

MOUNTAIN GUIDE 3 IN 1 - UTILIZING CARTOGRAPHY TO ENHANCE PRINT, INTERNET AND MOBILE MEDIA

KRIZ K.

Department of Geogrphy, VIENNA, AUSTRIA

Printed guide books as well as high quality large scale topographic maps have been accompanying alpinist endeavors effectively for many decades assisting the user during navigation in unknown mountainous areas. They have become an indispensable tool that developed over years utilizing technological know-how as well as advanced graphic design. However user interaction and participation were in the past very restricted. With the emergence of internet and mobile technology our way of thinking and working is changing dramatically. In this context print media seems to be retreating despite the fact that it still offers the best (carto)graphic visual resolution and haptic performance. Internets omnipresence is indisputable and mobile applications allow nowadays users to access spatial information ubiquitously. So why do we need analog printing if you can get everything digitally anywhere, in abundance and straight away?

In the course of a cooperation project based at the University of Vienna (Austria), Department of Geography and Regional Research work on utilizing cartography to enhance print, internet and mobile media is being undertaken. The goal is to analyze and evaluate various approaches on how cartography can be used to assist geospatial communication based on high quality large scale topographic maps and map related depictions. One practical outcome of the project is the production of a mountain guidebook with a strong focus on cartographic communication based on print, internet and mobile access. Furthermore user logging and tracking is incorporated to analyze utilization of individual tasks. This is assisted by a detailed database driven support system that captures all user relevant interface movements for post processing analysis.

The mountain guidebook that has been produced within the project embraces all three media equally and consists of 175 unique tours of the Eastern Austrian Alps, each of which are linked to textual, photographic as well as cartographic based information. Additionally geo-located data as GPS-tracks and three dimensional map related representations are adopted.

Specific topics and questions concerning the utilization of print, internet and mobile media in the context of cartographic communication will be addressed in this contribution. Furthermore concepts and strategies based on geospatial information transfer combining all three media will be presented.

INTRODUCTION

One of the major goals of cartography nowadays is to communicate information in an effective and sophisticated manner to achieve extensive insight on the process of spatial information retrieval. This can be achieved in many ways such as by disseminating analog spatial depictions through maps printed on paper or by communicating geo-information utilizing modern state of the art digital technology. Regardless of which approach is favored both address the user in a similar way. The approach must stimulate and activate the user to extract spatial information in order to promote an action.

Analog printed maps look back on a long tradition and have proven to be very efficient. The printing reproduction process as initiated over 500 years ago was one of the major thrusts that promoted not only cartography but mass communication on the whole. Digital technology nowadays utilizes similar transmission processes and supports new ways of communicating. However these methods and processes must consider design issues for successful communication. Independent of technology design is an important factor.

The usage of the internet with mobile devices for example is one of many prospering fields that can also be facilitated and is currently dominating cartography as well as the global use of geodata in the general public. The user has now a wide range of possibilities to access information assisted by technology. Whether utilizing analog or digital media there is however no difference in the process of obtaining insight. The perceptual use of visual, haptic and acoustic methods play a central role in cartographic communication. It is therefore important to be aware of the perceptual stimulus underlying this process and to understand the cartographic language of communication.

Cartography as a communication model describes the principles of understanding graphical design issues that not only the cartographer but also the user must be aware of. This is precisely the crucial issue when utilizing guide books in combination with large scale topographic information. All participants must have a profound knowledge in cartography and comprehend the process of communication. Lacking the

understanding of basic cartographic structures and rules, such as the correct use of graphic variables, generalization, simplification or other essential design issues and capabilities often leads to misinterpretation and ultimately to wrong conclusions. Therefore the user must know what the cartographer wants to express in order to communicate. The cartographer on the other hand must understand the users needs and try to focus on the essential tasks. Otherwise it is as if two different languages are spoken without a translator. Cartographic education of the general public at an early stage such as working with large scale topographic information in primary schools could alleviate the situation a bit.

OUTDOOR NAVIGATION

Spatial navigation and communication in mountainous regions especially in localities off the beaten track resemble an ideal environment to understand the process of cartographic communication as well as to evaluate the usage of state of the art technology. In order to assess this process and to promote the symbiosis of all three dominant access points in modern cartography (print, internet, mobile entry - 3 in 1) a cooperation project at the University of Vienna was initiated. The focal point of this project was the production of a mountain guidebook in order to examine how cartographic communication can be efficiently employed to a specialized public community utilizing print, internet and mobile media.

The prerequisites were to access knowledge within the field of large scale high quality topographic mapping and to combine the outcome with modern information retrieval methods and techniques as well as the production of a printed guidebook. It was also important to evaluate the user's needs and desires within such an environment as well as to understand the way the user navigates through such a system.

The basis for the guidebook were 175 ski tours in the region of the "Wiener Hausberge" located in the alpine areas south west of Vienna, Austria. All tours were tracked with GPS over a period of 4 years and additionally characterized including descriptions about the area, topographic peculiarities, mountain environment and other important information for mountaineers such as on avalanches and weather phenomena.

THE BOOK

The guidebook has a format of 15x23 cm, consists of 432 pages and includes furthermore a code secured approach to an internet portal as well as access to a mobile application. These three access points - book, internet and mobile entry - are the turntable of the system.

The book can be obtained online as well as in specialist bookstores that deal with mountaineering. It contains beside a general introduction on ski touring detailed information on all 175 tours. Two pages are dedicated to every tour consisting of text, overview statistics, a scenery image and a three dimensional perspective map view of the tour with the ascent and descent highlighted in the map. Further information concerning the tours can be accessed through the internet portal.

The book owner receives the admission ticket to the online system through a scratch code that is located inside the book cover. During the registration process that is activated via the homepage www.bergundkarte.at the user must choose a username as well as a password and has to declare his or her identity by inserting a valid email address. Thereafter a verification email is sent that has to be acknowledged by the user. Subsequently the user can then access the full scope of the application. If no username and password is given then only the demonstration mode is accessible. This limited access includes all functionalities of the application however allows the user to interact with only three designated tours.

THE INTERNET PORTAL

The internet portal consists primarily of three layers: overview map, tour listing and general information. It is database driven, browser independent and has the goal to assist the user in finding information on ski tours within a specified location. Two conceptual approaches within the application (spatial and textual) are relevant when working with the system. The spatial concept focuses on the map components within the application and assists the user in finding information based on a visual approach. The user searches in a map and focuses on information found in a spatial context. For example, what tour lies in the vicinity of a specific mountain or has a certain distance from a current location. The other approach concentrates more on a textual based concept that has a proximity to database queries. Sorting, extraction, exclusion and other methods of data querying can be addressed. The user has the possibility to query all ski tours in combination with further relevant attributes, such as tour length, duration, start elevation, maximum height and others. It is therefore possible to sort and create extractions from the available data. For example, show all ski tours in a certain region sorted by maximum elevation or select all ski tours that have a specific character combination in the tour name. Both approaches are complement to each other and communicate

the results in their environment. The results of textual selection are visualized both in a table listing as well as on the map. On the other side the spatial request is depicted in the map as well as in the table listing by underlying the selected table row.

THE OVERVIEW MAP

The overview map marks always the entrance to the system and offers the user a spatial synopsis of the area of interest. There are three general types of small scale maps for orientation within the application besides the detailed topographic maps that are included in every tour layer. The base map for general orientation, a region map with an overview of the sub regions and a distance map that allows the user to evaluate the approximate time needed from a given point to a chosen tour starting point. These maps have four levels of detail that include main topographic elements, transportation, hydrology, settlements, naming as well as various other specific thematic elements, such as delineation of regions or distance time bands. All tour locations are depicted on the map with a blue colored button pictogram with the number of tours labeled in the symbol. The size of the symbol varies on the total amount of tours linked to it. Depending on the level of detail the symbols are dynamically adjusted and changed if their position within the tour cluster to each other exceeds a certain distance. If a specific spatial or thematic selection is undertaken then the color of the symbol can change (blue = ski tour, orange = last visited, green = textual selection). Further information retrieval from the map can be obtained through mouse-over functionalities.

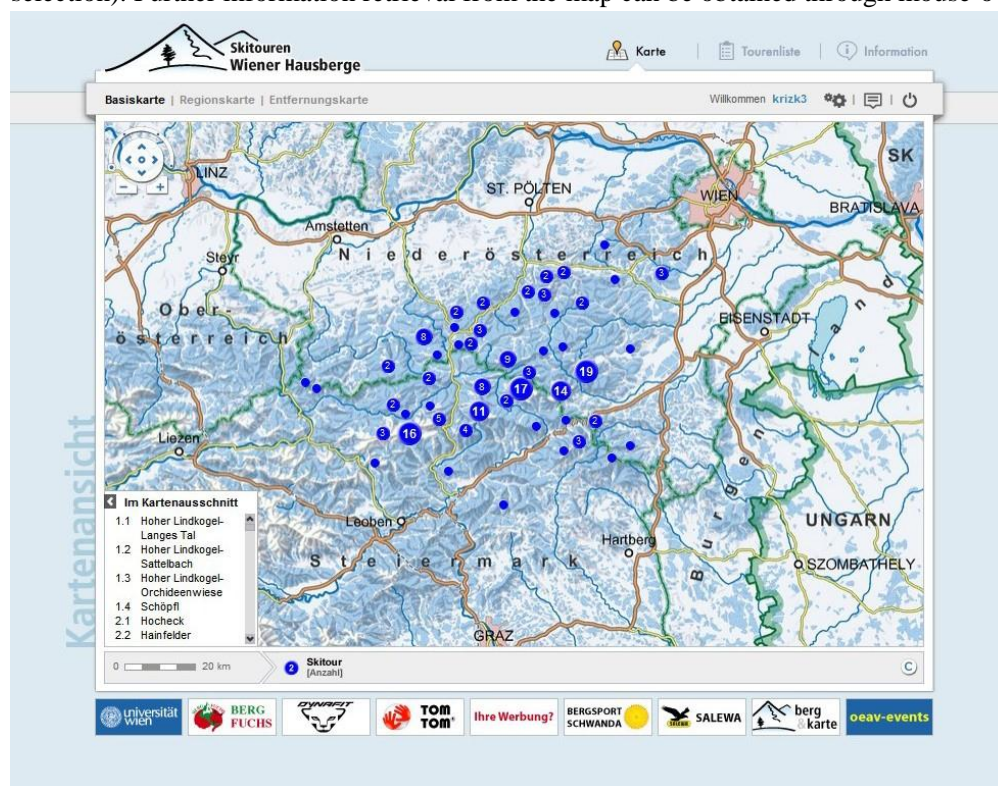


Figure 1: Internet Portal with Overview Map

THE TOUR LISTING

All tours can also be visualized in tabular form. Furthermore the user has access to a textual search utility as well as system functionalities such as user settings, feedback and application control. Every tour is allocated to one row and has the following items (columns) linked that can be sorted in ascending or descending order: Tour number, name of tour, name of region where tour is located, mountain range, start elevation, goal elevation, total height difference of tour in meters, tour distance in kilometers, tour duration in hours, terrain aspect and a general tour classification.

The screenshot shows a web interface for 'Skitouren Wiener Hausberge'. At the top, there are navigation links for 'Karte', 'Tourenliste', and 'Information'. A search bar is present with the text 'Tour suchen...'. Below the search bar is a table listing various ski tours. The table has columns for 'Nr.', 'Skitour', 'Region', 'Gebirge', and several columns for elevation and distance. The tour 'Weiße-Mäuerl-Flanke' is highlighted in red. At the bottom of the page, there are several logos for sponsors and partners, including 'universität wien', 'BERG FUCHS', 'DYNAST', 'TOM TOM', 'ihre Werbung?', 'BERGSPORT SCHWANDA', 'SALEWA', 'berg & karte', and 'oeav-events'.

Nr.	Skitour	Region	Gebirge	748 m	1673 m	940 Hm	4.1 km	2 ¼ h	N
11.11	Wurzboden	Gscheid	Göller	748 m	1673 m	940 Hm	4.1 km	2 ¼ h	N
11.17	Windberg-Kleinbodengraben	Neuwald	Schneealpe-Hinteralm	926 m	1903 m	1000 Hm	9.1 km	4 h	N-W
11.16	Windberg-Kampfl	Kapellen	Schneealpe-Hinteralm	860 m	1903 m	1100 Hm	6.5 km	3 ½ h	S
11.12	Windberg-Dirtlerschlucht	Neuwald	Schneealpe-Hinteralm	926 m	1903 m	990 Hm	9.1 km	4 h	N
11.15	Windberg-Blarergraben	Altenberg an der Rax	Schneealpe-Hinteralm	850 m	1903 m	1055 Hm	6.3 km	3 ½ h	S-O
10.11	Waldalpe	Frein an der Mürz	Mürzsteiger Alpen	964 m	1523 m	860 Hm	4.1 km	2 ¼ h	S-O
15.8	Weiße-Mäuerl-Flanke	Lackenhof	Ötscher	855 m	1893 m	1200 Hm	6.3 km	3 ¼ h	S-O
8.8	Waxriegel-Kuhplacken	Rohrbachgraben	Schneeberg	630 m	1888 m	1260 Hm	7.1 km	4 h	S-O
15.5	Wagnerritschen	Lackenhof	Ötscher	855 m	1893 m	1250 Hm	8.3 km	4 h	S-O
14.9	Vorderer Zeller Hut	Osching	Ybbstaler Alpen	790 m	1629 m	900 Hm	4.6 km	3 h	S-O
12.11	Veitsch-Überschreitung	Seebergsattel	Veitsch	1150 m	1981 m	1220 Hm	12.1 km	5 h	W-S-O
2.12	Untensteiner Alpen	Pernitz	Gutensteiner Alpen	647 m	1342 m	800 Hm	5.7 km	2 ½ h	S-O
2.11	Unterberg-Nord	Häinfeld	Gutensteiner Alpen	541 m	1342 m	800 Hm	5.3 km	2 ¼ h	N-O
3.1	Türnitzer Höger	Türnitz	Türnitzer Alpen	525 m	1372 m	850 Hm	6.7 km	3 h	S-W
10.3	Türnitzkogel	Türnitz	Türnitzer Alpen	525 m	1372 m	850 Hm	6.7 km	3 h	S-W
10.3	Türnitzkogel	Türnitz	Türnitzer Alpen	525 m	1372 m	850 Hm	6.7 km	3 h	S-W
6.17	Tränkviesenabfahrt	Klostertal	Schneeberg	713 m	2061 m	1350 Hm	7.4 km	4 ¼ h	N-W
10.7	Tonion-West	Gusswerk	Mürzsteiger Alpen	865 m	1699 m	840 Hm	4.2 km	2 ½ h	N-W
10.8	Tonion-Nord	Gusswerk	Mürzsteiger Alpen	865 m	1699 m	1160 Hm	6.3 km	3 ½ h	N-W
3.7	Tirolerkogel-Kalte Kuchel	Türnitz	Türnitzer Alpen	515 m	1380 m	870 Hm	5.3 km	2 ¼ h	N-O
3.8	Tirolerkogel-Eibl	Türnitz	Türnitzer Alpen	500 m	1380 m	1030 Hm	8.4 km	4 h	N-O

Figure 2: Tour Listing

GENERAL INFORMATION

The third layer comprises further sections (links, FAQs) on other important information concerning ski touring and knowledge acquisition. The link section covers therefore topics that connect to qualified resources such as regional information on weather and avalanches, transportation, tour planning, tour know-how as well as other relevant helpful information. The FAQ section provides detailed insight into the application and offers solutions as well as answers to common questions.

DETAILED INFORMATION LAYER

The detailed information layer comprises all tour essentials. Access to this information layer is possible either through the map or through the table listing. In both cases the user is guided to a new page that consists of tour statistics, an eye catcher image, links to further tour impressions, maps, thematic links as well as GPS data and a map overlaid Google Earth application link. The core of this layer are however the large scale topographic map views. These views give extensive insight in terrain specific topographic features. The map views consist of a classical large scale topographic winter style map with highlighted ascent and descent of the tour, a map with slope boundaries classified in steep (> 25°) and very steep areas (> 35°) and furthermore three perspective views overlaid with the winter style map, the slope map as well as an orthophoto map.

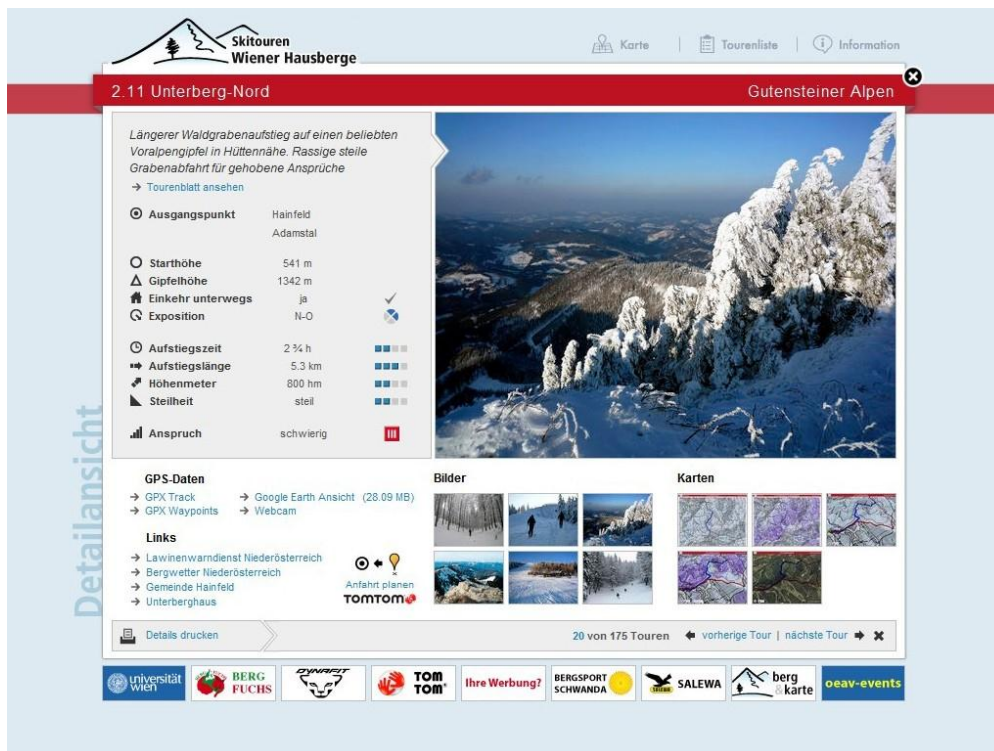


Figure 3: Detailed Information Layer

MOBILE APPLICATION

The third entry point to the system is through a mobile smartphone device. This access point resembles a slim however equally balanced version of the full application focusing on communication of the most important tour information. This reduction was necessary due to the fact that in remote (mountainous) areas an inefficient internet connection can sometimes slowdown the transfer of data dramatically. Therefore primarily textual based information is included with one exception - the winter style topographic map including ascent and descent. To avoid long download time this map can be preloaded and saved locally on the smartphone device. The mobile application is not a device dependent app and therefore does not have to be downloaded or installed. It works on all browsers and the only prerequisite is an internet connection.

CONCLUSION AND OUTLOOK

The mountain guide book 3 in 1 utilizing print, internet and mobile media "Skitouren Wiener Hausberge" is being currently (2011) accessed by over 2.000 users. All significant interactions relevant to cartography and geocommunication, such as when does the user login, how long does a user use the application, which pages are preferred, how are the overview and detailed maps accessed and used, and much more, are being tracked anonymously. This abundance of user data is then stored in a database that can be processed for further evaluation. Snap shots of the data already show evidence of interesting questions and trends that can be formulated. Does the user have problems accessing complex topographic maps? Is the interface straight forward? Does the user get lost in the application? What approach is preferred - spatial or textual? Is the system intuitive? Is there too much or too little information available? Questions that at first must be precisely verbalized and then analyzed.

The future will show whether the specialized user (=mountaineer) who is primarily interested in outdoor activities and exploring mountainous environments will accept such a system combining all three media in one or not. Maybe a renaissance of the paper map might even be one outcome!

REFERENCE

Szépfolusi, C., Kriz, K., 2010: Skitouren Wiener Hausberge - vom Wienerwald bis zum Hochschwab, Edition berg&karte, Verlag Berger, Vienna.