A NATIONAL AVALANCHE CENTER MOBILE APPLICATION

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Abstract: Beginning with discovery in April of 2022, the Northwest Avalanche Center has been working to develop a mobile application that has the potential to be branded as a national avalanche app and utilized by any avalanche center who publishes their products through the National Avalanche Center dashboard.

1. INTRODUCTION

Technology is the mechanism through which we reach our users, and maintaining best-in-class products to deliver weather and avalanche products is crucial to our work. In April of 2022 NWAC began a discovery process to understand technology gaps for users of the NWAC products. Through that process we identified a native mobile application as an opportunity to address barriers to users realizing the full value of our products. During the build exploration we also recognized the potential to harness the National Avalanche Center (NAC) platform to create one app that would be available to any avalanche center (AC) that publishes their products through the NAC dashboard. The beta version of the app launched internally in the spring of 2022 and will be available for public use in fall of 2023.

2. DISCOVERY

To ensure we were best serving our users and staff, NWAC launched an initiative to understand what technology gaps existed in the Spring of 2022. Our first step was identifying friction points for users accessing our products both on the computers and their phones. NWAC is mobile majority use, and we have anecdotal evidence that there are substantial friction points for viewing avalanche and weather data on the mobile version of the website. As part of discovery, we ran an incentivized user survey, conducted user interviews, polled our staff, and did a market analysis of what tools currently exist.

2.1 User survey

There were 1481 respondents to the user survey¹ in the spring of 2022. The survey included 53 questions broken into sections that

asked about: backcountry demographics, (user type, level of avalanche education), website use, mobile use, observations, weather station use, and general demographics. The goal was not to ask directly if NWAC should build an app but rather to understand challenges and then decide the best course of action for addressing those challenges.

2.2 Staff Survey

Nine NWAC staff² members filled out a lengthy survey to ensure that any technology tools we built were also meeting staff needs and streamlining processes. Publishing a forecast can be an arduous process at the end of a long shift, so part of our goal was to identify efficiencies in the forecaster workflow.

2.3 User interviews

NWAC staff and tech committee members conducted eight user interviews with general users as well as avalanche educators. Instructors of level 1 avalanche classes are often users' first experience with applying the forecast and therefore have deep insight into the efficacy and challenges.

2.4 Market analysis

NWAC staff conducted a thorough market analysis of the available weather, avalanche, mapping, and trip planning mobile apps available through the Apple and Google Play stores.

Based on the surveys, user interviews, and market analysis we found that although users were generally happy with the quality of our products, mobile use had several friction points, including navigation, reception, and user interface. We explored the options for devoting resources to optimize our website for mobile use which would have less cost, address some challenges, and focus our efforts on one platform. Ultimately, we decided that the opportunities for improving user experience, increasing connections with our users via observations, push notifications, and offline caching, as well as a greater range of future opportunities were worth the increased cost and resources for building a mobile app.

3. DESIGN

Our first step in the design process was classifying our target audience and establishing the goals for the product. We leaned on academic research (St. Clair et al., 2021)³ in addition to our own internal classification for users to create five user personas⁴ - Below Novice, Novice, Intermediate, Expert, and Professional. The app was designed primarily with the Novice and intermediate users in mind; however, we anticipate wide scale adoption by Expert and Professional and therefore took their needs into account.

Avalanche centers across the US provide a range of services to their users in addition to their core weather and avalanche products including but not limited to: education, incident report compilation, historical data, membership and donation opportunities, and volunteer information. In the interest of limiting scope, we decided to focus on the core products NWAC users apply for trip planning: avalanche forecasts, weather forecasts, weather station data, and observations, both view and submit.

We hired two designers to build interactive mockups and conducted nearly 20 user interviews with users of varied experience levels to gauge usability and patterns. The mockups were converted to semi-final designs developers used to build the beta version of the NWAC mobile app.

4. BUILD

Significant groundwork for building the app was conducted by NWAC's Technology Committee which is made up of volunteers with technical expertise. They devoted countless hours to ensure that when we hired a developer they would be set up with clear documentation and a solid starting place to spool up quickly. In November of 2022 we hired a contract developer for the extent of this project. He worked closely with NWAC staff, members of the tech committee, and the designers to build the app from December to April when the beta version was launched to the public.

3.1 Multi-Center Collaboration

Significantly, because several of our trip planning tools are produced through the National Avalanche Center dashboard, we had an opportunity to build this app for NWAC and any avalanche center using the NAC's tools at limited additional cost. We consulted with the National Avalanche Center to explore this possibility and refine the concept and decided the extra cost was worth the potential savings for avalanche centers that would have an app with little to no cost. As a nationally branded app, users would be able to select their forecast center when they install the app, and their preferences will be saved until they wish to change them.

From a technician perspective, the app is built with React native, an open-source framework developed by Facebook for building mobile applications using JavaScript and React. It allows developers to create native mobile apps for iOS, Android, and other platforms using a single codebase. Additionally, we used Expo, a free and open-source platform that simplifies the process of developing, building, and deploying mobile applications using JavaScript and React Native.

The app uses API from NAC for querying avalanche forecasts, warnings, weather, observations, etc. It also uses APIs from NWAC wordpress site for querying weather forecasts and observations specific to NWAC, since currently weather forecasts and observations are not yet populated into the NAC platform. NWAC will transition to the NAC observations platform in October 2023. Long term, these APIs/data behind them will be migrated to the NAC. The code base lives in a GitHub repository⁵.

5. BETA LAUNCH

The app launched to approximately 50 people in March of 2023 including NWAC staff, board, and donors whose contributions made the app possible. Users provided feedback via an error log, survey, and user interviews with staff. Though there were some bugs, feedback was overwhelmingly positive, and users described the experience as dramatically improved.

The app has the following benefits:

- Simplifies access: Viewing the forecast requires just one tap versus opening a web browser and searching.
- Mobile-native UI flows: We streamlined accessing trip planning products so that core information is clustered by zone. From each forecast zone users have one tap access to the avalanche forecast, weather forecast, weather stations, and zone-specific observations. Forecast components are collapsible to reduce scrolling and switching zones are easily navigable.
- Off-line caching: Users can now view the forecasts, weather data, and observations as well as submit observations when they're offline.
- Push notifications: Though not yet launched, we anticipate push notifications to be available with the public launch to alert users of forecast updates, warnings or watches, and significant weather events.
- Favorites: users will have the ability to record preference (forecast zones, weather stations, observation types etc.)

6. NEXT STEPS

The original team that built the app is working this fall to address any bugs, add final features, and add one additional avalanche center to the public launch in November 2023. NWAC staff is working with the NAC and the Sawtooth Avalanche Center to have the first version of the multi-center app available with launch. The app will be branded as a national app, both in name and logo, and if all goes well with development in September and October, users will be able to select between NWAC and Sawtooth Avalanche Center upon first installation and view the same core functionality for both centers.

Ultimately, we aim to build a high-quality publicfacing tool to improve user experience and decrease or eliminate the cost for other centers to use this app. We are looking forward to feedback from both users and other stakeholders in this first year and hoping to adopt more avalanche centers in the coming year.

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