Winter Hazard Accessibility Impact Reporting and Reference System for CU Boulder Campus

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Summary

Problem

Accessible entrances and paths on campus are not a reliable means of building access for people with mobility challenges during winter weather events. People lack the information they need to navigate campus as seamlessly as possible during winter events.

Need Statement

A way to address non-functioning accessible entrances and routes on CU Boulder's campus due to winter hazards so that all people can access buildings regardless of their mobility level.

Objectives

Create an enhancement to the existing interactive campus online map to represent the real time conditions of localized paths and entrances during inclement weather. Involve the greater campus community for real-time obstacle reporting. Ensure the map is representative of real weather conditions within a two hour margin. Improve the reported satisfaction of people with mobility challenges as they plan a route and navigate campus during poor weather conditions.

Project Proponents and Partners

- Facilities Management: Responsible for clearing paths around campus and will be needed to update path conditions as paths are cleared throughout the day.
- The greater campus population: A partner in reporting issues on campus in real time.
- Campus members with mobility challenges: Our direct partners to ensure we are meeting the community's needs appropriately.

Key Project Activities

We will begin by identifying the abilities of CU Boulder's current mapping platform to support new designs and the design elements needed in the updated mapping platform. Then we will design prototypes for new layers within the existing CU Boulder mapping system, conduct user tests with key stakeholders (facilities, students, faculty, members of the disability community) to gather feedback on initial designs, and iterate on prototypes based on feedback. With a refined prototype we will coordinate with the CU Facilities Management team and the Office of Disability Services to discuss prototype and implementation feasibility before implementing designs to the current CU mapping application for beta testing. We will iterate on our software design based on feedback from beta tests, then publish our final product design. We will conclude by communicating the release of the product with relevant stakeholders (students, faculty, staff, campus community).

Project Budget

The total funding needs for this project are $71,824. The budget needed to staff the personnel required to develop this project is $58,000, plus an additional need of $10,000 of time from staff at CU Boulder to integrate our deliverable into their platform and branding. An additional amount of $200 is required to incentivize participation in our test phase. Beyond that $3,280 is needed to distribute promotional materials to ensure people are aware of the resource, including posters for around campus, social media posts, and flyers in first year welcome packets. The rest of the budget will go towards software and office supplies.

Background and Context

Within the United States, educational institutions must ensure buildings have accessible entrances as outlined in the Americans with Disabilities Act (ADA). As a leading public university, CU Boulder has a population of over 36,000 undergraduate students[1], over 4,000 of which registered for disability accommodations in 2022[2]. In Boulder, an average of 23% of days between October and April have an inch or more of snow on the ground[3]. While buildings on campus have been retrofitted or constructed with features like ramps to comply with ADA requirements, this improved accessibility infrastructure is futile if snow and winter hazards prevent mobility-impaired community members from navigating campus paths at all.

The scope of this challenge encompasses all outdoor elements of CU Boulder's campus, including all entrances, ramps, exterior doors, pathways. The focus of the project will be on improving accessibility for individuals with mobility challenges during the winter months at CU Boulder. This includes but is not limited to students, faculty, staff, and visitors who may face difficulties accessing buildings due to any winter-related obstacles.

Despite being a known issue, few universities acknowledge winter accessibility in their documentation. One exemplar institution is Gallaudet University, which stipulates that clearing accessible entrances to buildings is prioritized over non-accessible entrances like stairs[4]. Another leader, Augsburg University, provides an emergency number to report ice on campus as well as salt buckets at the entrance to most of their buildings[5]. In addition, Augsburg and the University of Minnesota provide skywalks and underground tunnel systems. These pathways were not built to solve accessibility challenges but they provide a way for students to avoid weather hazards. Augsburg's skywalk system provides students, faculty, and staff access to the majority of the buildings on campus without having to go outside[6]. In a similar fashion, The University of Minnesota provides a robust system of skywalks and underground tunnels that connects buildings throughout campus[7].

These examples highlight how basic adherence to ADA does not mean universities are inherently accessible. This is especially true during winter months when campuses are subject to snow and ice which create hazards for anyone, regardless of their physical ability. While some universities have included additional strategies aimed at solving disrupted access to accessible pathways due to winter hazards, or have designed their campuses in a way to circumvent them, it's clear that a lack of proper resource allocation to the issue remains. Without ensuring that accessible paths are clear and operational, or including members of the disabled community in conversations with campus management, accessibility barriers will persist.

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[1] CU System Institutional Research. (n.d.). *CU Student Headcount*. University of Colorado. https://www.cu.edu/doc/custudentheadcountpdf

[2] University of Colorado System Office of Institutional Research. (2023). *University of Colorado 2022-2023 Diversity Report*. University of Colorado System Office of Academic Affairs. https://www.cu.edu/system/files/pages/81280-reports-policy-briefs/docs/2022-23-cu-diversity-report-final.pdf

[3] *Daily record weather at doc Boulder site (Apr 1990-present): NOAA physical sciences laboratory*. (n.d.). Retrieved April 26, 2024, from https://www.psl.noaa.gov/boulder/snow_ground.html

[4] Winter-Storm Emergency Preparedness: Plans & Procedures Gallaudet University/OSWDPolicy Guidelines. (n.d). *GU Winter Storm Plans & Procedures*. Gallaudet University. https://gallaudet.edu/wp-content/uploads/gcloud/gal-media/Documents/Office-for-Students-with-Disabilities/oswd-snow-preparedness-plan.pdf

[5] Facilities Management Snow Policy and Project Updates. (2021). *Inside Augsburg*. Augsburg University. https://amail.augsburg.edu/2021/11/22/facilities-management-snow-policy-and-project-updates/

[6] Fast Facts. (n.d). *About Augsburg University*. Augsburg University. https://www.augsburg.edu/about/facts/

[7] Gopher Way - Tunnels & Skyways. (n.d). *Parking & Transportation Services*. University of Minnesota. https://pts.umn.edu/Walk/Gopher-Way-Tunnels-Skyways

Project Need

Members of the CU community who rely on mobility aids often encounter significant obstacles in the winter when trying to move about campus. Winter hazards such as snow and ice make accessing spaces like dining halls and classrooms challenging; sometimes forcing non-attendance. The consequences for inaccessible pathways can lead students to feel overlooked, behind in their classes, and frustrated due to weather conditions outside of their control. Our group is looking for a way to address non-functioning accessible entrances on CU Boulder's campus due to winter hazards so that all people can access the building regardless of their mobility level. By ensuring accessible access to buildings on campus despite winter conditions, we can create safer campus environments for disabled students.

Target Group

Our project focuses on students with mobility challenges who depend on mobility aids, including wheelchairs, crutches, or walkers, to maneuver around campus. During winter months, severe weather disproportionately impacts students with mobility challenges because their aides are less able to adapt to the obstacles snow and ice accumulation create when compared to fully mobile peers navigating on foot. This creates barriers to building access and safety risks on campus. While our project primarily focuses on students at CU Boulder with limited mobility, accessible design solutions have the opportunity to extend beyond our primary group and benefit all members of the community. By ensuring accessible pathways and building entrances are kept clear during winter, our efforts promote inclusivity and enhance accessibility for everyone, including individuals with disabilities, faculty, staff, visitors, and those temporarily injured or transporting heavy loads. This fosters a more welcoming and equitable campus environment for all individuals, ultimately benefiting the entire campus.

Project Goal and Implementation

Our project aims to improve the experience of students with mobility disabilities as they navigate college walkways and building entrances during winter months. Ultimately we aim to make their experience less difficult and dangerous.

In order to address this problem, we created two primary objectives for our project:

1. Improve how CU Boulder communicates the impact of severe weather conditions on campus so that students with disabilities may plan their trips accordingly.
2. Improve the CU Boulder Facilities Management Team's response time in addressing winter hazards throughout campus. This objective can be further supported by leveraging student participation in identifying winter hazards throughout campus. Achieving these objectives will result in a safer, more inclusive campus for students with mobility disabilities that struggle to navigate campus during winter seasons.

We plan to design features within CU Boulder's online map, colorado.edu/map. The current interface enables community members to navigate campus, find parking, and access resources. Upgrading the existing map to include the ability to track winter weather/hazards on campus, enables students with mobility challenges to effectively plan their travel. Additionally, the platform will also function as a crowdsourcing application, allowing students, faculty, and staff to submit conditions updates to improve the facilities management team's response time for hazard removal. The new mapping layers will allow

students to assess current conditions to see which campus paths are covered by ice or snow, and where building entrances are inaccessible due to inclement weather. Additionally, the platform will allow for users to share community input through the form of standardized reports to help the facilities management team identify problematic areas. By simply selecting an area of campus on the map, a community member can update the system with current weather condition data.

To achieve this, our team will work over the course of 3 months alongside campus staff. Starting with a review of CU Boulder's mapping platform, our team will evaluate and implement our solution. Our team will also be responsible for designing and prototyping new features after brainstorming sessions, usability testing, conducting user interviews with campus faculty, staff, and students, and iterating on our designs. When the new features are ready to launch, our team will hand over promotional responsibility to CU Boulder's communications team who will be responsible for continuous promotion of the mapping system.

Activity Plan

This is an overview of our implementation plan. For our full Gantt chart, please refer to Appendix A.

Activity	Responsible Party	Time Frame	Notes
1) Identify abilities of current mapping platform to support new designs	Our team	1 week	Can be done in conjunction with Activity 2
2) Identify design elements needed in mapping platform	Our team	1 week	Can be done in conjunction with activity 1
3) Design prototypes for new layers within existing CU mapping system	Our team	2 weeks	Dependent on outcomes of Activities 1 & 2
4) Conduct user tests with key stakeholders to gather feedback on initial designs	Our team	3 weeks	Dependent on outcomes of Activity 3
5) Iterate on prototypes based on feedback	Our team	2 weeks	Dependent on outcomes of Activity 4
6) Coordinate with CU Facilities Management team and Office of Disability Services to discuss feasibility of prototypes and implementation	Our team, Facilities Management, Office of Disability Services	2 weeks	Can begin during Activity 3, cannot be finished until Activity 5 is complete
7) Implement designs to the current CU mapping application for beta testing	Our team, CU Web Development Staff	1 week	Can be done once feasibility is confirmed in Activity 6
8) Iterate on software design based on feedback from beta tests.	Our team	1 week	Dependent on outcomes of Activity 7
9) Publish final product designs.	Our team and CU Web Staff	2 days	Our team hands over responsibility to CU staff
10) Communicate release of product with relevant stakeholders (students, faculty, staff, campus community)	CU Boulder Communications Staff	Ongoing	Larger push needed early on, but continue engagement for most impact

Project Team

Our team consists of Will, an urban planner; LuLin, a UX designer; Shilpa, a UX researcher; and Joelle, an economist. All members of our team are familiar with the project management process. Will, our urban planner, is skilled at understanding the mapping principles we will utilize and how best to design our system around campus's existing infrastructure. LuLin and Shilpa will work together to find and design the specific features our enhancement to campus's existing mapping system will need for maximum success. Joelle will ensure the design of our project focuses specifically on what the campus community will find most valuable and will lead our effort to incentivize the broader campus community to engage in crowdsourced hazard reporting. Additionally, Joelle will facilitate the group's relationship with the Associate for Students with Disabilities for target community engagement. With our combined backgrounds, we bring expertise in digital accessibility projects, qualitative and quantitative research methodologies, data analysis and interpretation, project coordination, and organization skills. These skills will allow us to effectively plan, prioritize, and execute tasks to ensure the smooth progress of our project. Together, we are well-equipped to address the challenges of improving accessibility and mobility on campus.

Budget and Timeline

Budget (Link to full Gantt Chart can be found here)

Ref	Activity	Unit	Quantity Needed	Cost per Unit	Total Cost	Funding Source	Justification
1	**Personnel**						
1.1	Our Team-Shilpa, Joelle, Will, LuLin	Per person for 3 months	4	$ 14,500.00	**$ 58,000.00**	Grant	Salaries for our team
1.2	CU Boulder Staff Time (Project Management and Coordination)		2	$ 5,000.00	**$ 10,000.00**	Grant, CU Contribution	Staff time is necessary for project management, coordination, and communication with stakeholders throughout the project.
1.3	Participant Incentive for user testing	Per person	10	$ 20.00	**$ 200.00**	Grant	Incentive for participants to ensure diverse feedback from key stakeholders.
2	**Software**						
2.1	Figma	Per user for 3 months	12	$ 12.00	**$ 144.00**	Grant	Figma's versatility, real-time collaboration, and intuitive interface make it indispensable for designing modern, user-centric solutions. Figma cost=4 users for 3 months
3	**Office Supplies**						
3.1	Paper, pen, other stationary		4	50	**$ 200.00**	Grant	Necessary for making low fi prototypes and taking notes during user testing
4	**Printing and Promotion**						
4.1	First year packet flyers		8000	$ 0.40	**$ 3,200.00**	Grant	Printing promotional materials would help to communicate the release of the new mapping features to the CU Boulder community.
4.2	Posters		40	$ 2.00	**$ 80.00**	Grant	
	TOTAL				**$ 71,824.00**		

Timeline and Activities Schedule (Link to full Gantt Chart can be found here)

Ref	Milestone Description	Category	Assigned to	Progress	Start	Days
1	**Identify the abilities of CU Boulder's current mapping platform to support new designs**	Milestone				
1.1	Review existing features and functionalities of the CU Boulder mapping platform	Low Risk	Joelle	**1%**	4/28/2024	3
1.2	Assess the underlying technology and limitations of the current platform.	Low Risk	Joelle	**2%**	5/1/2024	1
1.3	Identify any potential constraints or opportunities for integrating new features.	Low Risk	Joelle	**2%**	5/2/2024	3
2	**Identify design elements needed in the mapping platform**	Milestone				
2.1	Conduct research on best practices for mapping platforms.	Low Risk	Shilpa	**5%**	5/5/2024	3
2.2	Compile a list of desired design elements based on user needs and industry standards.	Low Risk	Will	**3%**	5/8/2024	3
2.3	Prioritize design elements based on importance and feasibility. *dependent on previous step	Low Risk	Will	**2%**	5/11/2024	1
3	**Design prototypes for new layers within the existing CU Boulder mapping system.**	Milestone				
3.1	Create wireframes or mockups for each new feature or layer.	Low Risk	Lulin	**5%**	5/12/2024	12
3.2	Ensure consistency with existing CU Boulder branding and design guidelines. *dependent on previous step	Low Risk	Will	**5%**	5/24/2024	2
4	**Conduct user tests with key stakeholders (facilities, students, faculty, members of the disability community) to gather feedback on initial designs.**	Milestone				
4.1	Recruit participants from each stakeholder group for usability testing.	Low Risk	Shilpa	**3%**	5/26/2024	14
4.2	Develop test scenarios and tasks to evaluate the effectiveness of the prototypes.	Low Risk	Shilpa	**5%**	6/9/2024	3
4.3	Facilitate usability testing sessions and gather feedback from participants. *dependent on previous two steps	Low Risk	Shilpa	**5%**	6/12/2024	2
4.4	Document observations and feedback from each testing session.	Low Risk	Shilpa	**2%**	6/14/2024	2
5	**Iterate on prototypes based on feedback**	Milestone				
5.1	Analyze feedback from user testing sessions. *dependent on previous two steps	Low Risk	Shilpa	**5%**	6/16/2024	3
5.2	Identify areas for improvement	Low Risk	Will, Joelle	**3%**	6/19/2024	4
5.3	Update prototypes based on feedback, making revisions as necessary.	Med Risk	LuLin	**2%**	6/23/2024	7

6	**Coordinate with the CU Facilities Management team and the Office of Disability Services to discuss feasibility of the prototypes and implementation.**	Milestone				
6.1	Schedule meetings with relevant stakeholders to review prototypes.	Low Risk	Joelle	**2%**	6/30/2024	2
6.2	Present prototypes and discuss technical feasibility and implementation considerations.	Low Risk	Entire team	**3%**	7/2/2024	5
6.3	Address any concerns or questions raised by stakeholders. *dependent on previous step	Low Risk	Entire team	**5%**	7/7/2024	7
7	**Implement designs to the current CU mapping application for beta testing:**	Milestone				
7.1	Develop a plan for implementing the updated designs into the existing mapping platform.	Low Risk	Will	**5%**	7/14/2024	4
7.2	Coordinate with developers to integrate new features and layers.	Med Risk	LuLin	**5%**	7/18/2024	3
8	**Iterate on software design based on feedback from beta tests**	Milestone				
8.1	Gather feedback from beta testers on the usability and effectiveness of the updated mapping platform	Low Risk	LuLin	**3%**	7/21/2024	3
8.2	Identify any bugs or issues that arise during beta testing. *dependent on previous step	Low Risk	LuLin	**2%**	7/24/2024	2
8.3	Make necessary adjustments and refinements to the software based on feedback.	Med Risk	LuLin	**5%**	7/26/2024	3
9	**Publish final product designs.**	Milestone				
9.1	Finalize designs based on feedback and testing results. *dependent on previous step	Med Risk	Entire team	**5%**	7/29/2024	1
9.2	Prepare documentation outlining the new features and enhancements.	Low Risk	Will	**5%**	7/30/2024	1
10	**Communicate release of product with relevant stakeholders (students, faculty, staff, campus community):**	Milestone				
10.1	Coordinate with CU Boulder's communications team to develop a communication plan for announcing the release of the updated mapping platform.	Low Risk	Joelle	**5%**	7/30/2024	1/2
10.2	Communicate with stakeholders via email and other channels to inform them of the changes and encourage adoption.	Low Risk	Joelle	**5%**	7/30/2024	1/2

Monitoring and Evaluation Plan

Question	Indicator	Data Source
Impact		
Has there been a measurable decrease in mobility related incidents on campus during winter months since the mapping platform has been implemented?	Number of reported winter mobility-related incidents before vs. after implementation	Incident reports from CU Boulder Facilities Management.
What experiences have students reported in terms of their use of the new mobility mapping platform?	Response type (negative, positive, neutral) of user feedback regarding the platform's usability and effectiveness.	Feedback surveys.
Have students reported experiences of mobility challenges changing or improving since implementing the new features?	Increase in the percentage of students reporting positive experiences with newly implemented features	Pre and post-implementation surveys with students, interviews with students with mobility challenges.
Effectiveness		
How effectively does the new mapping platform allow students with disabilities to plan their campus routes during winter months?	Positive responses from users – specifically those with mobile disabilities	Feedback surveys, Interviews
How effective is the new platform at providing current winter weather data?	Users are pleased with and confirm the accuracy of weather condition data provided by the platform	Incident reports from CU Boulder Facilities Management.
How effective is the platform at gathering user-submitted feedback to help in improving response-times of the facilities management team?	Increase in facilities management's response to clearing paths, and positive user feedback on the quality of paths when cleared	Facilities Management records on response times, user feedback on path conditions and response times.
Are the crowdsourced updates accurately reflected within the mapping platform?	Positive user feedback regarding the reliability of crowdsourced info	Comparison of crowdsourced updates with actual conditions, user feedback surveys.
Is the platform meeting objectives detailed in the project implementation plan?	Compare with milestones outlined in our implementation plan and measure the impact / success through positive user feedback	Progress reports tracking the milestones

Question	Indicator	Data Source
Efficiency		
Are there any features within the mobility mapping platform that could be improved or streamlined to enhance efficiency?	Positive user feedback on road condition and crowdsourcing features and how they integrate with CU Boulder's existing map	User feedback surveys, User interviews
What are the costs of maintaining the new mobility mapping platform? And do the costs outweigh the benefits provided to students with disabilities?	Results from a cost-benefit analysis that indicate a positive correlation between the increased satisfaction + safety from students with disabilities vs. the cost to maintain features	Data/statistical reports
Has the response time of the CU Boulder Facilities Management Team improved since the new mapping platform was implemented?	Increase in facilities management's response time to path conditions before and after product implementation	Facilities Management records on response times, comparison before and after implementation.
Relevance		
Are the mapping features and navigation capabilities relevant for students with disabilities? Do they address the challenges experienced by students with disabilities on campus?	Decrease in reports of navigation errors or difficulties from students with mobile disabilities	Survey feedback
Is the platform capable of adapting to new changes in terms of infrastructure or developments on campus?	Feedback from IT regarding ease of updating the platform with new campus developments or changes	IT reports, feedback from developers.
Sustainability		
What plans and budget are in place to ensure the long-term maintenance of the new mapping platform?	Stakeholders agree to an ongoing funding plan that is outlined and documented	Funding agreements, Budget reports
What processes or systems are set up to respond to user-submitted feedback or complaints?	Decrease in average time to evaluate and implement feedback submission and receive positive feedback from users	Records of feedback submissions, response times, user feedback on responsiveness.
Is the mapping platform able to evolve over time based on the specific needs of students with disabilities to ensure inclusivity and accessibility over time?	Feedback from IT regarding ease of updating the platform with new campus developments or changes combined with feedback from students with disabilities on usefulness of new features or their need for new features.	IT reports, User interviews and surveys.