

GERMANY IN MAPS – A MULTIPURPOSE TOOL-BOX

Christian Hanewinkel and Sabine Tzschaschel

Leibniz-Institut für Länderkunde
Schongauerstr. 9
04329 Leipzig, Germany

Abstract

The paper deals with concepts for a further use of maps and graphical materials of the almost completed 12-volume German National Atlas. The idea is to tie together print, electronic offline, and electronic online versions as well as selective uses of particular elements and information layers of maps. All textual, cartographic and graphical elements are assembled in a “tool-box” in order to create new products for different user groups and uses with a strong emphasis on self explanatory cartography and on flexible products for manifold purposes. The paper talks about the elements of this tool-box, its functions and technical requirements, target groups for its use and possible off-spin products to be developed. One of the products will be an online “Geography of Germany”, with several interactive tools and the possibility for downloading maps, texts, figures and graphical elements, as a contribution to easily accessible geographical knowledge for a general public.

I THE NATIONAL ATLAS OF GERMANY

The German National Atlas in twelve volumes is a project of the Leibniz-Institut für Länderkunde (IfL), which is a non-university research institute for regional studies and member of the association of research-institutes Leibniz-Gemeinschaft. With support of the German Association of Geographers (Deutsche Gesellschaft für Geographie), the German Society of Cartography (Deutsche Gesellschaft für Kartographie) and the German Academy of Regional Studies (Deutsche Akademie für Landeskunde) the institute began in 1997 fund raising and building up logistics, after central government officials had denied responsibility for the project (for more detail of historical background, see MAYR 2001).

Today, the German National Atlas project has far-reaching significance for research and policy in the German geographers' landscape. On one hand, it is seen as a central medium for bringing knowledge, methods and the results of new research to broad public attention. On the other hand, it is considered as a prime project in order to bring together scientists from German geography and cartography and serves as a common platform for scientists working in quite disparate fields of research. The atlas is published simultaneously in a printed and an electronic version.

The IfL project team is responsible for the scientific editorship of the whole atlas, the overall concept for the 12 volumes, the maintenance of academic standards, and the transformation from the print into the electronic version. It has intended to develop a form of presentation which is easily understood and does justice to the most recent findings of media sciences and to incorporate didactical elements. It directs the development of concepts for each volume in accordance with the overall concept in an ongoing discursive process, taking into account scientific criteria as well as user-friendliness.

As means of societal integration, a number of advisory and discussion committees have been founded, with members from official organizations and from cartography institutes of German universities, the task of which is to ensure that all scientifically and politically relevant viewpoints are included in both the conception and the execution of the project.

All cartographic and graphic elements are created at the IfL, thus giving guarantee of a throughout consistent concept and principals of editing. The patronage of the President of the German Bundestag (Wolfgang Thierse) and the co-operation of important federal institutions lends the project the necessary seal of approval from the state.

The idea of the National Atlas in its present form was first presented to the public at the 51st German Geography Congress (Deutscher Geographentag) in October 1997 in Bonn, with a pilot volume and a demonstration CD-ROM. The positive feedback from the scientific community gave support to begin with the project in 1998. Since 1999, the volumes of the atlas and the corresponding CD-ROM have been appearing at 6 to 8 months intervals. Sponsors were found for several volumes (Free State of Saxony Ministry of Science and the Arts; Federal Ministry of Education and Research; Federal Ministry of Transport, Construction and Housing; Federal Representative for Culture; ZEIT Foundation; Thyssen Foundation; Mercator Foundation), and the project has found broad support from the scientific community, of both German geographers and cartographers.

1. Concept and contents

The National Atlas combines, for the first time, all significant spatially differentiated information on the physical and human geography of re-united Germany, current social and economic transformation processes, as well as the growing-together of the two former German states. The atlas is supported by research projects relating to specific topics, as well as to the presentation and imparting of information in maps, text and images.

The project aims to improve general understanding of the spatial differentiation of social, economic and natural processes on the interface between science and the general public, to awaken interest in cartography and geography. It appeals to a broad range of users and is accessible to a non-academic public.

The atlas consists of 12 thematic volumes (*see fig. 1*) and a general index volume. They are being published over an eight year period (1999 - 2006). Ten volumes, together with their respective CD-ROM versions, are already available. Circa 500 German-speaking geographers and experts from related disciplines are involved. Each volume contains ca. 50 separate contributions relevant to present times and presented in an easily understandable manner, containing short texts, illustrations and photographs in addition to the atlas maps.

German National Atlas – volumes/CD-ROMs

(date of publication)

- Vol. 1 – Society and state (1999)
- Vol. 2 – Relief, soils and water (2003)
- Vol. 3 – Climate, flora and fauna (2003)
- Vol. 4 – Population (2001)
- Vol. 5 – Villages and towns (2002)
- Vol. 6 – Education and culture (2002)
- Vol. 7 – Employment and standards of living (2005)
- Vol. 8 – Businesses and markets (2004)
- Vol. 9 – Transport and communications (2000)
- Vol. 10 – Tourism and leisure (2000)
- Vol. 11 – Germany in the world (2005)
- Vol. 12 – Living in Germany (2006)
- General index (2006)

Fig. 1: List of National Atlas volumes

2. Material for the tool-box

The material accumulated with the elaboration of the National Atlas adds up to quite a considerable pool of information. The 10 volumes published as of now, contain 1766 pages, with 527 double or 4-page-articles. They have 918 maps of Germany on different scales, more than 250 maps of Europe and/or the world, 436 regional maps or city maps, about 1400 figures, and almost 800 photographs, including air and satellite photography. Texts include shorter or longer essays, technical explanatory boxes and – where necessary – glossaries.

From the beginning, the electronic offline version was designed to reflect images of the print version as closely as possible. The general layout is book-like, using two-column texts and the corresponding graphic material on the screen. However, maps have been adjusted to screen-resolution, and optical appearance has been changed somewhat, due to special size and dimensions of screens. Additionally, a data-bank based module allows to create maps of Germany with all complete sets of county-data used in creating the maps of the atlas.

II TECHNICAL REQUIREMENTS

At the beginning of a foreseeable 6 to 8 year running time of the project, the general framework for the parallel production for a print product in 12 volumes and an electronic product had to be conceptualized. Several aspects had to be taken into consideration:

1. The continuity necessary for any long-term project; minimum requirements are an external identity of the successive parts of the product and internal coherence between them.
2. The data flow from the author to the publication with its different elements: text, maps, figures; from a contextual point of view as well as from a geometric point of view.
3. The perspective for this – in terms of technical development – long time period with regard to the rapid progress of the IT-sector and the corresponding new facilities for electronic map generation on screens.
4. The perspective of growing user demands and changing user habits during this long period of publication.
5. From the production and publisher's point of view, workflows (*see fig. 2*) had to be organized in such manner that the print and the electronic version could be produced within a reasonable period of time and without too large a gap in between. The production period for the print edition was projected to take six months, once given the availability of all author's materials and data. For the production of the CD-ROM, the assessment was four months, overlapping the print-production period during one month.

The way of production to chose had to cope with all theses demands and factors.

1. Map and figure production

The basic map of Germany – as “a selected region map” – was developed in five different scales, adapting to the chosen book's size and the four column layout. The starting data-set was the DLM 1000, a digital vector map of Germany edited by the Federal Agency of Cartography and Geodetics (BUNDESAMT FÜR KARTOGRAPHIE UND GEODÄSIE), with complementary information from varying sources. Using the graphical Program FreeHand the respectively generalized basic map was created, with approximately 70 layers, in which the thematic map information of the authors could be placed. In the map production process, visual design and aesthetical criteria are determined by the print product which always is produced first. The maps produced for print are the final product, and subsequently have to be adjusted to electronic use. The material has vector formats and has to be transformed to bitmaps or to other vector formats for visualization on screens, varying resolution, formats and composition. For figures, the production procedure is similar, but here, master copies for certain models were developed which can be used as standards. Since screen visualization is equally possible on basis of bitmaps and of vector graphics, one can select from several options.

2. Graphic components of the electronic version

All elements from the print version are being used and fed into the electronic version, basically without any changes. The technical procedure of transformation, though, differs, as visualization of graphics on screens can equally utilize raster or vector formats, depending on which will render optimal results. In order to transform simple maps or figures, at a scale at which the whole map can be displayed on the screen and all elements of the map can be read and clearly distinguished, raster data are used, while complex maps with several layers and high density of information, showing processes or changes in distribution, are processed in vector format.

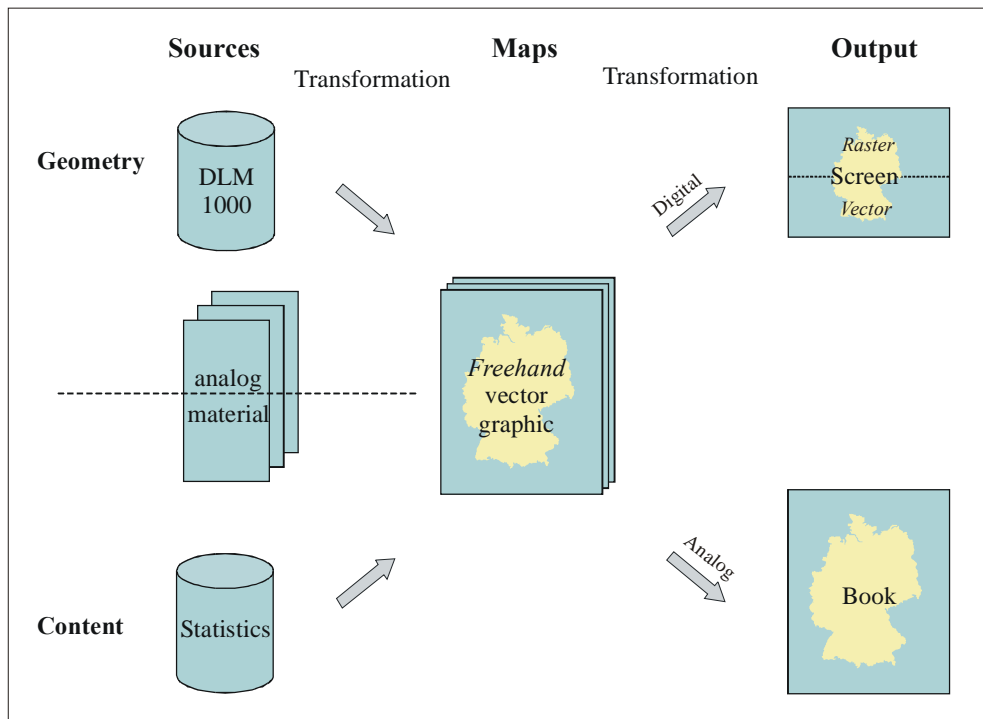


Fig. 2: Workflow of the graphic production process

Raster format: There are several well known types of raster formats, such as TIFF, GIF, JPG, BMP etc. Based on a long trial period and several testing runs, BMP-format with external compression resulted the most adequate for the atlas production, above all considering the relation file size to exactitude of the image produced. BMP-formats give the best results for line-symbols as well as considering access and rendering time. Thus, in transforming maps and figures from the FreeHand files, mainly BMP-formats are used. Due to this format and as a result of using strictly html-browser technology, these maps are view-only-maps. BMP-format is not apt for processing in internet, because the file size is too big for an acceptable loading time, and external compression is not available. In order to avoid this effect, for internet use, graphics should be transformed to JPG-formats, or should be handled like vector graphics, as explained in the following paragraph. Photographs always are stored as JPG.

Vector format: As to the use of vector formats, no long term testing was necessary. When the final conception for the electronic version of the National Atlas was decided on, in 1999, two adequate possibilities for scaling graphic elements with browser technology were available: PDF (Acrobat) and SWF (Flash/Macromedia). Since Flash offered a whole lot more of interactive possibilities, and did not render worse results than Acrobat in zooming, the decision was made for Flash. For comparison, it was more or less the same time, when the Swiss electronic atlas was developed (SIEBER, BÄR, 1996). Here, the program "Director", also produced by Macromedia, was applied. It offers quite a number of additional functionalities, but it also demands a far higher effort of production, which was impossible to achieve within the realm of the conditions of the German National Atlas. Since the end of the year 2000, an interesting alternative is available, the SVG-format. According to a study by SCHNABEL (2001), this format would result more efficient at least with regard to online application, and would be longer lasting, for the purpose given. Even though several arguments are favorable for the use of SVG-formats, the cumulative character of CD-ROM production would make it necessary to re-transform all formerly produced volumes, causing high expenditures in time and money. For reasons of continuity, this new alternative had to be abolished with regard to this project.

Transforming FreeHand maps into SWF-format, three types of maps are being produced:

1. Static Maps with reduced possibilities of interaction, limited to rather technical possibilities. Maps can be zoomed in two or three steps, or can be zoomed by drawing up a selection rectangle in the reference map. The map elements "title", "reference map" and "legend" can be activated or de-activated. Additionally, for maps using symbols of different sizes, there is an "intelligent" element of the legend, designed like a transparency, which varies with the scale and can be freely placed over a symbol, in order to see the exact symbol size.

2. Static maps with contextual interactivity. These “clickable maps” allow to click on certain active points or other elements on the map in order to make further information or another layer of objects appear. Similarly, by activating orders through the legend, elements can be added or entire information layers can be activated or de-activated.
3. Animated maps with contextual interactivities. Sequences, processes or dynamic interactions in time and space are shown as animations. User interaction is possible through activating the process or its individual phases, respectively different layers in the legend.
4. A fourth type of map based on vector format is the specific add-on feature of the electronic National Atlas. It is the only element not taken 1 : 1 from the print version, but utilizes the data on which print maps are based, when they are available for the respective spatial units. These vector maps are created by means of a data bank, which contains geometrical and statistical data. With an integrated map construction program, maps of Germany can be generated automatically. A set of functionalities allows to manipulate and analyze these maps via the user interface, for example by a change of categorization-method, a change of colors, the selection of minimum and/or maximum values from two indicators, through the comparison of two maps, or even the overlay.

These map types, view-only maps and figures, interactive maps and the cartographic analyzing program together form the electronic version of the National Atlas of Germany. The components represent the three electronic atlas-types, listed by ORMELING (1994) as possible varieties – but in this case, they are all present within one product and can be used alternately, and in some cases even parallel.

3. Different media for the electronic atlas version

The standard electronic version of the German National Atlas has been conceptualized and realized as offline product on CD-ROM. Due to the architecture of the program and the application of some controls depending on Windows, a direct use online for internet is not possible, even though all components, taken separately, are internet compatible.

With the special CD-ROM production “National Atlas of Germany – a selection”, the variety of products has been amplified, already. Even though characterized as offline-edition, the product is a pseudo-online variety. On the very same CD-ROM, there is a server installed, which handles the requests given by the UI using the standard browser for visualization. Since – as described above – all graphical components individually are online compatible, they were transformed to the Flash-format for this product. After having accomplished this step, internet presentation is possible without complication, as has been proven in tests, loading the material up to an internet server. Therefore, the electronic version and its derivatives will be apt for online and offline use, given its present state of development.

III. TARGET GROUPS AND ELEMENTS OF AN “ATLAS-TOOL-BOX”

Most atlases and high quality cartographic products are commercial goods, due to their high development costs and the labour intensive character of graphical elaboration. The German National Atlas does not make an exception from this rule. An international high segment publisher (Elsevier) is in charge of marketing and sales, and even though the IfL-research institute provides all data up to the process of print to plate without charge, the market price is high and restrictive, with regard to a broad distribution. Therefore, for further uses of atlas elements, low cost or even free distribution is aimed at. With this strategy, the institute wants to live up to its statutes which demand a wide and free distribution of geographical knowledge and a break down of scientific publications for the interested public.

1. Target groups

National atlases generally do not reach a broad distribution, even though the Swedish and the Netherlands’ examples have taught us that this need not be so, necessarily. Traditionally, prime target groups are teachers and students of geography and social sciences at upper high school and university levels. In this context, central topics are the physical, economic, and social structure of the country of residence, as well as social and economic developments. Spatial differentiation is mainly reduced to be a question of detail – the map of Germany specifies where economic development takes place or does not take place, and at which locations there are population losses or gains.

Our vision of the treasury, hidden behind the huge mass of material of the atlas, though, goes beyond this perspective. The multitude of themes presented on maps and by figures draws a highly complex picture of Germany, with a multi-

dimensional spatial differentiation. Through the complexity of thematic layers, new insights in developments, causal relationships and inner dynamics of a country's inner structure can be obtained. As an example, looking at maps which deal with the location of enterprises and new industrial developments, the combination with the information of maps of leisure facilities, quality of physical environment or of cultural services might bring new and unexpected aspects to the interpretation of high order headquarter developments. Of course, theoretical studies dealing with factors for locational dynamics are aware of these relationships, since a long time. But research normally is restricted to case studies. There are few publications which incorporate data about a whole country, especially combining research in several distinct scientific fields, such like economy, environmental quality and leisure infrastructure.

Taking the multiple possibilities into account, target groups for national atlases can be recruited from a much larger total than from those concerned with national higher geographic education, only. If data are guaranteed to be recent, several potential user groups can be identified, in addition to geography teachers and professors.

- **Politicians:** there is a high demand of information that shows and explains the specific living situation in the regions of every country or region, and their future perspectives. Maps that show regional distributions in easy terms can help visualizing local problems and local specialities, for politicians of the own country as well as from abroad.
- **Press and mass media:** recent trends show an inflation-like use of maps in the media, normally produced in low quality, with false technical parameters and in sensationalist aesthetics. Well prepared maps and the illustration of unexpected spatial distributions and coincidences are apt to find great attention in the media. Publicity and marketing form another segment of this user group. Since designers nowadays are used to utilize graphics programs such as FreeHand, professionally made basic maps might even improve quality of publicity.
- **Foreign teaching** of politics, regional geography, language and economic development etc. about a foreign country or the world region in which it is located, usually is short of good material. Even though the world-wide-web gives access to manifold information about any spot in the world, for example, a Korean geography professor will be pleased about some cartographically well elaborated, easy to download material with recent data and scientifically based comments about Germany and Europe (or about any other European country).
- **Advisors and decision makers** in economy and public institutions. The number of consulting offices is growing constantly. In addition to managing and marketing advice, one of the main contents of information consists of general regional background data about locations of possible investment, of pilot sales regions, or of the hinterland of a possible cooperation partner.
- Last not least: the **“general public”** from the country itself or from abroad, interested in developments of a certain region, in a specific topic, or simply in a broad information about a country.

In order to “recycle” the National Atlas material for all these or other target groups, we propose its use in form of an offline and online electronic tool-box which allows a high flexibility of combination of topics, extraction of maps and map-layers, visualisation of data and background-information. Additionally, some derivated print products are also under consideration.

2. Flexible elements for the “tool-box”

All elements produced for the atlas – print and electronic version – can be considered possible elements of the atlas tool-box. Depending on clients' demands, these elements can be reproduced, combined in different constellations, or completed by additional material. For this purpose, the original structure of author-based articles is to be broken up. A selection of relevant themes is to be made, in order to reduce the more than 600 articles of the 12 volumes to a manageable size.

Considering the different target groups, the material has to be prepared to serve any type of demand:

Text: Each theme has to be covered by several texts of different depth and scientific background, including a short abstract, a listing-type short version and a full length scientific version. Complementary elements can be technical explanations, background information, a glossary of key terms, additional/regional examples, further literature on the theme, or a pedagogically prepared text guiding through the contents. An additional element, as of now somewhat neglected, should be a thorough textual interpretation of individual maps.

Tables: Tables can be considered as base material for maps. Especially for the use of teaching, but in some situations as well for press reproduction or the necessities of some enterprise representative, hard data might be of additional interest.

Even though data for the German National Atlas are mainly subject to licenses and royalties, once legal questions are solved, some tables could form further elements of the tool-box.

Maps: The Maps are the most important elements of the tool-box. They are available in the different formats listed above. Additionally, especially for didactical purposes, certain maps could be produced in a step-wise manner, in order to make it easier to identify their different layers and their different dimensions of information.

Figures: Figures generally give background information and general statistical overviews on topics. In order to guarantee that the atlas shows the themes in their most up-to-date version, the easiest way is to update data for figures constantly. A politician or a journalist might not mind if data for a map of enterprise-turnover are two years old, but figures showing the national gross income or summed up enterprise turnover should reflect the most recent data available.

Photographs: For some themes, photographs add substantial information; for most of them, though, photographs play an illustrative role. Even though, experience proves that there is a high demand for attractive pictures, and aimed at classroom use, pictures might be necessary in order to illustrate and to explain. Since photographs need a far lower resolution for a good quality on a screen than for print, to add additional pictures causes rather low costs in terms of effort and space, even though costs might be high in terms of copyright fees. In all cases in which regional examples are involved, aerial or satellite photography is of utmost importance.

IV. OUTPUT

Given the varied groups of possible users and the multiple formats in which the elements of the National Atlas could be put to further use, several types of spin-off products can be thought of, even though some of them might not be possible to realize.

1. Print

- Thematically selected one-volume National Atlas for schools (in German): Due to federal structures of the educational sector, the rather complicated coordination with the conference of (16) ministers of education of the German *Länder* would be the prerequisite for realizing such a project.
- Thematically selected one-volume National Atlas of Germany (in English) for an international demand in schools, universities and public sector, as well as German cultural representation abroad: If an international publisher can be found, a selection of topics relevant for the international image of Germany, with recent data and a reduced text load, will be of interest for politicians and public representatives dealing with Germany, as well as for college and university libraries in the USA and Japan, in UK and many other countries.
- Individual maps for publication in scientific studies, press publication, or other purpose (on demand).

2. Offline

- CD-ROM version of the “National Atlas of Germany – a selection” in German: As opposed to the existing offline-version of the National Atlas, selected topics, reduced texts, and a more modern design could make it an interesting version for private PC users. It should include the possibility for updating data of the interactive cartographic module.
- Comprehensive CD-ROM version “National Atlas of Germany” in English; contents selection like print product (see above); including the interactive cartographic module with possibility to update data.
- Basic Map of Germany – geometric data in graphical formats, for further uses in mass media, in schools or for any type of publications: The about 70 layers of cartographic information of the map of Germany provide a basic map that can be used in many contexts and for many purposes. Once solved the legal problems of data ownership and rights to pass them on, the data could serve for the media as well as for publicity or for teaching. These data comprise for example different degrees of densities of the river system, from first order rivers up to a highly densified system of tributaries; other layers of the physical landscape are woods, or mountains etc. Thematic information reaches from settlement surfaces, communities, towns and cities to administrative seats of regional governments or law courts. Regionalization is possible according to a great number of criteria, from districts of the

federal administration, the county or the municipal administration, over postal or military districts up to syndicates' regions, planning regions, dioceses of the protestant or the catholic churches, labour districts or touristic regions.

3. Online

- Download-teaching-units: This product bears an important chance to take influence on the image of Germany abroad. Teachers and professors all over the world have to face units about Germany or about the European Union. What they ask for is information, split up into easily understandable and graphically well equipped units, if possible as downloads for direct use in classrooms and beamer/power-point projections. Even though it would be too high an effort to gather information about contents of teaching lessons at different levels in other countries, some basic topics will most likely form part of any standard teaching unit, such as "physical landscape", "population development", "differences in living quality", "immigration and foreign work force", "economic poles and industrial restructuring" or "environmental problems".
- Online-version of the comprehensive CD-Rom "National Atlas of Germany" in English (see above). For this product a pilot version has been produced in 2004 (National Atlas of Germany – a selection) which realizes first steps in direction of a flexible tool-box use of atlas elements (*see fig. 3*).
- Online-version of the comprehensive CD-Rom "National Atlas of Germany" in German (see above).
- Online "Regional Geography of Germany" in English: This is a project integrated in a virtual geography of Europe, created by a series of links on the homepage of the Organization of European Geographical Associations EUGeo. Even though the contents of this product will not differ significantly from the other English language online-products listed above, as special approach it will offer a "guided tour" through the geography of Germany, that is to say, there will be a suggested order of access to the elements of the tool-box.
- Periodically changing online section: "What is in the news?" Geographers and cartographers should react to everyday news. Many news-items need maps, and the press meets this need as it can. In order to facilitate good and always up to date information about Germany, national atlas makers should present an online "Map of the month" or periodically maps and/or modular units about a topic related to recent news.

4. Online/offline-interface of the tool-box

The tool-box program has to be able to fulfil several functions. In order to serve all different needs and demands outlined above, it has to be highly flexible and easy to be used. The existing pilot CD-ROM "National Atlas of Germany – a selection" makes a first step in this direction. Its structure is hierarchical, thus allowing to browse systematically in a book-like manner through the themes, according to chapters. But there is no need to stick to the hierarchy. Search-function and links make it possible to jump directly to any theme, map, figure or text-fragment of interest.

The chapters' interface consists of one principal window in which the active element is amplified (*see fig. 3*). Each theme opens with a map in the main window – paying tribute to the principal character of an atlas. Basically, though, all elements are of equal importance, in this system. All non-activated elements are always visible at the same time, in miniature-size reduction, possible to be activated with a simple click. A short appetiser phrase of the text is visible, and the text can also be activated, if desired. A solution for indicating other text elements in an easily accessible manner still has to be developed.

The menu bar at the left side of the screen offers buttons for

- ◆ return to hierarchical index
- ◆ search function
- ◆ links to other themes/internet links
- ◆ interactive cartographic module
- ◆ references

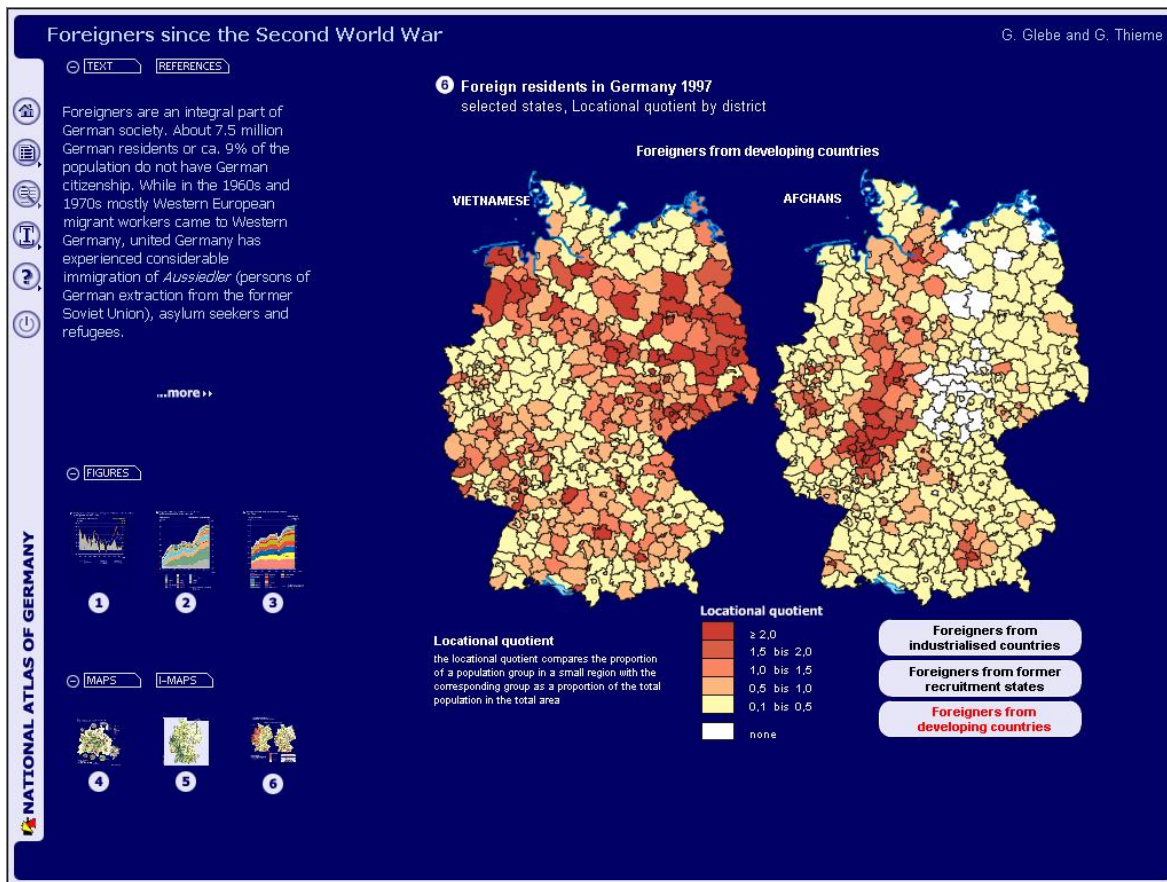


Fig. 3 Screenshot from the CD-ROM “National Atlas of Germany – a selection”

In order to meet all the listed demands and interests, some further functionalities have to be developed and integrated in the interface, such as:

- ◆ download
- ◆ export of files in different formats for printing or processing
- ◆ change of operating and text language (English/German)

V. SUMMARY AND PERSPECTIVES

Recapitulating, there is a wide range of possibilities to put use to the large stock of graphical materials as well as scientific texts, elaborated in the course of editing the German National Atlas. Especially the high quality maps in FreeHand, the very detailed basic map, the interactive and animated maps in Flash and the interactive cartographic module can be used in quite a number of contexts, partially in the same form as in the atlas, and partially updated.

The project proposed offers a selected part of the atlas material as an online tool-box which enables users all over the world to select and extract that information on Germany which they need and in the format in which they need it.

Problems arise with the complicated legal situation. On the one hand, interests of the publisher have to be considered, on the other hand, in Germany neither statistical data nor geometric data are of public domain. Since maps figure as transformation of statistical data, their publication is allowed, while passing on data lists or geometric data for downloads and further uses might result difficult or even illegal.

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Academic biography of Christian Hanewinkel

Diploma in Geography (Major), Cartography and Economy (Minors), University of Trier; title of diploma-thesis: Economic analysis for the use of cartographic data processing in small and medium planning institutions.	1994
Scientific staff at the Leibniz-Institut für Länderkunde, Leipzig	04/1995 - ...
Project editor for the 12-volume CD-ROM edition of the National Atlas of Germany at the Leibniz-Institut für Länderkunde, Leipzig	1999 - ...
Project manager, responsible for the IfL part of the EU-project "STATLAS"	2001- 2004
Project editor for „National Atlas of Germany – a selection“ (CD-ROM)	2004

Academic biography of Sabine Tzschaschel

Undergraduate-Studies at Macalester College, St. Paul, Minn. USA; B.A. in Geography and Geology	1969-1971
Diploma in Geography (Major), Sociology and Social Psychology (Minors), Technical University of Munich; title of diploma-thesis: "The public spaces of the Munich pedestrian zone as behaviour setting."	1976
Teaching-Assistantship at the Dept. of Social Geography, Technical University of Munich	1977-1982
Teaching-Assistantship at the Department of Cultural Geography, University of Bayreuth	1983-1985
Ph.D. at the Technical University of Munich; title of Ph.D.-thesis: "Geographical research on an individual level – relation and critical reflection of Micro-Geographies."	1986
Research- and Teaching-Assistantship at the Dept. of Social Geography, Technical University of Munich	1986-1992
Free-lance journalist for international travelling literature in Madrid, Spain	1992-1995
Head of the Department of Regional Geography of Germany at the Research-Institute for Regional Geography in Leipzig (Leibniz-Institut für Länderkunde)	05/1995
Project editor for the 12-volume National Atlas of Germany at the Leibniz-Institut für Länderkunde, Leipzig	1997 - ...
Project editor for „National Atlas of Germany – a selection“ (CD-ROM)	2004