Title: **New mobile and web-based services for backcountry skiers**

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Abstract:

The WSL Institute for Snow and Avalanche Research SLF developed White Risk mobile, an IPhone-application which was presented at the ISSW-Europe 2009 in Davos.
It provides weather, snow and avalanche information, as well as the opportunity to learn more about hazards and behavior in the hibernal backcountry.
A positive feedback on White Risk mobile inspired the SLF to extend its research in mobile and web-based platforms for planning and executing trips into the backcountry.
The University of Venice joined this project in order to investigate the applications interface design and didactical approach.

Aim of this collaboration is to develop a new Web-GIS-application which offers more map functions focusing the planning of a trip at home before executing it.
People will be able to draw their tour on a map, define a timetable, spot difficult passages, check the hill slope, altitude and exposition as well as include snow and weather prevision into their planning.
A mobile counterpart will enable skiers to access their saved trip and current data from measurements stations providing useful information for the decision making process in the field.

Designwise the aim is to create both a functional and inspiring application which stimulates skiers to use it. Another focus is to design a ‘tangible‘ interface beeing up with todays developments in ‘touch-devices‘ and the way people get used to navigate digital contents.

During winter 2010/11 we will test the new web and mobile platform with a selective distribution to backcountry skiers.

Introduction

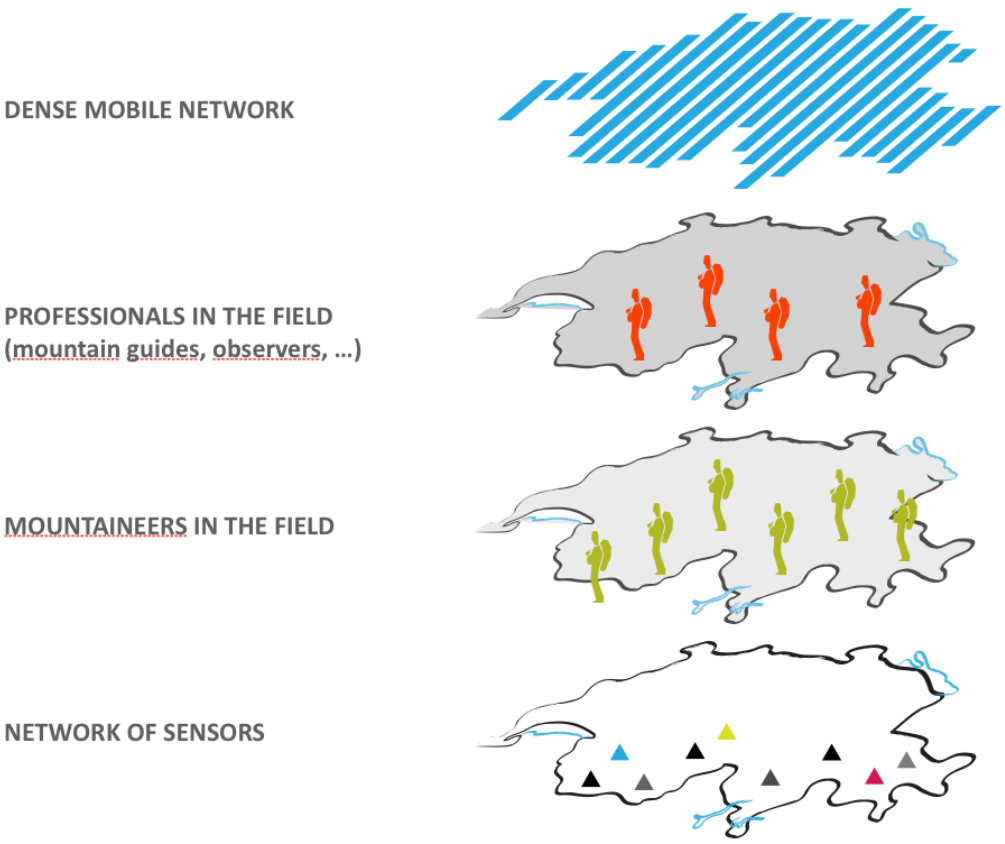
During the past few years the access to georeffered information and the spread of telematic systems has remarkably increased. Internet services, mobile applications and navigation systems became part of our daily life and influence more and more our confrontation with the real world. Nowadays our way to approach a specific location is highly influenced by the digital information we get about it. Digital maps for example became a base and starting point for nearly any trip we plan and undertake.

Within the telematic scenery two main aspects have highly changed the users interaction with information related to maps and the users location. One is the possibility to visualize a variety of different data sources on the same map - this way the digital map itself becomes a canvas for various layers of information (e.g. traffic, weather, ...) - and as users we can choose between these different sources and which we would like to see on our map. Multi-layered structures became part of our use of Geoinformation systems and influence our perception of the real space too.
The second aspect is the change from a static and hierarchical structure of the Web 1.0 towards a dynamic and modular one of the Web 2.0 a fact which also effected the use of Geoinformation Systems. Today there is another datasource added to the existing ones - the user himself. After the great developments in the entertainment business such as social networks, multi user platforms or games, the question rises how the new dynamics of an user orientated Web GIS and user generated content could be put into any context of daily use.

One field for such developments is the world of outdoor and mountain activities. Some changes already arrived in this field such as the spread of the mobile phone or GPS-driven devices. Also social Networks have been born which deal with the exchange of data considering trips into the mountains and offer quite actual information from the user in the field. Something that could be very useful thinking of avalanche risk and people being or working in the hibernal backcountry.

Switzerland a layer cake

Talking about multi-layered structures before in Switzerland we have a variety of overlapping data sources considering the situation in the mountains. There is as wide spread network of sensors measuring weather and snow conditions, there is a large number of people being in the mountainous areas, there are many professionals too and there already exists a quite dense mobile network which is accessible also in most of the areas where mountain activities take place. (Figure 01)



Having these „layers“ already and merging them together it seems quite evident that there is a lot of opportunities to use these data sources in order to create new services for all the people who spend their leisure time or work in the mountains.

Especially winter activities in the backcountry far away from the frequented areas could profit from such new services. Backcountry skiing or ski touring is such an activity.
But where to situate such a service in the long chain of different actions considering a ski trip into the backcountry? Is it rather the rescue-part which could be increased by new mobile services or could it be some service which accompanies the user before and during his trip in the field?

Setting up the project

To better define the starting point for our project and the research question itself a number of interviews has been done with the different stakeholders of such a possible project. Talking with mountain guides, rescuers, insurance companies and backcountry skiers it came out that the rescue part for example seems to be perfectly organized and already makes use of many of the actual technologies we have. On the other hand many of the people who are going to ski off piste could be much better prepared and informed.

This lack of knowledge and experience plays a crucial role in the decision making process during a ski trip off the pistes. The Psychologist Jan Mersch and the ski instructor Wolfgang Behr describe the decision making process as an interplay between rules, intuition, knowledge and the capacity to take a mental distance to the actual action or situation. While an experienced mountain guide is able to decide using his experience, knowledge and mature intuition, an intermediate or beginner bases his decisions much more on rules. (Mersch, Behr, 2009)

So the question was how to bridge this gap of information and experience at the user side? The next step to better define the approach was to take a closer look to the decision making process a the human side itself. Gary Klein writes about decision making that an experts experience „ grows out of the ability to run mental simulations“ and „constructing a mental simulation involves forming an action sequence in which one state of affairs in transformed into another“ (Klein, 1999) This brings us closer to the question whether it might be possible to top up a skiers experience by giving him the possibility to mentally simulate his trip before actually executing it.

Until now the planing of a ski trip on a map was such a mental simulation. Talking about digital maps and the new opportunities of their use in combination of telematics there seems to be a large field of new opportunities to offer tools and platforms for running such mental simulations.

Snowsense a new web and mobile service for backcountry skiers

Back in 2008/2009 the WSL Institute for Snow and Avalanche Research SLF in Davos has already developed a mobile application called „mAvalanche“ followed up by the IPhone app „White Risk Mobile“. Both offer a large number of information about weather and snow conditions and some map functions already. Also a tool called the „Danger Analyzer“ was

developed which focuses the main risks and avalanche factors in the field. With the aim to enlarge the number of services the decision was taken to invest in a research project in order to design a new WebGIS-application which will offer more map-based functions focusing the planning of a trip before actually executing it. To complete the process of planning and being on the trip also a mobile counterpart was developed in order to accompany the decision making process in the field.

Skiers will be able to draw their tour on a digital map, define a timetable, spot difficult passages, check the hill slope, altitude and exposition as well as include snow and weather previsions into their planning. Therefore a WebGIS has been developed which offers all necessary map functions for the planning at home. To access the saved data while actually being in the backcountry a mobile counterpart has been also programmed. This mobile application enables the skier to download and edit his saved trips as well to read current data from measurements stations providing useful information for the decision making process in the field. A GPS-driven map tool accompanies the users trip and continuously spots the defined passages. Before each difficult passage the skier has the possibility to further estimate the actual risk by using the „Danger Analyzer“ tool and measuring the hill slope or access actual weather and snow data.

Another main focus is the skiers feedback on the real situation.Both of the former applications mAvalanche and White Risk mobile already offered the possibility to send feedback about snow conditions or avalanche events. The new application will further track the users movements in the field. An application-page called „on the track“ (Figure 2) enables the user easily to document his trip. By clicking on the various icons a large number of positive or negative aspects can be reported and visualized on the map. In addition it is also possible to send a georeffered message including both text and images.

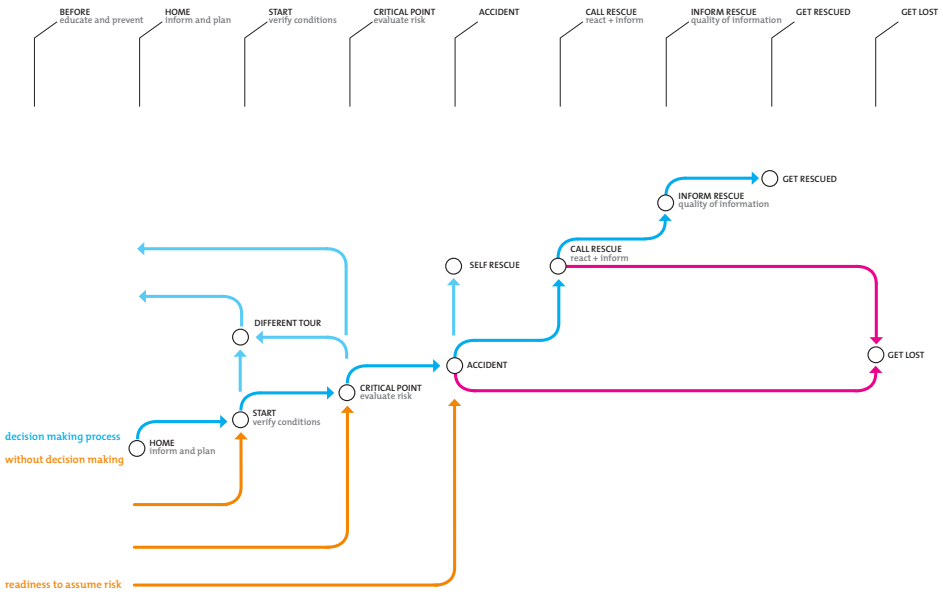
This way new useful content becomes generated and shared with other users. A function which might be also very interesting for the professionals working in the field since before many of the information coming in from mountain guides or local observers has only been reported after their return back home, a time gap which in some cases might become critical when talking about avalanche risk.

Design issues

From the designers point of view the main focus is to create a functional interface which allows to access all necessary and important information as well as giving it an inspiring cut in order to include also users who might not have thought about using such a service before. The variety of users (from mountain guides to teenagers) requires a strong user centered approach to resolve the usability issues while beeing attractive at the same time.

To meet these problematics two design methods or approaches have been chosen. One is a strong co-creative and co-productive project setup - both the designer and the programmers involved in the project are backcountry skiers themselves as well as a team of mountain guides and skiers who accompany the project during meetings or testing phases. This way we hope to assure the perfect usability for our different user groups.

The second decision which was taken in the design process is rather than focusing on a fancy interface design we concentrate more on the information itself: information content design. The whole information structure is based on a backcountry skiers action chain itself (Figure 3) and the database architecture was developed upon these facts too.



In a secondary step first decisions about the interface design have been made. Starting with simple postit-sketches dimensions and principles about the various modules and elements of the future application have been made (Figure 5) At this point another question rose about how to meet todays developments in touch devices and the users way to navigate digital contents. Consequently most of the applications elements turned out to be designed as flexible windows or „widgets“ which can be easily positioned on the map by the user himself. This way only the necessary information is visible.

Another aspect regarding the mobile application are all the issues about usability in the field such as difficult light conditions or navigating a touch device with cold fingers or even gloves. Many mobile interfaces are based on a 36px or 40px grid. This means that most of the buttons or navigation elements are only approximately 40px wide. A size which on most smartphones is easy to touch/click with a finger but not so during the winter and in the field. In consequence our mobile application is all based on a 60px grid which is easier to navigate even with some gloves on. Another problem we had to tackle is the perfect readability of all the information on a small screen and under strong light conditions such as in the snowy mountains. After a series of tests in the field with the former applications and the new interface design we tried to increase the contrast between the various elements such as the background, the buttons and graphics or written information. Of course such changes often meet the whole range of graphics, color codes and symbols already established in the users minds. In order to make each graphic and symbol recognizable for the different users (experienced and new ones) a lot of time was spent to define a special color palette for the applications as well as to modify some of the existing graphics in order to make them more readable but still recognizable for the user.

HIER DIE ZWEI GRMs ZEIGEN ???

Next steps

The next steps of the Snowsense-Project will be testing the new web and mobile platform with a selective distribution to backcountry skiers during winter 2010/11. The aim is to evaluate and better the usability of the both applications as well as check for technical issues such as GPS-tracking, network availability or battery life of the mobile devices.

In March 2011 Snowsense will be presented during an event in Davos. Around 20 groups of backcountry skiers will use both the web and mobile platform to plan and execute trips in the mountains around Davos. In Davos itself we will show a live tracking of each group visualized on a central screen which shows all movements and decisions taken by the various skiers. This way we also hope to show people that backcountry skiing is not only about the ride down but mainly a complex and dynamic process before and in the field.

References

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