }
if (selectBldg1_rb.selected) {
    // trace("place1 button selected");
    mapFull_mc.stopDrag();
    mapFull_mc.onRollOver = function() {
        this.useHandCursor = true;
    };
    mapFull_mc.onRollOut = function() {
        this.useHandCursor = false;
    };
};
panMap_rb.addEventListener("click", radioButtonListenerObject);
mapFull_mc.onPress = function() {
    if (panMap_rb.selected) {
        mapFull_mc.startDrag();
    }
};
mapFull_mc.onRelease = function() {
    mapFull_mc.stopDrag();
};
/*radioButtonListenerObject.focusIn = function(eventObject){
    // trace("panMap called");
    if (panMap_rb.selected) {
        mapFull_mc.onPress = function () {
            if (panMap_rb.selected) {

mapFull_mc.startDrag(false, -(mapFull_mc._width/1.05), -(mapFull_mc._height/1.2), (mapFull_mc._width/2), (mapFull_mc._height/2));
//    mapFull_mc:startDrag();
//    trace("map dragable");
} else {
mapFull_mc.stopDrag();
}
}
mapFull_mc.onRelease = function () {
mapFull_mc.stopDrag();
//    trace("map not dragable");
}
}
else {
mapFull_mc.stopDrag();
//    trace("map not dragable - panMap OFF");
}
if (selectBldg1_rb.selected) {
//    trace("place1 button selected");
mapFull_mc.stopDrag();
mapFull_mc.onRollOver = function () {
    this.useHandCursor = true;
}
mapFull_mc.onRollOut = function () {
    this.useHandCursor = false;
}
}
radioMap.addEventListener("focusIn",
radioButtonListenerObject);/*
//=====pushButton Listeners=====
//Enable pushButton functionality
pushButtonListenerObject = new Object();
pushButtonListenerObject.click = function(eventObject) {
    //    if (this.floorplan_pb.selected) {

getJSON("http://www.bubblechamber.tv/jmr/posts/FoundersFloorplan.pdf", 
"_blank");
    // }
};
/*-----------------------------FUNCTIONS-------------------------------
-----
//=====Check Box Functions====
//stop draggability when over the icon
legend_mc.elevatorCheckIcon_mc.onRollOver = function() {
trace("Over Elevator Icon");
legend_mc.stopDrag();

//Hide all elevator symbols when user clicks on corresponding icon
legend_mc.elevatorCheckIcon_mc.onRelease = function() {
    mapFull_mc.elevatorsAllInMap_mc._visible = false;
    legend_mc.elevatorCheckIcon_mc._visible = false;
    legend_mc.elevators_ch.selected = false;
};

//Hide all automatic door symbols when user clicks on corresponding icon
legend_mc.autodoorCheckIcon_mc.onRelease = function() {
    mapFull_mc.autodoorsAllInMap_mc._visible = false;
    legend_mc.autodoorCheckIcon_mc._visible = false;
    legend_mc.autodoors_ch.selected = false;
};

//Hide all TDD symbols when user clicks on corresponding icon
legend_mc.tddCheckIcon_mc.onRelease = function() {
    mapFull_mc.tddAllInMap_mc._visible = false;
    legend_mc.tddCheckIcon_mc._visible = false;
    legend_mc.tdd_ch.selected = false;
};

//Hide all SDRC Van symbols when user clicks on corresponding icon
legend_mc.vanCheckIcon_mc.onRelease = function() {
    mapFull_mc.vansAllInMap_mc._visible = false;
    legend_mc.vanCheckIcon_mc._visible = false;
    legend_mc.van_ch.selected = false;
};

//Hide all Accessible Parking symbols when user clicks on corresponding icon
legend_mc.parkACheckIcon_mc.onRelease = function() {
    mapFull_mc.parkAAllInMap_mc._visible = false;
    legend_mc.parkACheckIcon_mc._visible = false;
    legend_mc.parkA_ch.selected = false;
};

//Hide all General Parking symbols when user clicks on corresponding icon
legend_mc.parkGCheckIcon_mc.onRelease = function() {
    mapFull_mc.parkGAllInMap_mc._visible = false;
    legend_mc.parkGCheckIcon_mc._visible = false;
    legend_mc.parkG_ch.selected = false;
};

//Hide all Resident Parking symbols when user clicks on corresponding icon
legend_mc.parkRCheckIcon_mc.onRelease = function() {
mapFull_mc.parkRAllInMap_mc._visible = false;
legend_mc.parkRCheckIcon_mc._visible = false;
legend_mc.parkR_ch.selected = false;

//Hide all Staff Parking symbols when user clicks on corresponding icon
legend_mc.parkSCheckIcon_mc.onRelease = function() {
    mapFull_mc.parkSAllInMap_mc._visible = false;
    legend_mc.parkSCheckIcon_mc._visible = false;
    legend_mc.parkS_ch.selected = false;
};

//===Slider Control Functions=====
//Set slider & map zooming functionality
//When slider control is pressed make the slider control dragable
//Then set the Map Zoom boolean to true
magnify_mc.sliderZoom_mc.onPress = function() {
    magnify_mc.sliderZoom_mc.startDrag(false, SliderXStart, this._y, SliderXEnd, this._y);
    boolMapZoom = true;
};

//When slider control is released, it is no longer dragable
//And the map zoom boolean becomes false
magnify_mc.sliderZoom_mc.onRelease = function() {
    magnify_mc.sliderZoom_mc.stopDrag();
    boolMapZoom = false;
};

//If the map zoom boolean is true
//stretch the map by 10 x the slide control's length
magnify_mc.sliderZoom_mc.onMouseMove = function() {
    if (boolMapZoom) {
        NextZoom = magnify_mc.sliderZoom_mc._x - LastZoom;
        mapFull_mc._width = OriginalMapWidth + (20 * NextZoom);
        mapFull_mc._height = OriginalMapHeight + (20 * NextZoom);
        mapScale_mc._width = OriginalScaleWidth + (1.08 * NextZoom);
        // trace("map scaled by" + (20 * NextZoom));
        /* if (tabStartEnabled || tabEndEnabled) {
            mapFull_mc._width = mapFull_mc._width +
            ((magnify_mc.sliderZoom_mc._x - 557.6) * 10);
            mapFull_mc._height = mapFull_mc._height +
            ((magnify_mc.sliderZoom_mc._x - 557.6) * 10);
            mapScale_mc._width = (scaleWidth + magnify_mc.sliderZoom_mc._x - 557.6) * 0.6;
            mapScale_mc._height = 383.8 + ((magnify_mc.sliderZoom_mc._x - 557.6) * 10);
        } else {
        */
        trace("W: " + mapFull_mc._width);
        trace("H: " + mapFull_mc._height);
    } else {
}
mapFull_mc._width = 2 * (447.5 + ((magnify_mc.sliderZoom_mc._x - 557.6) * 10));
mapFull_mc._height = 2 * (383.8 + ((magnify_mc.sliderZoom_mc._x - 557.6) * 10));
mapScale_mc._width = (scaleWidth + magnify_mc.sliderZoom_mc._x - 557.6) * 1.3;
mapScale_mc._height = 383.8 + ((magnify_mc.sliderZoom_mc._x - 557.6) * 10);
trace("W: " + mapFull_mc._width);
trace("H: " + mapFull_mc._height);
*/
};
legend & scale
Frame 1
altLegend, <altLegend_mc>
scale_mc, <mapScale_mc>
22-northarrow
legendMC, <legend_mc>
frames
mapFrame
Frame 1
frame_mc, <mapFrame_mc>
printFrame
Frame 1
printFrame, <printFrame_mc>
outside border
Frame 1
school_logo
LogoText
Frame 1
treeshadows
Frame 1
logobackground
Frame 1
HSULogo-Bgnd.jpg
help
helptext
Frame 1
textspace
Frame 1
helpUI_gr, <help_mc>
tree
Frame 1
interface
buttons
Frame 1
Button, <mapPrint_cbu>
Button, <info_cbu>
Button, <newRoute_cbu>
Button, <placeFloorplanButton>

mapzoom
Frame 1
  magnify, <magnify_mc>

options
Frame 1
  RadioButton, <panMap_rb>
Button, <help_cbu>
Button, <showLegend_cbu>
ComboBox, <endPlace_cb>
ComboBox, <startPlace_cb>
  tempFix, <tempFix_mc>

halos
Frame 1
  startPlaceHalo, <startPlaceHalo_mc>
  startPlaceHalo, <endPlaceHalo_mc>

xml interface
Frame 1
bldg_info
tabs
Frame 1
  startTabOff_mc, <tabStartOff_btn>
  endTabOff_mc, <tabEndOff_btn>
  pathTabOff_mc, <tabPathOff_btn>
  startTab_mc, <tabStartOn_btn>
  endTab_mc, <tabEndOn_btn>
  pathTab_mc, <tabPathOn_btn>

bldg_info
Frame 1
  TextArea, <placeInfo_ta>
    (empty), <placeNameUpper_txt>

map
RouteText
Frame 1
    (empty), <routeText_txt>

RouteButton
Frame 1
mask
Frame 1
  hitmask_mc, <myHitMask_mc>

routeMap
Frame 1
  Loader, <routeMap_ldr>

hideAll
Frame 1
  curtain, <curtain_mc>
map
Frame 1
  map_mc, <mapFull_mc>
  Actions for map_mc
    /* Tests functionality of hitMask_mc instance.
    on(press) {trace ("hitMask pressed")} */
layout
mapframe
Frame 1
text
Frame 1
whitespace
Frame 1
hidden
Frame 1
  *****, <sample_txt>, (Arial, 6 pts)
RadioButton, <selectBldg1_rb>
RadioButton, <selectBldg2_rb>
Button, <focus_cbu>
Symbol Definition(s)
  altLegend
Layer 1
Frame 1
  Legend, (Verdana, 12 pts)
  T, (Verdana, 8 pts)
  TDD Phone, (Verdana, 10 pts)
  A, (Verdana, 8 pts)
  Automatic Door, (Verdana, 10 pts)
  E, (Verdana, 8 pts)
  Elevator, (Verdana, 10 pts)
  van_mc, <vanCheckIcon_mc>
  SDRV Van Pickup / Dropoff, (Verdana, 10 pts)
  P, (Verdana, 8 pts)
  Accessible Parking, (Verdana, 10 pts)
  P, (Verdana, 6 pts)
  General Parking, (Verdana, 10 pts)
  R, (Verdana, 6 pts)
  Resident Parking, (Verdana, 10 pts)
  S, (Verdana, 6 pts)
  Staff Parking, (Verdana, 10 pts)
  Accessible path, (Arial, 12 pts)
  Part of slope exceeds 5%, (Arial, 12 pts)
scale_mc
Layer 1
Frame 1
100', (Verdana, 6 pts)

22-northarrow
Layer 1
Frame 1
legendMC
Toggles
Frame 1
CheckBox, <parkG_ch>
CheckBox, <parkS_ch>
CheckBox, <parkR_ch>
CheckBox, <autodoors_ch>
CheckBox, <tdd_ch>
CheckBox, <parkA_ch>
CheckBox, <van_ch>
CheckBox, <elevators_ch>
elevatorIcon_mc, <elevatorCheckIcon_mc>
autodoorIcon_mc, <autodoorCheckIcon_mc>
tddIcon_mc, <tddCheckIcon_mc>
park-a1Icon_mc, <parkACheckIcon_mc>
park-n1Icon_mc, <parkGCheckIcon_mc>
park-s1Icon_mc, <parkSCheckIcon_mc>
park-r1Icon_mc, <parkRCheckIcon_mc>
vанIcon_mc, <vanCheckIcon_mc>

Layer 1
Frame 1
Legend, (Verdana, 12 pts)
Accessible path, (Arial, 12 pts)
Part of slope exceeds 5%, (Arial, 12 pts)
Click symbol to hide/show on map, (Verdana, 10 pts)
frame_mc
Layer 1
Frame 1
printFrame
Layer 1
Frame 1
helpUI_gr
Layer 1
Frame 1
UI_info_textspace
helpInfo_gr, <helpInfo_mc>
Use these drop-down menus to choose your starting or ending locations., (Arial, 10 pts)
Starting/Ending Location, (Arial, 12 pts)
Drop Down Menus, (Arial Black, 12 pts)
Location-specific Buttons, (Arial Black, 12 pts)
Shows accessibility options for the last selected building., (Arial, 10 pts)
Info, (Arial, 12 pts)
Click to view the last selected building's floorplan., (Arial, 10 pts)

Floorplan, (Arial, 12 pts)
Static Buttons, (Arial Black, 12 pts)
Click this button to print the current screen. Be sure to change
the printer preferences from portrait to landscape., (Arial, 10 pts)
Print, (Arial, 12 pts)
Click this button to show/hide a legend for the symbols on the
map. This legend can be moved. Click the symbols to show or hide the
corresponding symbols on the map., (Arial, 10 pts)
Legend, (Arial, 12 pts)
Click this button to show/hide this help text., (Arial, 10 pts)
Help, (Arial, 12 pts)
Slider, (Arial Black, 12 pts)
Zoom map in and out with this slider, (Arial, 10 pts)
Zoom, (Arial, 12 pts)
Radio Button, (Arial Black, 12 pts)
Select this button then move the map by clicking and dragging the
mouse or using the arrow keys., (Arial, 10 pts)
Move Map, (Arial, 12 pts)
Keyboard Command, (Arial Black, 12 pts)
Press key in paranthesis to use an object. For drop-down menus
navigate with arrows and select with spacebar., (Arial, 10 pts)
(), (Arial, 12 pts)
magnify
Layer 1
Frame 1
slider_mc, <sliderZoom_mc>
Zoom (+/-), (Arial, 12 pts)
tempFix
Layer 1
Frame 1
Starting Location (!), (Arial, 12 pts)
startPlaceHalo
Layer 1
Frame 1
startTabOff_mc
Layer 1
Frame 1
Start Info (S), (Verdana, 10 pts)
endTabOff_mc
Layer 1
Frame 1
End Info (E), (Verdana, 10 pts)
pathTabOff_mc
Layer 1
Frame 1
Route Info (R), (Verdana, 10 pts)
startTab_mc
Layer 1
Frame 1
Start Info (S), (Verdana, 10 pts)
endTab_mc
Layer 1
Frame 1
End Info (E), (Verdana, 10 pts)
pathTab_mc
Layer 1
Frame 1
Route Info (R), (Verdana, 10 pts)
hitmask_mc
Layer 1
Frame 1
hitmask_gr
curtain
Layer 1
Frame 1
map_mc
22-northarrow
Frame 1
21-legend
Frame 1
building_names
Frame 1
buildingNamesAllInMap_mc, <buildingNamesInMap_mc>
field_names
Frame 1
fieldNamesAllInMap_mc, <fieldNamesInMap_mc>
19-streetnames
Frame 1
to 101 S / Downtown Arcata, (Verdana, 14 pts)
14th Street, (Verdana, 14 pts)
15th Street, (Verdana, 14 pts)
B Street, (Verdana, 14 pts)
R, (Verdana, 14 pts)
ossow Street, (Verdana, 14 pts)
Union Street, (Verdana, 14 pts)
Spring Street, (Verdana, 14 pts)
B, (Verdana, 14 pts)
a, (Verdana, 14 pts)
yview Street, (Verdana, 14 pts)
16th Street, (Verdana, 14 pts)
17th Street, (Verdana, 14 pts)
Harpst Street, (Verdana, 14 pts)
Laurel Dri, (Verdana, 14 pts)
v, (Verdana, 14 pts)
e, (Verdana, 14 pts)
G, (Verdana, 14 pts)
r, (Verdana, 14 pts)
anite, (Verdana, 14 pts)
A, (Verdana, 14 pts)
v, (Verdana, 14 pts)
enue, (Verdana, 14 pts)
Sequoia Mall, (Verdana, 14 pts)
Mill Street, (Verdana, 14 pts)
to 101 N, (Verdana, 14 pts)
Sunset, (Verdana, 14 pts)
Avenue, (Verdana, 14 pts)
to 101 S, (Verdana, 14 pts)
Lib, (Verdana, 14 pts)
r, (Verdana, 14 pts)
ary, (Verdana, 14 pts)
Circle, (Verdana, 14 pts)
L.K., (Verdana, 14 pts)
W, (Verdana, 14 pts)
ood Boule, (Verdana, 14 pts)
v, (Verdana, 14 pts)
ard, (Verdana, 14 pts)

13-elevators
Frame 1
elevatorsInMap_mc, <elevatorsAllInMap_mc>

11-autodoors
Frame 1
autodoorsInMap_mc, <autodoorsAllInMap_mc>

12-tdd
Frame 1
tddInMap_mc, <tddAllInMap_mc>

10-vans
Frame 1
vansInMap_mc, <vansAllInMap_mc>

09-parking-a
Frame 1
parkA_mc, <parkAAllInMap_mc>

16-parking-g
Frame 1
parkGInMap_mc, <parkGAllInMap_mc>

15-parking-r
Frame 1
parkRInMap_mc, <parkRAAllInMap_mc>

14-parking-s
Frame 1
   parkSInMap_mc, <parkSAllInMap_mc>
06-a-paths
   Frame 1
buildings
   Frame 1
      buildingsAllInMap_mc, <buildingsInMap_mc>
field_details
   Frame 1
fields
   Frame 1
      fieldsAllInMap_mc, <fieldsInMap_mc>
18-vans
   Frame 1
      jollygiant-parking_mc
      harrygriffith-parking_mc
      union-parking_mc
17-parking-a
   Frame 1
      Cypress, (Verdana, 14 pts)
10-bldgnames-dorms
   Frame 1
      R, (Verdana, 14 pts)
09-bldgnames-facilities
   Frame 1
08-bldgnames-general
   Frame 1
09-bldgs-houses
   Frame 1
08-bldgs-learning
   Frame 1
07-bldgs-oncampus
   Frame 1
04-fieldnames
   Frame 1
03-fields
   Frame 1
02-sidestreets
   Frame 1
      02-sidestreets
undefined area
   Frame 1
      01-background
03-parking
   Frame 1
      parkingsAllInMap_mc, <parkingsInMap_mc>
background
Frame 1
van_mc
Layer 1
  Frame 1
    vans_mc, <vanMapIcon_mc>
elevatorIcon_mc
Layer 1
  Frame 1
    elevator_mc
autodoorIcon_mc
Layer 1
  Frame 1
    autodoor_mc
tddIcon_mc
Layer 1
  Frame 1
tdd_mc
park-aIcon_mc
Layer 1
  Frame 1
    park-a_mc
park-n1Icon_mc
Layer 1
  Frame 1
    park-n_mc
park-sIcon_mc
Layer 1
  Frame 1
    park-s_mc
park-rIcon_mc
Layer 1
  Frame 1
    park-r_mc
vanIcon_mc
Layer 1
  Frame 1
    vanIcon_mc, <vanCheckIcon_mc>
UI_info_textspace
Layer 1
  Frame 1
helpInfo_gr
Layer 1
  Frame 1
    HSU_tree.swf
slider_mc
Layer 1
  Frame 1
hitmask_gr
Layer 1
Frame 1
buildingNamesAllInMap_mc
Layer 1
Frame 1
BOAT, (Verdana, 16 pts)
UCS, (Verdana, 16 pts)
H81, <h81Name_txt>, (Verdana, 16 pts)
PS, (Verdana, 16 pts)
RR, (Verdana, 16 pts)
HWH, (Verdana, 16 pts)
S&R, (Verdana, 16 pts)
Alder, <alderName_txt>, (Verdana, 4 pts)
Art A, <artAName_txt>, (Verdana, 4 pts)
Art B, <artBName_txt>, (Verdana, 4 pts)
H37, <h37Name_txt>, (Verdana, 4 pts)
H87, <h87Name_txt>, (Verdana, 4 pts)
H52, <h52Name_txt>, (Verdana, 4 pts)
H18, <h18Name_txt>, (Verdana, 4 pts)
H97, <h97Name_txt>, (Verdana, 4 pts)
Cedar, <cedarName_txt>, (Verdana, 4 pts)
CL, <ceramicsName_txt>, (Verdana, 4 pts)
CDL, <cdlName_txt>, (Verdana, 4 pts)
Chinquapin, <chinquapinName_txt>, (Verdana, 4 pts)
Cypress, <cypressName_txt>, (Verdana, 4 pts)
Fern, <fernName_txt>, (Verdana, 4 pts)
Field House, <fieldhouseName_txt>, (Verdana, 5 pts)
FSH, <fishName_txt>, (Verdana, 4 pts)
Forbes Physical Complex, <forbesName_txt>, (Verdana, 5 pts)
FR, <frName_txt>, (Verdana, 4 pts)
Founders Hall, <foundersName_txt>, (Verdana, 6 pts)
Gist Hall, <gistName_txt>, (Verdana, 6 pts)
Green, <greenName_txt>, (Verdana, 4 pts)
H56, <h56Name_txt>, (Verdana, 4 pts)
H91, <h91Name_txt>, (Verdana, 4 pts)
H83, <h83Name_txt>, (Verdana, 4 pts)
Harry Griffith Hall, <hghName_txt>, (Verdana, 6 pts)
Heimok, <heimokName_txt>, (Verdana, 4 pts)
Jenkins Hall, <jhName_txt>, (Verdana, 6 pts)
H99 / CCAT, <h99Name_txt>, (Verdana, 4 pts)
H94, <h94Name_txt>, (Verdana, 4 pts)
Jolly Giant Commons, <jgcName_txt>, (Verdana, 5 pts)
Juniper, <juniperName_txt>, (Verdana, 4 pts)
Laurel, <laurelName_txt>, (Verdana, 4 pts)
Library, <libraryName_txt>, (Verdana, 5 pts)
Madrone, <madroneName_txt>, (Verdana, 4 pts)
van_mc, <vanMapIcon mc>
van_mc, <vanMapIcon mc>
van_mc, <vanMapIcon mc>
parkA mc
Layer 1
Frame 1
park-a mc
park-a mc
park-a mc
park-a mc
park-a mc
park-a mc
park-a mc
park-a mc
park-a mc
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park-a mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
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park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-a_mc
park-GInMap_mc
Layer 1
Frame 1
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-n_mc
park-RInMap_mc
Layer 1
Frame 1
park-r_mc
park-r_mc
park-r_mc
park-r_mc
park-r_mc
parkSInMap_mc
Layer 1
Frame 1
park-s_mc
park-s_mc
park-s_mc
park-s_mc
park-s_mc
park-s_mc
park-s_mc
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park-s_mc
park-s_mc
park-s_mc
park-s_mc
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park-s_mc
buildingsAllInMap_mc
Layer 1
Frame 1
pepperwood-bldg_mc, <pepperwoodBldg_mc>
h13-bldg_mc, <h13Bldg_mc>
be-bldg_mc, <beBldg_mc>
chinquapin-bldg_mc, <chinquapinBldg_mc>
hemlock-bldg_mc, <hemlockBldg_mc>
madrone-bldg_mc, <madroneBldg_mc>
maple-bldg_mc, <mapleBldg_mc>
tanoak-bldg_mc, <tanoakBldg_mc>
cypress-bldg_mc, <cypressBldg_mc>
sunset-bldg_mc, <sunsetBldg_mc>
studenthealth-bldg_mc, <shcBldg_mc>
h91-bldg_mc, <h91Bldg_mc>
sdrc-bldg_mc, <sdrcBldg_mc>
alder-bldg_mc, <alderBldg_mc>
redwood-bldg_mc, <redwoodBldg_mc>
nelson-bldg_mc, <nelsonBldg_mc>
univeristycenter-bldg_mc, <ucBldg_mc>
founders-bldg_mc, <foundersBldg_mc>
vmh-bldg_mc, <vmhBldg_mc>
forbes-bldg_mc, <forbesBldg_mc>
ceramics-bldg_mc, <ceramicsBldg_mc>
mus-bldg_mc, <musBldg_mc>
h56-bldg_mc, <h56Bldg_mc>
h52-bldg_mc, <h52Bldg_mc>
h53-bldg_mc, <h53Bldg_mc>
h55-bldg_mc, <h55Bldg_mc>
sculpture-bldg_mc, <h75Bldg_mc>
mus-a-bldg_mc, <musABldg_mc>
art-bldg_mc, <artBldg_mc>
thea-bldg_mc, <theaBldg_mc>
library-bldg_mc, <libraryBldg_mc>
h54-bldg_mc, <h54Bldg_mc>
sci-a-bldg_mc, <sciABldg_mc>
wf-bldg_mc, <wfBldg_mc>
willow-bldg_mc, <willowBldg_mc>
creekside-bldg_mc, <creeksideBldg_mc>
h81Bldg, <h81Bldg_mc>
libanxBldg, <libanxBldg_mc>
artBBldg, <artBldg_mc>
fieldsAllInMap_mc
Layer 1
  Frame 1
    bowl-bldg_mc, <rbField_mc>
    events-bldg_mc, <ceaField_mc>
    baseball-field_mc, <baseballField_mc>
    lpf_field_mc, <lpfField_mc>
    tc_field_mc, <tcField_mc>
  jollygiart-parking_mc
Layer 1
  Frame 1
  harrygriffith-parking_mc
Layer 1
  Frame 1
  union-parking_mc
Layer 1
  Frame 1
  02-sidestreets
Layer 1
  Frame 1
    75, (Helvetica Bold, 7 pts)
  01-background
Layer 1
  Frame 1
parkingsAllInMap_mc
Layer 1
  Frame 1
    ath_parking_mc, <athParking_mc>
    fr_parking_mc, <frParking_mc>
    hgh_parking_mc, <hghParking_mc>
    jg_parking_mc, <jgParking_mc>
    library_parking_mc, <libraryParking_mc>
    lower_parking_mc, <lowerParking_mc>
    main_parking_mc, <mainParking_mc>
    sd_parking_mc, <sdParking_mc>
    tc_parking_mc, <tcParking_mc>
  vans_mc
Layer 1
  Frame 1
    V, (Verdana, 8 pts)
elevator_mc
ceramics-bldg_mc
   Layer 1
   Frame 1
mus-bldg_mc
   Layer 1
   Frame 1
h56-bldg_mc
   Layer 1
   Frame 1
h52-bldg_mc
   Layer 1
   Frame 1
h53-bldg_mc
   Layer 1
   Frame 1
h55-bldg_mc
   Layer 1
   Frame 1
sculpture-bldg_mc
   Layer 1
   Frame 1
mus-a-bldg_mc
   Layer 1
   Frame 1
art-bldg_mc
   Layer 1
   Frame 1
thea-bldg_mc
   Layer 1
   Frame 1
library-bldg_mc
   Layer 1
   Frame 1
h54-bldg_mc
   Layer 1
   Frame 1
sci-a-bldg_mc
   Layer 1
   Frame 1
sci-c-bldg_mc
   Layer 1
   Frame 1
jenkins-bldg_mc
   Layer 1
   Frame 1
gist-bldg_mc
   Layer 1
Frame 1
h73-bldg_mc
Layer 1
  Frame 1
sci-b-bldg_mc
Layer 1
  Frame 1
wlf-bldg_mc
Layer 1
  Frame 1
ucs-bldg_mc
Layer 1
  Frame 1
police-bldg_mc
Layer 1
  Frame 1
rr-bldg_mc
Layer 1
  Frame 1
hwh-bldg_mc
Layer 1
  Frame 1
shipping-bldg_mc
Layer 1
  Frame 1
storage-bldg_mc
Layer 1
  Frame 1
h38-bldg_mc
Layer 1
  Frame 1
h36-bldg_mc
Layer 1
  Frame 1
h83-bldg_mc
Layer 1
  Frame 1
cdl-bldg_mc
Layer 1
  Frame 1
cdl-bldg_mc, <cdlBldg_mc>
plant-bldg_mc
Layer 1
  Frame 1
sci-d-bldg_mc
Layer 1
  Frame 1
Frame 1
h99-bldg_mc
Layer 1
Frame 1
h95-bldg_mc
Layer 1
Frame 1
juniper-bldg_mc
Layer 1
Frame 1
laurel-bldg_mc
Layer 1
Frame 1
la-bldg_mc
Layer 1
Frame 1
mwcc-bldg_mc
Layer 1
Frame 1
bw-bldg_mc
Layer 1
Frame 1
h90-bldg_mc
Layer 1
Frame 1
sci-e-bldg_mc
Layer 1
Frame 1
siemens-bldg_mc
Layer 1
Frame 1
h85-bldg_mc
Layer 1
Frame 1
sbc-bldg_mc
Layer 1
Frame 1
uanx-bldg_mc
Layer 1
Frame 1
wf-bldg_mc
Layer 1
Frame 1
willow-bldg_mc
Layer 1
Frame 1
creekside-bldg_mc
sd_parking_mc
Layer 1
Frame 1
tc_parking_mc
Layer 1
Frame 1
cdl-bldg_mc
Layer 1
Frame 1
APPENDIX K.

PROGRAM BUGS

- Upper Playing Field done as RBF for routes to/from H71, UC, Founders, Student Health, Nelson Hall West, and Siemens
- Nelson Hall West and Nelson Hall East are backwards graphically and in the routes XML, to be switched...
- Nelson Hall West is not done, Nelson Hall East done but mis-labeled
- Bowl West and Bowl East
- Extra routes drawn in for H71, UC, Founders, Student Health Center, Nelson Hall West and Siemens
- Only building routes shown... not routes between fields or parking lots
- FSH-UC Minimap missing
- For H71, UC, FH, SH, Cypress, Sunset and JGC, Buildings connected to the library are shown as having accessibility to Siemens Hall
- Nelson Hall East and West need to have 2 separate MovieClips for recoloring
- Van Duzer Theater and Theater Arts Building need to have 2 separate MovieClips
- NR folder is missing... only the old “unclean” versions are left in FLA form
- Some routes do not resize properly when loaded:
  - NR-FR
  - FR-NR
APPENDIX L.

POTENTIAL ADDITIONAL FEATURES

- Fix print feature to print route text on one page and route map on another page
- High-contrast version of map
- Full audio input/output
- Downloadable mp3 of route directions
- User can interact with map using voice commands
- Users can record/view route reviews
- Locations selectable by clicking on map
- Mini base map with region zoom
- Mini images of each building on map when user rolls over a location.
- When user selects a route make the textArea move up and down when the user presses up/down keys
- When user opens a start/endPlace ComboBox make it automatically scroll to object that begins with the same letters if the user presses a number of keys in rapid succession
- Add a “Sort By” function to switch from sorting by building name and Building Number.
- Include a feature to group houses
- Feature & Fix: Make map not move if a combobox is open. Also, allow users to skip through combobox items with page up/down and typing the first few letters of an item.
• Update route texts and buildings.xml to include special facilities and centers (i.e. can looks up MultiCultural Center, House 54 or Telonicher House)

• Add lines that show where you go in interiors?

• A movie that shows the walking path?
Abstract

This project is at the crossroads where my thesis work meets my GIS education and projects. It should result in the combination of my thesis work and my GIS projects into the foundation for a potential entrepreneurial activity making maps for people with physical disabilities. It will heavily use raster GIS analysis techniques to deal with issues of personal mobility and the accessibility of public spaces for people with physical disabilities.

This project seeks to deal with the following issues using GIS raster analysis: 1) How to get from any building to any other building at HSU. And 2) Which cities and large public institutions in Humboldt County could most use a similar accessibility analysis. This project will attempt to provide maps with highlighted routes for each major building used by students at Humboldt State University. It will also attempt to provide a list of public places in Humboldt County that are particularly hilly. If possible this project will include text directions and information about a user interface. In addition this project may attempt to extend its analysis beyond Humboldt County to other counties along the West Coast. Finally, this project may consider how to develop a user interface online and make this database management tool accessible online.
These two questions have been addressed in my thesis work developing an interactive Accessibility Analysis for HSU’s Student Disability Resource Center. The thesis project was handled using an interactive graphical user interface built in Flash using a database written using XML and ActionScript. My final project for the NRPI 470 Intermediate GIS course was an accessibility analysis of HSU's slopes. This project has informed my thesis writeup. In addition, my lab project and another lab possibility introduced at the beginning of NRPI 540 Raster GIS Analysis Seminar clarified the potential for converting the final project from NRPI 470 into a similar project powered by GIS, using cost-weighted analysis tools and techniques. In addition, GIS raster techniques learned in NRPI 540 should be useful in revealing where similar projects may be useful around Humboldt County, where tectonic activity has resulted in uneven terrain and difficulties for people with physical disabilities.

Introduction

This project uses raster GIS analysis techniques to find the least cost path for a person with a physical disability to get from any building to any other building at Humboldt State University without using a vehicle wherever possible. It also uses raster GIS techniques to find the locations of other schools where the unevenness of terrain may create a challenge for people with physical disabilities.
It also uses zonal statistics to determine where public buildings might be on particularly uneven terrain.

Materials and Methods

DEM of Humboldt County
Pathways at Humboldt State University
Footprint of cities around Humboldt County
Point data for locations of public facilities

Anticipated Products and/or Outcomes

Queryable geodatabase management system where any two buildings from campus can be selected and the best route can be displayed.

Statistical information about the cities that are most uneven around Humboldt County and contain the biggest public institutions.