

# «Base Map» - a new vector tiles-based map for mobile applications

Mark Wigley <sup>a</sup>, Karsten Pippig <sup>a\*</sup>, Tobias Stalder <sup>a</sup>, Sebastian Denier <sup>a</sup>, Christoph Streit <sup>a</sup>

<sup>a</sup> Federal Office of Topography swisstopo, Mark Wigley – [mark.wigley@swisstopo.ch](mailto:mark.wigley@swisstopo.ch), Karsten Pippig – [karsten.pippig@swisstopo.ch](mailto:karsten.pippig@swisstopo.ch), Tobias Stalder – [tobias.stalder@swisstopo.ch](mailto:tobias.stalder@swisstopo.ch), Sebastian Denier – [sebastian.denier@swisstopo.ch](mailto:sebastian.denier@swisstopo.ch), Christoph Streit – [christoph.streit@swisstopo.ch](mailto:christoph.streit@swisstopo.ch)

\* Corresponding author

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## Abstract:

Digital maps have undergone profound changes in recent decades. With the widespread availability of the internet, web-based mapping services and the mobile use of geodata on smartphones, maps have become a ubiquitous and indispensable source of information. At the same time, user expectations have increased significantly: modern maps are expected not only to support orientation but also to be dynamic, up to date, interactive and adaptable to individual needs. Against this background, swisstopo aims—within the framework of its 2025 Strategy — to continuously adapt its cartographic services to evolving user patterns and the needs of future generations. A central element of this strategic direction is the “Next Generation Map” project, which focuses on developing innovative cartographic solutions for the digital environment.

An important milestone of this project was reached in spring 2024 with the release of the new “Base Map” in the swisstopo app. This map is entirely based on vector tile technology and was specifically designed for mobile use. It complements swisstopo’s existing map portfolio and provides a modern alternative to the traditional national map, tailored particularly to the requirements of smartphone users. While its design remains inspired by the visual identity of the Swiss national map, numerous cartographic elements have been adapted to improve readability and performance on small screens.

A key characteristic of the Base Map is the vector-based representation of **terrain**, which has long been a defining feature of Swiss cartography. By using modern vector technology, terrain can be rendered efficiently while keeping storage requirements low. The complete map of Switzerland and Liechtenstein requires less than three gigabytes of storage while enabling seamless and highly performant zooming. This technical foundation allows map content to be displayed dynamically and interactively, creating a flexible basis for future extensions and adaptations.

Another important feature of the Base Map is the integration of **points of interest (POIs)** and real-time information. **Mobile maps** are frequently used for tasks such as orientation, navigation, search and decision-making, where up-to-date information is crucial. The Base Map therefore combines swisstopo’s authoritative geodata with dynamically integrated data from external sources. In this way, the map acts as a bridge between traditional cartographic visualisation and connected, data-driven information services. Furthermore, the underlying **vector tile** service is available free of charge as part of the Swiss Map Web product line, allowing third parties to integrate the map into their own applications and projects.

The development of the Base Map followed a user-centred approach. During the early design phase, users under the age of 30 were actively involved in the development process. An initial prototype was presented, discussed and evaluated in three focus groups, and the insights gained were directly incorporated into the subsequent product development. The map was then deliberately released as a Minimum Viable Product (MVP) in order to collect real-world user feedback at

an early stage. This iterative approach enabled swisstopo to continuously refine the product based on actual user needs and to avoid misaligned developments.

Six months after its release, swisstopo conducted a comprehensive user survey with 4,849 participants. Around two thirds of respondents rated the Base Map positively, particularly highlighting its modern design, ease of use and clear presentation. Users under the age of 35 showed especially strong acceptance and used the map more frequently, confirming the project's objective of addressing a younger generation of map users. At the same time, the survey revealed areas for improvement, including loading performance and the relatively low colour contrast compared with the traditional national map.

The improvements derived from this survey have already been implemented, particularly enhancing the readability, colour contrast and overall performance of the map. However, the user-centred development of the Base Map is being continuously pursued. Further optimisations are planned for summer 2026, aiming to further enhance the user experience through refinements in cartographic design as well as technical improvements related to performance and interaction. To assess the impact of these enhancements, another user survey is planned for autumn 2026, which will systematically evaluate how the implemented changes affect usability and user satisfaction.

This paper presents the conceptual and technical development of the Base Map as well as the user-centred development process behind it. It also discusses the main findings of the user studies. The Base Map demonstrates how traditional cartographic quality can be combined with modern web technologies, dynamic data sources and evolving user expectations. As such, it represents an important step in the further development of swisstopo's digital mapping services and provides a foundation for future innovations in mobile and interactive cartography.

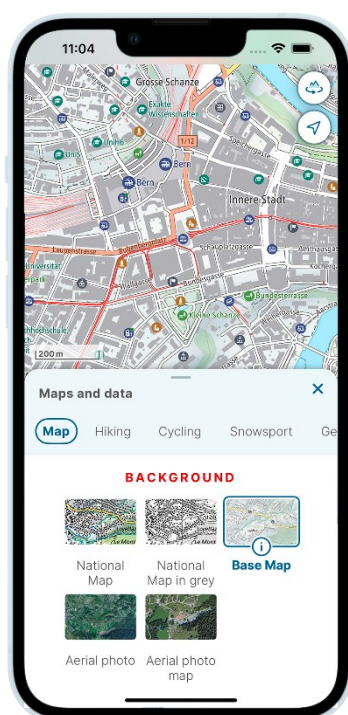


Figure 1. (left): Example of the map representation.

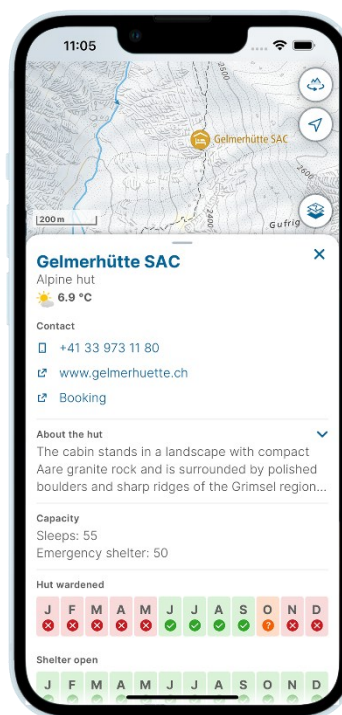


Figure 2. (right): Example of user interface design.