

# "SWISS WORLD ATLAS – INTERACTIVE" – ANALYSIS OF USER NEEDS AND CONCEPT OF A NEW SCHOOL ATLAS

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**Abstract:** The "Swiss World Atlas" is the most widespread school atlas in Switzerland for geographical education at secondary school level (12 to 19 years old students). Over the next years, this analogue collection of maps will be supplemented with an interactive and Internet-based atlas. In an extensive survey, geography teachers were asked about the actual use of printed and digital school atlases and computers for geographical education. The survey attests, that the maps of the current printed atlas are partially too complex – above all at lower secondary level. Thus, the maps have to be adaptable for reducing and customizing the map content. Also, a user-friendly navigation and a high functionality would allow flexible use in geography lessons. These facts as well as other results and aspects contribute to a concept of the new interactive atlas version. Furthermore, teachers as well as didactic experts should be involved in the forthcoming development.

## **1 INTRODUCTION – SITUATION OF THE TRADITIONAL PRINTED "SWISS WORLD ATLAS"**

Printed school atlases are probably the most used teaching aids in geographical education all over the world. In Switzerland, the "Swiss World Atlas" (former "Schweizer Mittelschulatlas") is the most widespread school atlas at secondary school level (12 to 19 years old students) (HURNI 2005, MARTY 2007) (figure 1). The hardcover book is revised periodically every three to five years and is published in three language versions (German,

French and Italian). Firstly published in the beginning of the 20th century, the "Swiss World Atlas" was developed by Prof. Eduard Imhof to a highly reputable map collection for different levels of education. Under the lead of chief editor Prof. Ernst Spiess, it was awarded many times by didactic as well as by cartographic associations.

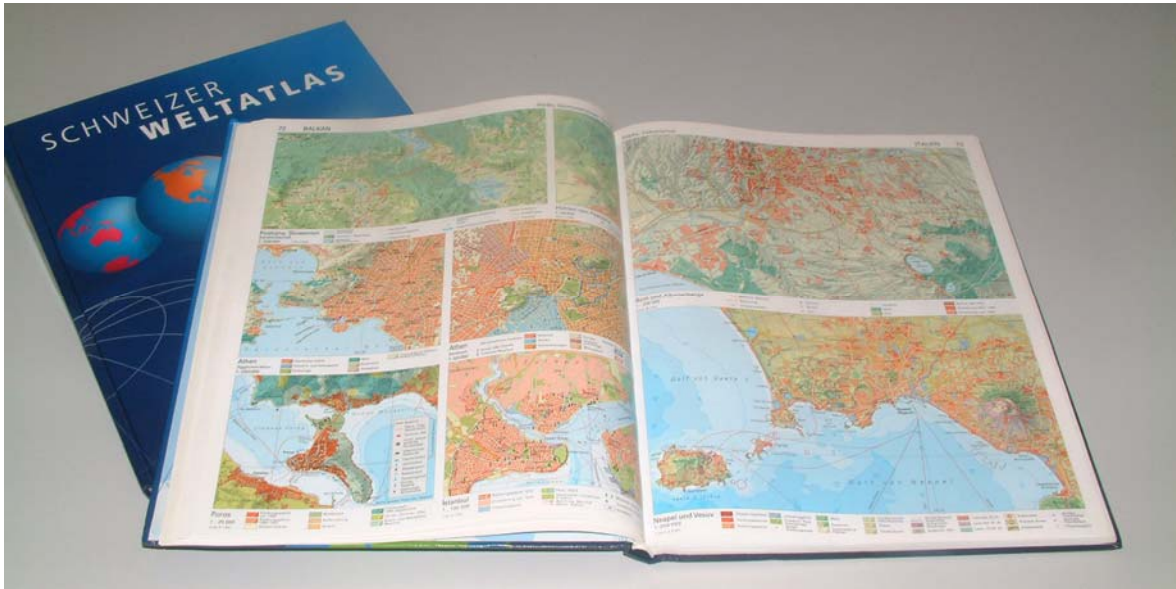


Figure 1: Printed "Swiss World Atlas" ("Schweizer Weltatlas") with exemplary topographic and thematic maps (SWISS WORLD ATLAS 2006).

As a comprehensive collection, the "Swiss World Atlas" contains nearly 400 single maps and other map related representations (satellite images, orthophotos, perspective views, drawn profiles and diagrams) to a hundreds of different topics. Figure 2 shows details of the three main groups of maps in the atlas: Small scaled topographic and thematic maps as well as detailed maps to regional, thematic case studies. The atlas is structured in a first part with maps of Switzerland, a second part with maps of Europe and a third part with maps of the other continents and of the whole world.

The "Swiss World Atlas" follows different goals:

- It teaches different geographic issues in a showcase approach by thematic maps.
- It gives an overview over countries and continents by topographic maps.
- It provides materials for teaching cartography and map reading.

Despite of the undoubted high didactic value, there must be noted some critical remarks to the "Swiss World Atlas". The atlas is addressed to different target groups, mainly to geography teachers and students at the secondary school level. Fact is, that students at the

lower level 1 (grade 7 to 9) have not the same skills to read, understand and analyze the maps like advanced students at upper level 2.

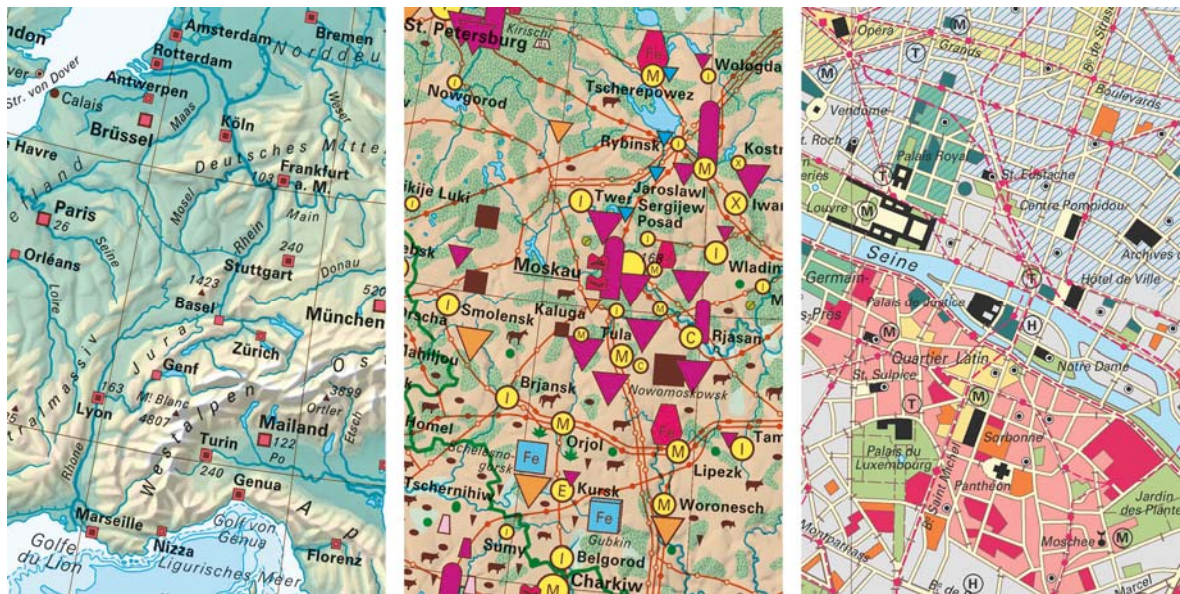


Figure 2: Sections of topographic and thematic map examples out of the printed "Swiss World Atlas".  
 Left: topographic map of Europe 1: 15 000 000; centered: economy map of Russia 1: 15 000 000;  
 right: town map of Paris 1: 50 000 (SWISS WORLD ATLAS 2006).

In many maps, the content is very dense and complex, mainly in thematic economy maps about regions and continents. Sometimes, the graphic design is not always well succeeded. Colors for area objects are often too similar. The thickness of diverse line object categories is too thin or the color contrast is too poor.

Additionally, the "Swiss World Atlas" is confronted with disadvantages of printed school atlases in general. An obvious one is the decreasing topicality of the content just after publication. Furthermore, printed atlases are rather improper for explanations from teachers and the use in classroom discussions. Finally, navigation within the atlas by indices and key word lists is quite laborious for unexercised students. This could be one of the reasons why students are not very enthusiastic to browse the atlas by themselves to get geographic information out of it.

The mentioned disadvantages lead to an increasing competition of the "Swiss World Atlas" with other products. Schoolbooks for example, include more and more maps, which precisely fit to the discussed subject and the age-related map skills of students (RINSCHÉDE 2003). Other examples of competing products are interactive maps or atlases, which enable additional ways of utilization as well as adaptable, additional, linked and topical contents.

## **2 PROJECT OF AN INTERACTIVE ATLAS VERSION**

Considering the mentioned critical points, the publishers decided to start a new project for a coexistent interactive version of the "Swiss World Atlas" (SPIESS ET AL. 2005). An additional reason to launch such an interactive product is the still increasing informatics at Swiss schools. Even less research results have been published to confirm positive impacts of IT use in geographical education, the observed situation let sustain the high expectations in this project.

Similar to the printed atlas version, the "Swiss World Atlas – interactive" should still follow an exemplary approach. Therefore, the maps represent typical phenomena or processes at specific sites or spaces, but displayed on screen and supplemented with additional interactivity as an added value. A wide range of large and small-scale topographic maps for overview will still be offered. The relationship of the graphic map design must be recognizable too. But also, an innovative enhancement of new functions for additional use and teaching purposes has to be provided (HAEBERLING AND BAER 2006).

To guarantee the later usability of the "Swiss World Atlas – interactive" and to figure out what users expect by the term of added value, it is advisable to include the future users in the process of development right at the beginning. Especially helpful are advices of teachers as decision-makers and designers of geography lessons.

## **3 SURVEY ABOUT USER NEEDS ON THE "SWISS WORLD ATLAS – INTERACTIVE"**

In order to get information about future user needs, a survey was arranged within the framework of a master thesis to work out the details of the interactive atlas version concept (MARTY 2007). One goal of this survey was to examine the actual use of atlases and computers in geographical education at secondary school level. Another goal was to explore the demands of teachers in geography on content and functionality of the new interactive atlas.

The survey was divided into two parts. The first one contained a structured poll with the aid of a standardized questionnaire. Key issues were habits, previous knowledge and experiences of teachers in the usage of atlases and computers in geographical education. Furthermore the participating teachers were asked what kind of elementary demands they have on an interactive atlas. The second part consisted of six supplementary oral interviews with computer-experienced teachers and didactic experts. They provided to collect the

demands on the atlas in more details. To have a basis for discussion, the interviews were supported by an interactive atlas prototype (MARTY 2007).

#### **4 CONCEPTUAL ASPECTS OF THE "SWISS WORLD ATLAS – INTERACTIVE"**

The aim of the "Swiss World Atlas – interactive" is to offer a product with an added value compared to the printed atlas version. This added value manifests itself in additional ways of utilization and enhanced contents, which should be (contrary to contents in the printed atlas version) adaptable, linked and preferably topical. Moreover, the interactive atlas version should provide a better support for students in performing the below mentioned general tasks of working with maps in geographical education (HÜTTERMANN 1998):

- Elaboration, presentation and transfer of spatial information.
- Development of the students' orientation pattern by acquiring the world's topographic structures.
- Acquisition of map skills such as reading, understanding, interpreting, evaluating, and making maps.

As for the additional ways of utilization, there are different possible add-ons for the interactive atlas version. Maps can be projected onto the wall, what enables a simultaneous use of the printed as well as the interactive atlas version. Thus, explanations from teachers and classroom discussions become less circumstantial. Another additional way of utilization is the autonomous work of students with interactive maps. This allows customized learning tempo and should boost the motivation of working with the atlas. Finally, the possibility of the interactive atlas to create user-defined maps enables the further use as print-out or as exported illustrations in other software. The mentioned survey about user demands confirms the importance of all additional ways of utilization, with the result that all among them have to be considered simultaneously in the forthcoming development of the interactive atlas.

As for the atlas contents, teachers demand user-definable maps, which allow to combine different subjects and to reduce or raise the complexity of contents. This is an absolute must from teachers' point-of-view. Moreover, the teachers have concrete requests concerning types of representations of additional contents: teachers of lower secondary level require rather simple and pictorial representations such as simplified maps and

photographs. On the other hand, teachers of upper secondary level require more abstract and numerical contents such as diagrams and statistical tables. Teachers of both levels are especially interested in satellite images and three-dimensional representations. Important are also the links between related maps and contents within the atlas, as a basis for a simple and quick navigation. Links to contents out of the atlas have less priority. Finally, teachers are interested in the topicality of contents, but it is not top priority.

The future functionality of the "Swiss World Atlas – interactive" has to be implemented in such a way that the mentioned added value can be guaranteed. Figure 3 shows a possible structuring of functions occurring in interactive atlases, suggested by CRON (2006). Below the figure, the different function groups are listed with picked aspects, which seem to be especially important for the "Swiss World Atlas – interactive".

Function groups	Function subgroups	Examples of functions
General functions		Language selection, File import/export, Printing, Placing bookmarks, Hot spots, Tooltips, Help, Home, Exit
Navigation functions	Spatial navigation	Spatial unit selection, Move map, Reference map/globe, Position, Spatial/Geographical search
	Thematic navigation	Theme selection and change, Index of themes, Search by theme
	Temporal navigation	Time selection, Animation
Didactic functions	Explanatory functions	Guided tours, Preview, Explanatory texts, Graphics, Images, Sounds, Films
	Self-control functions	Quizzes, Games
Cartographic and visualization functions	Map manipulation	Switch on/off layers, Switch on/off legend categories, Modification of symbolization
	Redlining	Addition of user defined map elements
	Explorative data analysis	Modification of classification, Modification of appearance/state, Map comparison, Selection of data
GIS functions	Space and object oriented query functions	Spatial query/Position query, Measurement/Query of distance and area
	Thematic query functions	Thematic queries, Access to statistical table data
	Analysis functions	Intersection, Aggregation and overlapping, Terrain analysis

Figure 3: Function groups, function subgroups and examples of functions of interactive atlases (CRON 2006; slightly reduced).

General functions are fundamental functions for a simple handling of the atlas. Especially mentionable are printing and file export for the further use of maps as print-out or as

exported illustrations in other software. From the teachers' point-of-view, these two functions belong to the most demanded ones. Also indispensable is the possibility to place bookmarks, which allows a quick display of a prepared map.

Spatial and thematic navigation functions are elementary for map search at the beginning or during the use of the atlas. Temporal navigation is less important, since there is too little data to different time periods in the "Swiss World Atlas". Especially important are spatial navigation functions also to support the students in developing an orientation pattern of the world's topographic structure.

Didactic functions (especially the subgroup of explanatory functions) are indispensable for the autonomous work of students without the teachers' aid. Furthermore, these functions can assist the students in acquiring map skills by offering guided tours, explanatory texts, graphics, images or films. Perhaps a little astonishing is the fact, that teachers are not very interested in self-control functions for students. They declare that this should be rather the teachers' job.

Concerning cartographic and visualization functions, the possibility to switch on/off layers is an absolute must to combine different subjects and to reduce or raise complexity of map contents. Additionally, map comparisons are important to support the students in evaluating maps.

GIS Functions are important aids in interpreting, evaluating, and making maps. Teachers are especially interested in spatial and thematic queries. On the other hand, the implementation of rather complex analysis functions seems to be beyond the teachers' demands, particularly on lower secondary level.

To guarantee the mentioned added value, everything amounts to a realization of the "Swiss World Atlas – interactive" as a web solution. A main reason is the all the time availability by any web browser (as far as possible without additional installations). Another aspect is the possible integration of additional (and maybe topical) content of web services or web links for teaching purposes. Another main reason is the flexible and expandable architecture of a web solution, which enables a steady development and quick update of the atlas contents and functionality.

As a final prioritization from the teachers' point-of-view, the survey shows that a simple and intuitive handling of the atlas has by far top priority (figure 4). Behind it, frequent

updates of contents, a multifaceted functionality and a good cartographic quality seem to be rather important than multifaceted (additional) content.

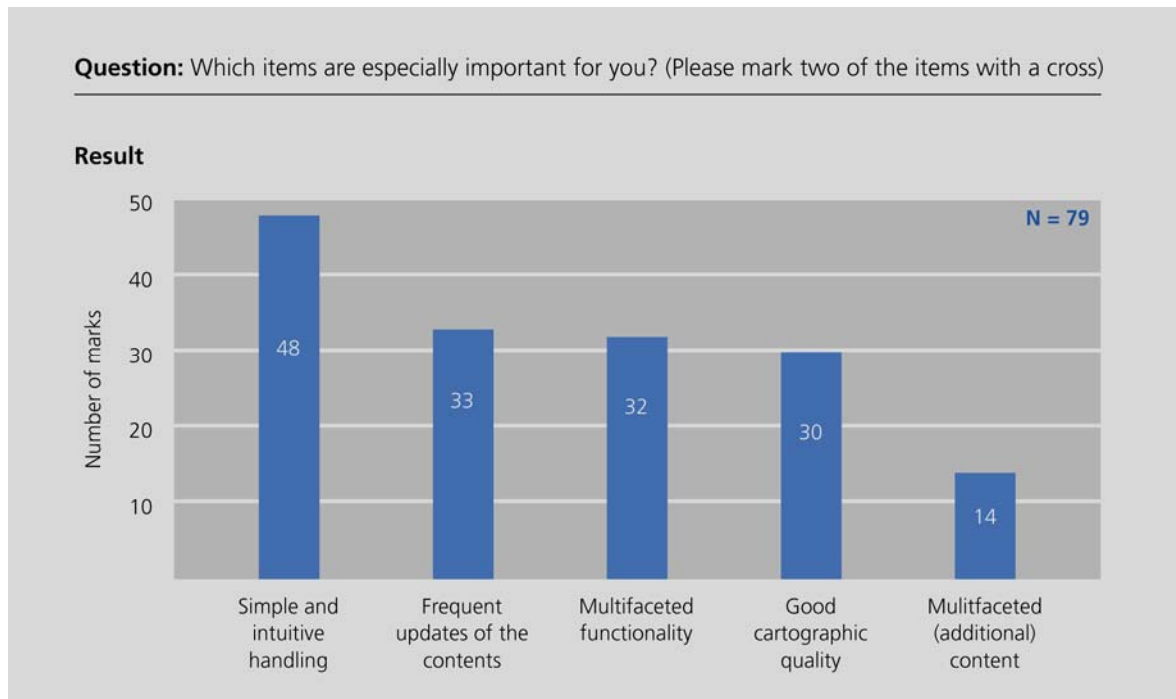


Figure 4: Prioritization of key items of the "Swiss World Atlas – interactive" (MARTY 2007).

## 5 USER-CENTERED DEVELOPMENT OF THE "SWISS WORLD ATLAS – INTERACTIVE"

All the considerations for the conceptual decisions as well as the evaluated user needs and expectations bring forth to a user-centered development of the planned atlas. The approach of user-centered development is a method, which is used mainly in the IT engineering industry for software products (figure 5).

For a successful introduction in Swiss geographical education on the secondary school level, it is vital to keep maintaining the complete user-centered development process. All development steps should be proceeded with the participation of the involved people, here especially with teaching staff and didactic experts. In this project, students will not be direct development partners. However, teachers will respect their geographic interests and knowledge as well as their acquaintance and skills in the atlas handling.

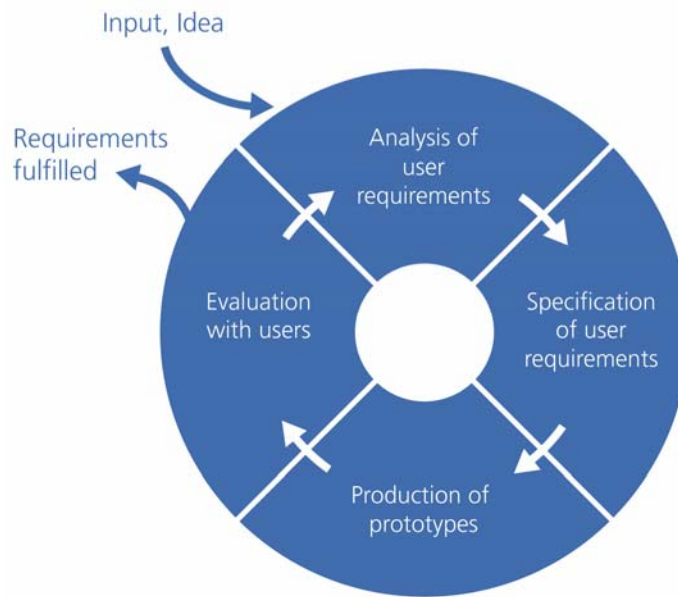


Figure 5: The principle of a user centered development (MARTY 2007).

The strongest focus in the project must be thrown on user-friendliness in respect of the structure and the manipulation of the new "Swiss World Atlas – interactive". This issue is a decisive success factor for an effective introduction and a high future acceptance of this Web-based atlas. Different aspects characterize user-friendliness in this context: The atlas must be available at every time in the always-same quality. Robust Web technologies as well as low performance requirements have to be guaranteed. Navigation within the atlas and the maps has to be easy-to-handle. Uncomplicated search strategies for maps and depicted phenomena should be integrated. Of course, user-friendliness implies also adequate map content concerning interests, knowledge and cognition of teachers or students.

At the end, the atlas will be published in a user-centered design. Thus, the layout of the Web application as well as the thematic content and functionality of the maps must fit to didactic principles of the secondary school level. The user's intellectual capabilities and aesthetic preferences have to be considered very carefully. This includes also age-based interactive navigation tools for map selection and information acquisition (e.g. by interactive legends, pictures, tables).

The currently developed prototype of the "Swiss World Atlas – interactive" should take into account all user needs and requirements, analyzed in the described comprehensive survey. Additionally, the critical and extensive discussion of the prototype will point out

the pros and cons, if it is useful to follow the approach of a user-centered development also for a Web-based interactive school atlas.

In future, a holistic approach could be aimed for the "Swiss World Atlas – interactive". There, data sets with their map objects should be managed in large data bases and complemented with different thematic layers and attributes. From these extensive multi-layered data sets, a large diversity of atlas maps could be derived for specific purposes and in different scales or projections.

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