The Application of a User-Centered Design Framework to a Static Topographic Ski Touring Map

by **Vivien van Dongen**

Ski touring is an activity where the skier ascends and descends the mountain outside the slopes of ski resorts. Ski tourers use maps for planning, navigating, and reflecting on ski tours. Even though ski touring is a popular sport, no research has been conducted on user-centered ski touring map design.

This research is set out to create a user-centered ski touring map. A new user-centered design (UCD) framework was created, which contributes to the field of cartography by providing cartographers with a rigor, thorough and cost-efficient approach to incorporate the user in the production of static maps. The application of this UCD framework to the ski touring map production fills the niche market of user-centered ski touring maps succesfully.

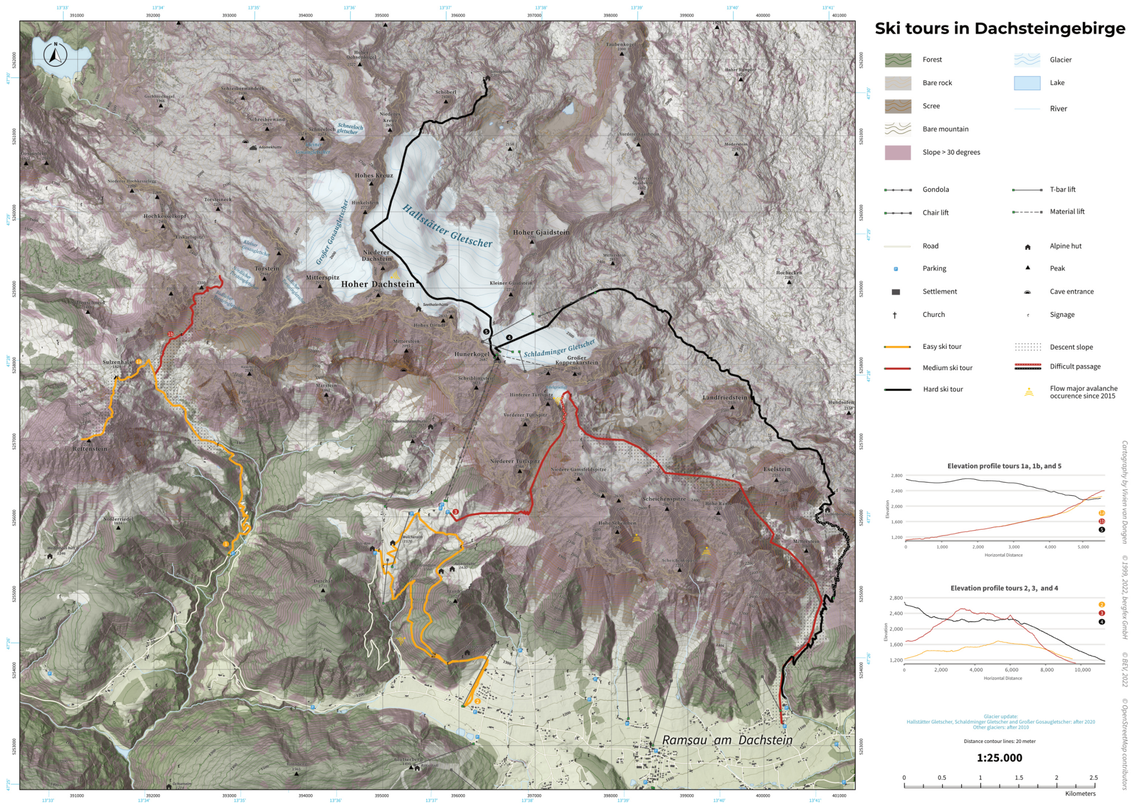

Fig. 2. The final map result after the user study

Research Objectives

To create a user-centered ski touring map design following a UCD framework, solely using open data.

1. Examining the needs and demands of ski tourers for ski touring maps.
2. Applying a user-centered framework to a ski touring map design using open data
3. User testing the new map design in terms of map use in order to fulfill the user-centered framework.

Fig. 1. A part of the preliminary map design (above) and the improvements (down).

Methods

The following fives phased UCD framework was developed based on the UCD approaches of Roth, Ross, & MacEachren [1] and Tsou & Curran [2]:

(i) accommodating the needs and demands of the target group through an in-depth literature review, comparing existing ski touring maps and interviewing the target group; (ii) establishing the map's purpose and design considerations; (iii) designing the preliminary map; (iv) evaluation of the map by ski tourers using a survey, and (v) finalizing the design tailored to the needs and demands for ski touring.

Needs and Demands

To find the needs and demands of the ski tourers, seven ski touring maps were compared and five interviews with target users were conducted. Ski tourers prefer large-scale topographic maps with detailed information about landcover and the steepness of the slopes, helpful for navigation and assessing avalanche risk.

Map considerations

The map displays the Dachsteingebirge in Austria. The scale is 1:25.000. Contour lines and pink shading visualize the slope. The transparent pink shading is on top of slopes steeper than 30 degrees, where avalanches are more likely to occur.

Map production

The preliminary map design was produced with a DEM model with 1 meter resolution of the Austrian government and data from OpenStreetMap.

Map evaluations

A user study was conducted with 20 ski tourers. They were asked questions on legibility and use of the preliminary map design, as well as on its usefulness for planning, navigating and reflecting, as well as for assessment of avalanche risk. The participants found the map useful for planning, navigating and reflecting, but had remarks on the contour lines color, the font sizes and height indications.

Map improvement

The results of the user study were used to improve the map design according to their needs. Changes were made for contour line color and font size. More height indications and information on previous avalanches were added, see Figure 1.

Conclusion

The final user-centered ski touring map design can be seen in Figure 2. This research fills the cartographic gap with a new map design and a UCD framework that directly links the ski tourers'needs and demands to the map design.

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Chair Professor and Supervisor: Univ.Prof. Mag.rer.nat. Dr.rer.nat. Georg Gartner, Technische Universität Wien

Reviewer: Dr.rer.nat Nikolas Prechtel

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Keywords

Static map production, user-centered design, ski touring

Link to map

References

[1] Roth, R. E., Ross, K. S. & MacEachren, A. M. (2015). User-centered design for interactive maps: A case study in crime analysis. ISPRS International Journal of Geo-Information, 4(1), 262-301.

[2] Tsou, M.-H. & Curran, J. M. (2008). User-centered design approaches for web mapping applications: A case study with usgs hydrological data in the united states. In International perspectives on maps and the internet (pp. 301–321). Springer, Berlin, Heidelberg.

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