

ViViTo

An Interactive Information Tool for Mountainous Protected Areas

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Abstract

ViViTo (Virtual Visit Tool) is an information tool for visitor centres of protected areas in the Alps. The objective of ViViTo is to allow users to inform about ecology and cultural landscapes of the Alps as well as the nature conservation policies in an attractive and enjoyable way. The application is based on a virtual globe, a 3D software model of the Earth. One of the main challenge was the design of the user guidance which account for the heterogeneity of the users in respect to media and language skills, educational background, age etc. The development of ViViTo was lead managed by the Swiss National Park and is a result of the Interreg III B project ALPENCOM.

1. Introduction

Alpine protected areas have several functions to fulfil. In the first instance they are habitats for flora and fauna – human decided to be worth of protection. Furthermore, in some of them the preservation of historical land use forms is in the foreground. They shall contribute to the recreation of the population and shall generate income by tourism. Even if the priorities of the alpine protected areas may differ, all of them have the idea to sensitize their visitors for the necessity of the protection of alpine wildlife, nature landscapes or historical cultural landscapes.

During the last decades managers of protected areas have realised the need of networking with other protected areas, the need of common strategies and knowledge exchange of method and experiences. Their awareness grown that protected areas could not concerned anymore as blissful islands – habitats are linked, wildlife migrates, the environment is changing permanently and tourism is no local phenomenon. A common appearance and representation of interests towards policy, society and decision makers got more and more important.

Based on an initiative of the French government the Network of Alpine Protected Areas (Alparc) was founded in 1995. Nowadays Alparc is the task force of the Alpine Convention. Within the last years the network developed rapidly. One of the most important projects up to now – ALPENCOM – was launched in 2005. „ALPENvirental COMMunication“ was financed through the Com-

munity Initiative Programme „Interreg III B Alpine Space“. The project consortium is formed by 10 alpine protected areas from France, Italy, Slovenia, Austria and Germany. The overall objective of the project is the establishment of „a global information and communication exchange system for sustainable management of natural resources and public relation for alpine networks of protected areas.“ Work package 5 of the project deals with the development of a virtual globe application for visitor centres of protected areas. The Swiss National Park was commissioned by the consortium for the development of the application, whose objectives and realisation is presented in this paper.

2. Aim of the Application

A virtual globe application for the visitor centres was considered as an attractive way to communicate the common objectives of the Network of Alpine Protected Areas on the one hand and to offer visitors' information about ecology, landscapes and culture of alpine protected areas and the Alps in general on the other hand. Around 800 points of interest (POI) on local, regional and alpine level have been defined by the project partner who are suitable to represent the spectrum. They are related to the topics nature protection, landscapes, flora and fauna, cultural heritage and environmental education.

To show the totality of the Alps and therewith the (physical and institutional) network of the Alps as well as geographical entities at small scale was regarded as precondition for the application. The divergent requirements pose a challenge to the application:

- The Alps with its protected areas have to be visualised and perceived as a whole.
- The themes which are related to the whole Alps have to be shown and accessible within this context.
- The protected areas have to be visualised with high resolution aerial views and digital elevation models. Otherwise, the impression of the virtual landscape would not be realistic.

Any text information of the application has to be provided to the user in one of the main alpine languages (French, German, Italian and Slovenian) and in English as well.

3. Users and Use Cases

Basis of the design of the application – baptized to the name Virtual Visit Tool (ViViTo) – was the determination of the potential users and the specific situation in a visitor centre of a protected area.

In respect to the potential user the result showed that there is no standard user. Visitor centres are frequented by children, youngster and elderly people, families, single travellers or participants of organised bus trips like scholars on school trip. All of them have different levels of media and language skills, educational background etc. Some may be more interested in discovering the Alps and protected areas from the air independently – in virtual visits of parts of the parks which are not accessible due to law restrictions or because of remoteness. Other may be more interested in the information provided to predefined POI. However, for all potential users the application should be attractive as possible.

In respect to the situation of the place of installation of ViViTo it could be divergent as well and could change quickly. If the visitor centre is crowded, for instance if the participant of a bus trip gushed into the exposition spaces, users get stressed if a waiting queue emerged in their back. Only in times of few visitors users have the time to deal with the application for longer time. However, the experience of the persons in support the visitor centres is that most visitors do not spend more than 10 minutes at one and the same exhibit. Generally most visitors lose interest if an

exhibit is information overloaded or if the interaction with the module is very complex. Easy to learn user interfaces and an adequate reduction of information are essential for a visitor information tool as ViViTo.

4. Approach of Complementary User Interfaces

In consideration of the heterogeneity of potential users and changing conditions in visitor centres we decided to provide the users two different but complementary kinds of interfaces: a joystick and a menu based on a clickable map which is accessible with a touch screen.

The idea of the joystick is to enable users to flight freely over the whole Alps and the protected areas. With a crosshair users can activate symbols showing theme and location of POI to open an info box with a textual description of the selected geographical entity, enriched with a photo or a video. The joystick interface should oblige those users which prefer to have a high degree of freedom in navigation. Furthermore, using a joystick as hardware interface gives users the feeling of flying a helicopter, which is fascinating and attractive for most people. However, handling a joystick with several functions, while orientating and navigating in a virtual 3D is a complex task, which may be difficult especially for those users which are not common with virtual globe application like Google Earth or 3D computer games.

The complementary approach of a touch screen menu based on a clickable map enables interface designers to implement a higher degree of user guidance functionalities. A good designed menu would allow an intuitive access to geographical areas and themes. Such an interface would support those users which are not accustomed to navigate in virtual

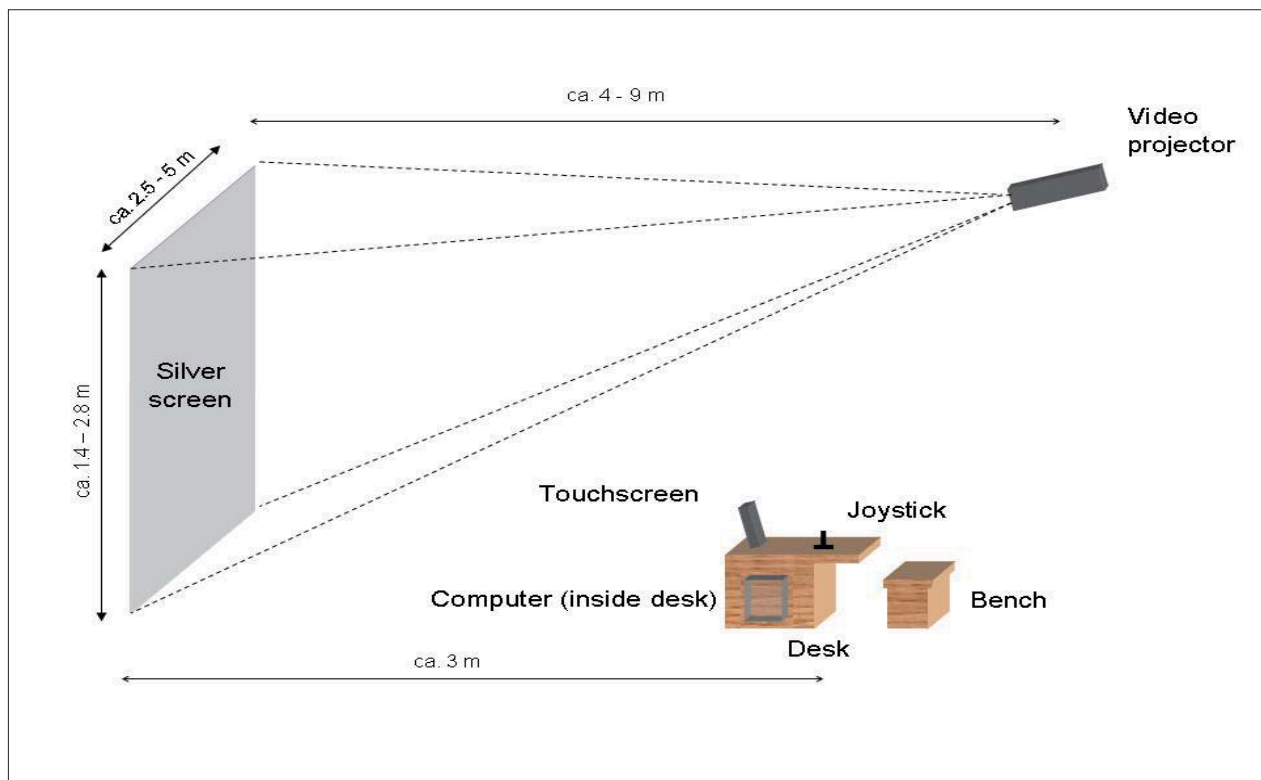


Fig. 1: Hardware components of ViViTo

3D worlds or which like to get to the information without indirections.

An exemplary installation of ViViTo with all hardware components is shown in Fig. 1.

5. Development of User Interfaces

The final design of the user interfaces is based on practical tests and the results of a visitors' evaluation of an advanced, completely operational prototype of ViViTo. Several weeks in summer 2007 we received feedback from guests of the Swiss National Park visitor centre. The general feedback was quite positive – 71% of the visitors liked the application very much, 26% answered that they like the application. However, in respect to the usability of the user interfaces a need of amendment got obvious. One third of the interviewee indicated to have a problem with the handling of the application. Half of the interviewee responded that they could not open the info box using the joystick. The result of the visitors' evaluation confirms our observations of the users whereby we determined the main obstacles for a high usability:

- The user guidance of the touch screen menu was too complex. Even if the user guidance followed a stringent philosophy, it was not transparent enough to allow users a quick understanding about how to use the menu.
- Beside such conceptual aspects the graphical design of the touch screen menu was not appropriate. The difference between clickable control elements and non-clickable graphical elements was not clear enough.
- A help menu explaining how to use the touch screen menu was provided, but on a separate page. An attending help which informs the users about the system status and about possible next steps was recognized as much more suitable for the users.
- A functional overload of the joystick overstrains the users as well as a very high degree of freedom in navigation. Automatism which restricted the possible view angles and flight automatism are useful for a virtual globe application used in public space.
- The sensitive area of a POI symbol was dimensioned too small. Users have to point on the sensitive area very precisely otherwise the info box did not open.

In the following we will introduce the revised user guidance of ViViTo and the joystick without dwell into the analysis of the tested and evaluated prototype.

6. The Touch Screen Menu

Entrance is the welcome page (Fig. 2), where users can select a language. All clickable control elements have been designed as buttons, similar to those control elements known from menus of cash points or ticket machines.



Fig. 2: Welcome page



Fig. 3: Overview Alps

While the welcome page is active, an overview of the whole Alps is shown (Fig. 3).

Immediately after the selection of a language, a virtual flight starts to the protected area which is related to the visitor centre where the application is installed. In the same time the touch screen switch to main menu, which is composed by a clickable map on the right side for the selection of geographical areas of interest and a menu which allows the access to themes? Pressing on such a theme button opens a context menu with a list of POI (Fig. 4). POI could be selected and a flight starts to the POI in the virtual landscape (Fig. 5).

At any time users can switch between themes, POI, geographical areas (Alpine arc, Eastern Alps, Western Alps, and Central Alps) and protected areas. In any case there will be a respond of the system and the user will be informed about the system status and possible next steps.

In the lower part of the menu is the status and help information. Three buttons on the lower right-hand corner brings the users back to the welcome page (home-button), to a help page explaining the joystick (question-mark-button) and to a page with continuative information (i-button).



Fig. 4: Selected POI in context menu

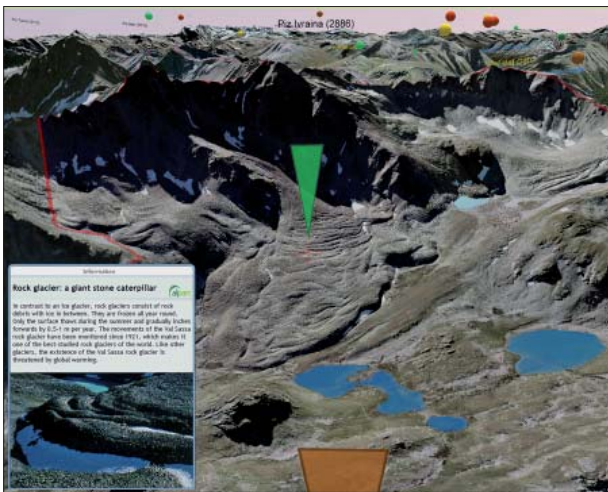


Fig. 5: View of selected POI with info-window

7. The Joystick

The joystick for the ViViTo application has to be robust and should be usable for all potential users. After several tests with usual gaming joysticks and prototypes we decided to use an industrial joystick with 2-axis (Fig. 6). The joystick is designed ergonomically and could be used by left-handed and right-handed persons as well as children (small hands). Only three additional control elements are integrated: a thump wheel for altitude changes, a trigger button which allows rotating the view angle and two buttons which trigger a special overview function.

Beside the (hardware)-ergonomics of the joystick an automatism is implemented on software side, which facilitate users' to navigate with the joystick. Once users start flying, the view angle is captured – the degree depends on the flight altitude – so that the horizon of the virtual landscape is always visible.

8. Discussion

In computer science usability is a term used to denote how easy user interfaces are to use (cf. Nielsen, J., 1994; Norman, D., 2002; Shneiderman, B. and Plaisant, C., 1987). There are several methods used to evaluate usability. User-focused methods (e.g. thinking aloud method) make use of data gathered from users. Traditional user-focused usability testing is performed in a usability-laboratory which allows recording the interaction of the users with the system for the analysis afterwards. Cheaper and faster are expert-focused methods, like the heuristic evaluation, which are relying on expert reviewers.

Jakob Nielsen (2005), referred as the guru of web page usability by the New York Times, defined ten general principles for user interface design. We have proofed, if the design of the ViViTo touch screen menu is consistent with these general rules or if specifics of the use cases necessitates digressing from one of these general rules.

„The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.“
The user gets always informed about status and possible next steps. Furthermore, each user action results immediately in a reaction of the system.

„The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms.“
We avoided technical jargon and expressed us clear and simple.

„Users often choose system functions by mistake and will need a clearly marked „emergency exit“ to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.“
With the home-button user can come to the welcome site at any time. However, undo and redo functions are not necessary and would increase the complexity of the application.

„Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.“
The complete design and vocabulary follows a stringent logic.

„Even better than good error messages is a careful design which prevents a problem from occurring in the first place.“
The system gets by without any error message.

„Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.“
We regard rule 6 as a consequence of the first and fourth rule.

„Accelerators – unseen by the novice user – may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.“



Fig. 6: ViViTo joystick

This rule is not applicable for ViViTo. The application is designed for non-experts.

„Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.“ The menu is reduced to the essential – textual and graphical.

„Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.“ The system gets by without any error message (see rule 5). Operating errors of the menu in terms of faulty insertion are not possible.

„Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.“ The users are supported with a very concrete, clear and short help.

In respect to the usability of the joystick for the ViViTo application it was not possible for us to find literature, which gives us a feasible method for its evaluation. However, we considered the general recommendation about design and usability of hardware and software given by Stapelkamp (2007). We hope to get new findings about the usability of the joystick for the ViViTo application with a further visitor evaluation in June 2008 with the guests of the new visitor centre of the Swiss National Park, which opens on May 31st, 2008.

9. Summary

The ViViTo application is a virtual globe application for visitor centres of alpine protected areas. It allows virtual flights over the Alps and virtual visits of alpine protected areas. Around 800 points of interest about nature protection, landscapes, flora and fauna, cultural heritage and environmental education are integrated in the virtual landscape.

In consideration to the heterogeneity of the potential users and changing conditions in the visitor centres two complementary user interfaces have been developed. Users which prefer a high degree of freedom in navigation could use a joystick. A touch screen menu meets the demands of those users which are not familiar with virtual reality applications and the use of joysticks, or for those which just like to get information without indirections.

A visitors' evaluation of a prototype in summer 2007 shows a need of amendment of the usability of the ViViTo application, even if the general user feedback was very positive. Based on the results of the visitors' evaluation we developed the final version of the touch screen menu. The new design is consistent with 9 of 10 general principles for user interface design – the 'usability heuristics' of Nielsen (2005). The rule which was not considered refers to expert users and is not applicable for ViViTo.

We hope to get new findings about the usability of the user interfaces, especially the joystick, in a further visitors' evaluation of the ViViTo in June 2008.

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