

## **Designing an electronic socio-economic new atlas of Greece.**

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### **Summary**

The lack of a complete and systematic cartographic documentation of the socio-economic spatial parameters of Greece, creates a great scientific and development gap. The last relevant Atlas goes back to 1963 and it is considered as old, at least as far as the data used are concerned. The recent publication of a new Atlas in this field, does not cover the gap mainly because the cartographic approach followed is rather limited and weak. As a consequence, such cartographic challenge is a major concern for specialists especially from the domain of the university. Thus, In the Department of Cartography, University of Thessaloniki, a relevant research has started some time ago in order to design an electronic new socio-economic Atlas of Greece. The thematic treatment starts from the cartographic representation of demographic data, proceeds to data relevant to production and development and concludes in other themes concerning educational and cultural issues. The design decisions are based on the following assumptions: (a) The statistical data used are according to the last census of 1991. (b) The geo-reference unit is the Prefecture (52 in total). This choice is made due to the scale selection to fit the Atlas format in DIN A2. (c) The data processing and the cartographic representation is performed by implementing relevant software, proper for such applications. (d) The thematic structure of the Atlas follows the flow: Physical features, population, production, culture, economy etc. (e) Each theme is related to a cartographic section including tables, diagrams and texts. An indeed special care regards the visualization issues both for the electronic variant and the hard-copy counterpart of this new Atlas and some innovative tests concerning the visual treatment and some new design of symbols, pictograms and other means of thematic symbolic representation. Special care has also paid in the coupling of the electronic and the hard-copy versions of the Atlas.

## Introduction

The aim of this project is the design of the new socio-economic electronic atlas of Greece. This project is being developed, among other research projects, at the Department of Cartography in Aristotle University of Thessaloniki, Greece.

Atlases always were the communication means for geographers, thought of as the final image of the geographic data on a map. In this sense, an atlas is a collection of relative objects, which are used to portray information for a specific subject on a map<sup>1</sup>. An electronic atlas is a digital collection of maps with illustrations, information, tables and texts. It can combine statistical indicators, tables, texts, maps, graphs, pictures, video, audio and animation into a power full, effective and entertaining presentation.

The development of digital technologies, G.I.S., multimedia, Internet technology has made possible the completion of the first electronic atlases. Today electronic atlases exist in a large number of web sites and on many compact disks. Many companies use atlases as -strategy and commercial- tools for the success of their economic development and governments use atlases for the design of their policies.

It is evident that with the use of electronic atlases one can make better decisions with increased accuracy, speed and shared access to more data for better public and private service planning, geographic allocation and resource allocation.

Building and managing infrastructure-health, education, public safety, transportation- requires knowledge of population spatial distributions, together with age and sex distribution in order to adequately plan and provide facilities and services. Businesses need to determine good sites for marketing new products and locating new stores.

Concluding we could say that an electronic atlas is an information data system, which exists and operates among and with the interactivity of digital geographic databases and maps<sup>2</sup>.

The Netherlands Cartographic Society offers a comprehensive definition of an electronic atlas: *“an information system set up for the interactive consultation of digital geographic databases concerning certain area or theme and containing data which are comparable in terms of the level of generalization and the resolution at which data were collected”*.

## General approaches for Electronic Atlases

Initially, two general approaches based on two different techniques, were developed for electronic atlases. The first approach was based on existing geographic systems, enriched with multimedia functions (Multimedia in GIS). The second approach integrated GIS functions and authoring systems (GIS in Multimedia)<sup>3</sup>. Neither of these two approaches respected cartographic aspects. At a subsequent stage, the new approach for interactive atlases was *“The GIS and Multimedia Cartography”*<sup>4</sup> approach. In this final approach, cartographic techniques like generalization, symbolization, etc were noticed and developed.

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<sup>1,2</sup> Ben White, 1998, Electronic Atlases: In theory and in practice

<sup>3,4</sup> Dr. Hans Rudolf Bar and Dr. Rene Sieber approach, Towards High Standard Interactive Atlases. The “GIS and Multimedia Cartography”

Although GIS and electronic atlases are both computer-based information systems, many differences can be noted between these two systems<sup>5</sup>:

	GIS	Electronic Atlas
Use of interface	<i>Complex</i>	<i>Easy</i>
Users	<i>Experts</i>	<i>Non-experts</i>
Computing time	<i>Long</i>	<i>Short</i>
Control by	<i>Users</i>	<i>Authors</i>
Main focus	<i>Handling of data</i>	<i>Visualization of topics</i>
Data	<i>Unprepared</i>	<i>Edited</i>
Output medium	<i>Paper</i>	<i>Screen</i>

### Design of the environment

There are three basic steps for the design of the outline of an electronic atlas:

- a) The use of a common GIS system provides the possibility to work with a database and create the first images of the atlas. A database providing all the statistical analysis of the atlas must be constructed.
- b) The use of a graphic application prepares the files for entering into a multimedia system.
- c) Final process of data in a multimedia system and representation of the images.

Certain choices must be made regarding the format of the files so that we can have the atlas over the web or on a compact disk. At the conclusion of the last task –that of the completion of the atlas in a multimedia environment,- all the new technologies of these systems must be used in order to achieve the best format of the Atlas.

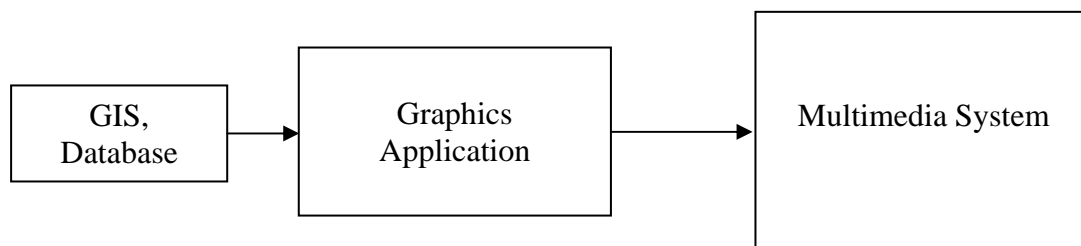


Figure 1: Designing an electronic Atlas

<sup>5</sup> Barbara Schneider, Integration of analytical GIS-functions in Multimedia Atlas Information Systems

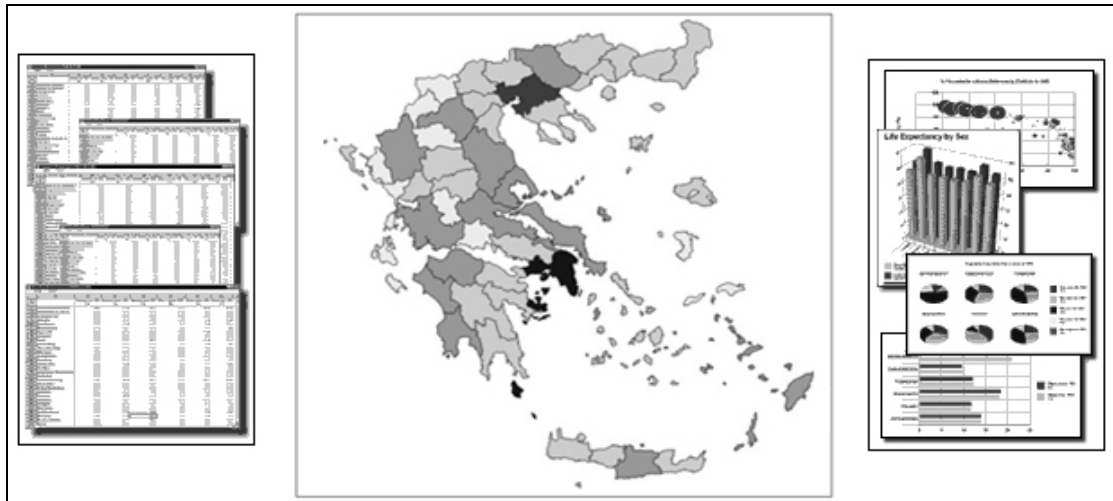


Figure 2: The multifunctional electronic atlas.

## Electronic atlases

Designing an electronic atlas is hard work and the composition of it demands a sequence of seriatim approaches of the production of the atlas. Besides the classical problems faced by cartographers, must also consider aspects like the choice of the files formats and the best use of new cartographic functions (animation, interactivity, video, highlights, sound etc).

Except for today's cartographic capabilities, complete utilization of personal computers and network power, which gives us the ability of processing a large amount of data with new and flexible ways, must be achieved.

Although electronic atlases are the natural next step to classical atlases, many differences between the two can be identified. Though main principles and basic aims are the same, different prospects and methods of production give advantages and disadvantages to the electronic way of mapping.

The basic advantages of electronic atlases vs. classical atlases are:

- **Quicker and easier to revise**
- **Manipulability**
- **Flexible base for the creation of new map products**
- **Presentation of dynamic phenomena etc.**
- **Cheaper development and production**

## Designing an electronic atlas

At the first stage of designing an electronic atlas, we must choose the operational strategy of the atlas. There are two kinds of electronic atlases:

- 1) **Atlases with a hierarchical layout**
- 2) **Atlases with a single layout**

In the first group of atlases, which follow the logic of a hierarchical layout, the user has the ability to move from layers of general information to layers of more detailed

information (for example the user can change scale, from the country level to a prefecture level).

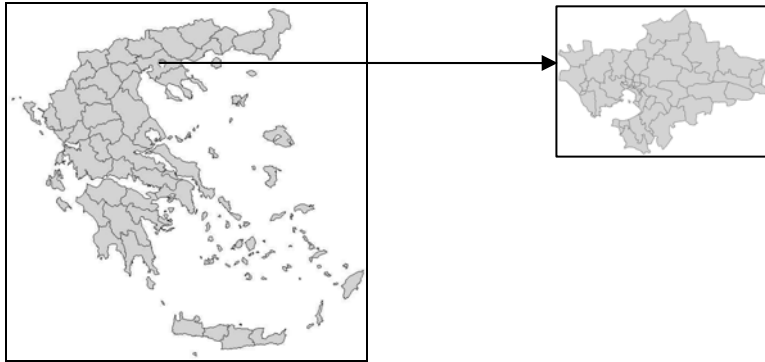


Figure 3: Hierarchical Layout of an electronic Atlas (scale change).

In atlases with a single layout, the user has the ability to turn layers on and off or zoom in and zoom out on the same scale of information.

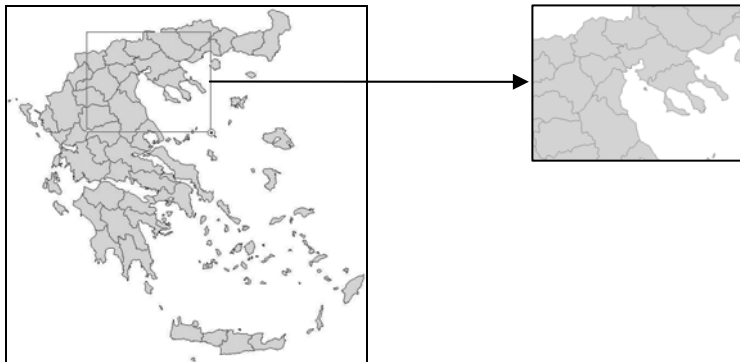


Figure 4: Single Layout of An Atlas (zoom in).

The choice of the operational strategy depends on:

- **The aim and the kind of data**
- **The users of the atlas**
- **Methods of delivery of the atlas**
- **Geomorphology of the ground layer**

### **Designing the New Greek Atlas**

Every atlas is a different project, and therefore the cartographer must consider different aspects. Greece is a unique country because of the morphology of its relief. Almost ten thousand islands in the Aegean and Ionian Seas surround the main body of the country. Half of the total surface of the national territory is seawaters, and islands like Crete and Rhodes can be considered as outposts of the natural continuity of the main land. The administrative borders of the Greek municipalities changed after 1997 with the “Kapodistrias” project. This project re-divided the country and created new relationships between communities. The new administration map of Greece is the new layer of the atlas. Also the economic data of the country have greatly changed during

the last decade. After joining the *European Union* and the *Economic and Monetary Union*, the economic situation in Greece has dramatically changed. These changes create a new form of the Greek community and different economic and social data. Employment, education, production data, are all different and given in a new community network.

This explosion of development in the country forms a new atlas, *the new socio-economic electronic atlas of Greece*.

For the above-mentioned reasons, the demand for a combination of the two atlas design techniques has been judged necessary. Having the advantages of the two techniques, we can achieve the best communication with the user of the atlas.

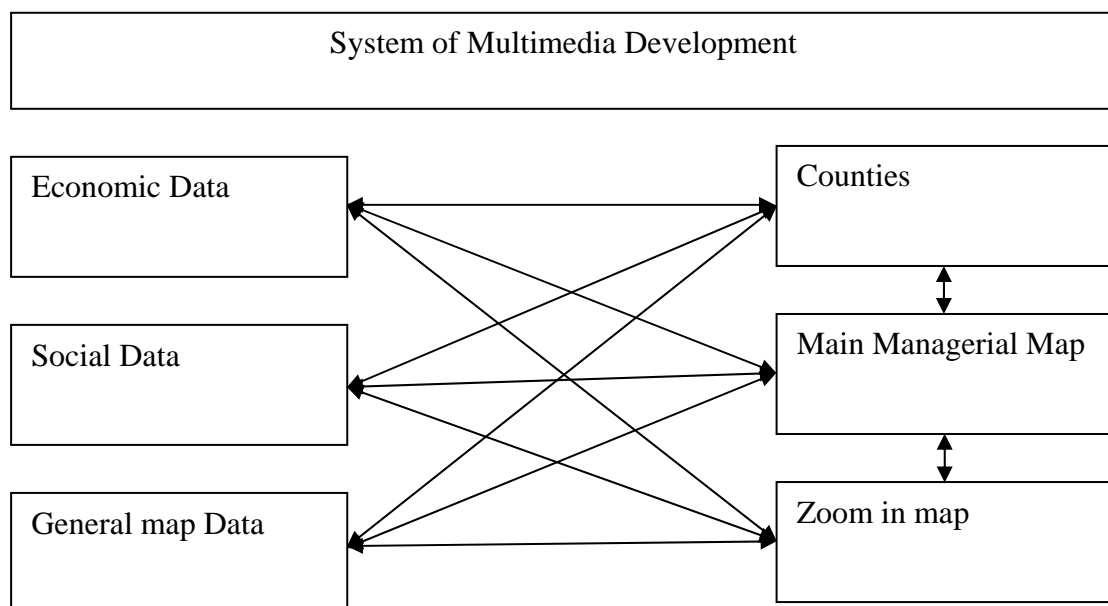


Figure 3: Final System of multimedia Atlas

The basic layer of the atlas is the new administrative map of Greece. The users of the atlas have several options to search the information provided via the map. Among the buttons one can use to find information. The map itself is a big button using technologies of geographic information systems. Users can just click with the mouse on a Greek county and get information on a different scale. And there is always the capability of searching for data of different subjects using the basic cartographic rules and culture of Greek mapping as developed in the Greek Universities during the last years.

### **The cartographic support**

The choice of the proper cartographic background for any cartographic procedure always underlies an important step for the whole apprehension and structure of the cartographic product.

Apparently, there exist important differences between different research results, in a way that the cartographic background can be from very important to less important, to schematic. In the case of the new electronic socio-economic atlas of Greece, even though the demands of construction are not so high, the choice of the cartographic

background is of great importance for the developers of the atlas because of the need for a printed final product.

The cartographic background, which finally was chosen, has all the characteristics to serve parallel purposes supplemental to the atlas.

These characteristics are the following:

- **Projection**
- **Datum**
- **Scale**
- **Readability**
- **Chromatic relations**
- **Legend**
- **Generalization**
- **Accuracy**

### **Issues of Scale**

According to the logic of designing such atlases, the issue of scale is not one of the first basic choices. The exact specification of the prime and allocated scales is although necessary, in our case, as a tool for the efficient correlation of data and basic map.

### **The choice of thematic symbols**

(Issues of graphic communication for Electronic Atlases)

In an atlas, even in electronic atlases, where a volume of geometric and thematic information is represented, the problem of the choice of designing templates is singularly important.

The Department of Cartography of Aristotle University of Thessaloniki has developed a great activity, on research projects, and application projects as well, in the issues of design and graphic communication.

The basic graphic choices for the new electronic atlas rest on the classification of the representation ways of thematic information.

We have spotty, linear and surface-volumetric thematic representations.

Factors, which influence the choices of the design templates, are scale, users, and the need for the Atlas to function in electronic and conventional form.

Spot symbols usually represent geographic positions and place-names and all the choices are simple and conventional.

Linear symbols refer to limits, borders, water networks, transfer and communication networks. In this case choices are also simple and conventional.

Surface-volumetric symbols represent singularities and major margins of choices.

Problems on choropleth and pycnometric maps are well known. The basic problem that engaged in this atlas was mainly the output of severity between allocated geographical units for the easiest comparison and ability of correlations between them.

## Structure of Socio-economic Atlas

The structure of the information system, which supports the atlas, truly corresponds to what we could call the thematic content of the atlas. We consider it a special information system, which includes observations and measurements of space, objects, and activities of the country, and also includes all the relative procedures for collection, registration, recapture, procession and allocation of the elements.

Types of thematic information which register in this kind of system are basically two:

- **Natural and geometric elements of space.**
- **Characteristics of the human space.**

The N.E.S.E.A.G. features three geographical area levels: Country, 53 Prefectures and 1100 municipalities. The Greek Census Service covers more than 100 demographic and socio-economic indicators that were collected for all persons during the 1991 Census.

The topics covered are: land, population, education, economic activity, migration, households, and housing conditions, urban-rural distribution, settlement network.

The thematic indicators of the Atlas are:

### 1. Natural Environment

- Relief
- Soil characteristics
- Climatic characteristics
- Geological characteristics
- Seismic-tectonic characteristics
- Water characteristics
- Ecological characteristics

### 2. Land Uses

- Agriculture
- Pastures
- Forestry
- Waters
- Settlements
- Industry

### 3. Household and housing

- Average number of persons per household
- Average number of dwelling rooms per household
- Proportion of pop. with access to electricity
- Proportion of pop. with access to sanitation

### 4. Settlement networks

- Types of settlements
- Density of settlement network
- Architectural characteristics
- Historical characteristics
- Urban-rural settlements

### 5. Networks

- Infrastructure
- Transports
- Communications

### 6. Demography

- Population distribution
- Population density
- Natural increase
- Fertility
- Mortality
- Infant mortality
- Population structure



## 7. Socio-economic characteristics

- Employment rate
- Unemployment rate
- Production
- Investment
- Income
- Adult literacy rate
- Percentage (%) of labor force by economic sector
- Elections
- Education
- Health

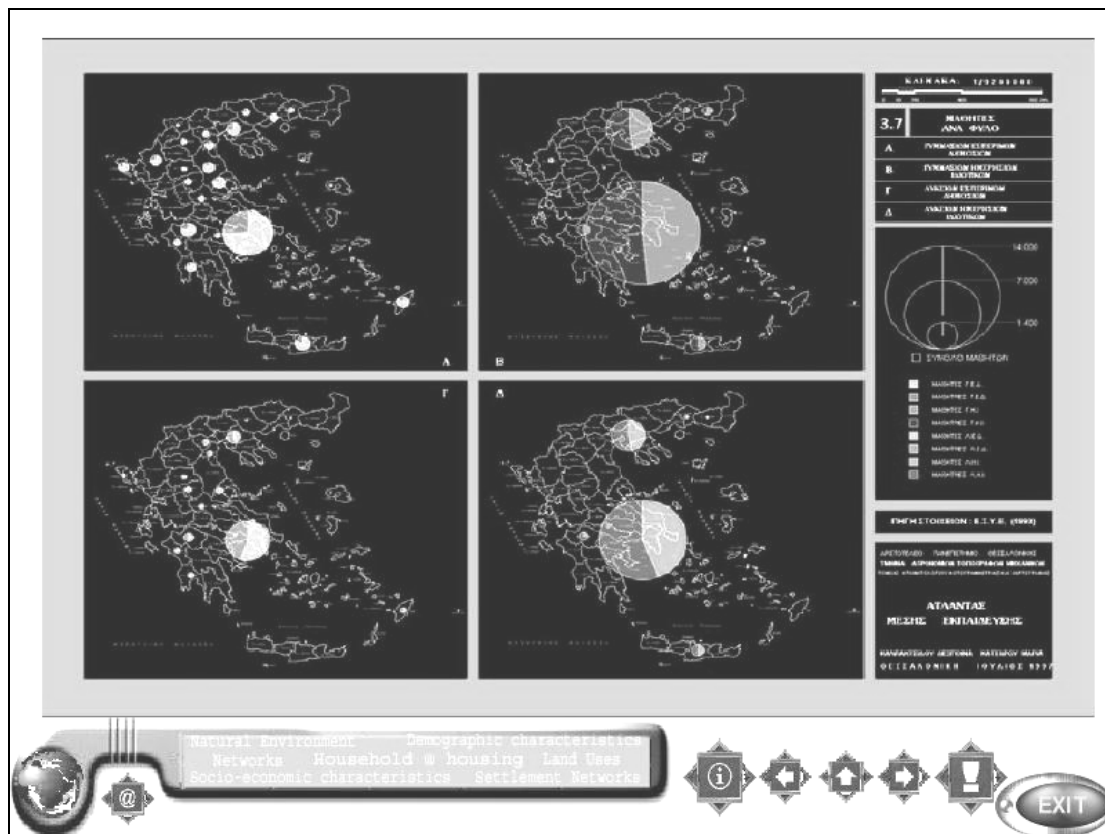


Figure 5: Example of an electronic map in its electronic environment.

## Conclusions

Design and completion of an atlas always was one of the great concepts of cartographers. The main aim always was to survey the true image of a subject of a land. Because of the continued change in data and the dynamics of Greece the design of the new atlas was of critical importance. The completion of the atlas is a work that never ends and continuous among the changes of data. The new socio-economic electronic atlas of Greece is an atlas, which uses all the modern techniques of cartography, and is also a Greek atlas in which the culture of Greek cartography is imprinted.

The principal characteristics of modern electronic atlases versus the conventional ones are as following:

- **From large to small mapping systems.**
- **From static to dynamic maps.**
- **From passive to interactive mapping.**

What the maps do show is the complexity of competing and complementary spatial patterns in a period of sustained economic growth and social and political development. We hope that the atlas as a whole will be used as a basis for thought and argument about the processes that create geographical differences in Greece, and about the significance of those differences for the history of the country, as well as providing illustration of the spatial distribution of particular economic and social phenomena.

The atlas is a reminder of the manner in which prosperity and vitality depends on the variety of place and region, and on the tension between different patterns of spatial organization. In current circumstances increasing awareness and understanding of these different patterns, whether in teaching or research, can only be a benefit.

## Bibliography

1. Aristotle University of Thessaloniki, Department of Cartography, 1996, The digital atlas of the Greek secondary education. (In Greek).
2. Aristotle University of Thessaloniki, Department of Cartography, 1996, The digital Atlas of the Greek Agriculture. (In Greek).
3. Dr. Bar Rudolf Hans, Dr. Sieber Rene approach, 1999, Towards High Standard Interactive Atlases. The "GIS and Multimedia Cartography".
4. Hurni Lorenz, 2000, Atlas de la Suisse - version multimedia.
5. I.C.A. Workshop: Electronic Atlases and Cartographic Multimedia Products from CD-ROM to Internet, 1996, Workbook.
6. Karanikolas N., Kousoulakou A., Lafazani P., Myridis M., 2000, Demographic aspects of the regions of the Central Makedonia of Greece. A digital approach. (In Greek).

7. Karanikolas N. and Papadopoulou K., 2000, A new multimedia map of Thessaloniki. (In Greek).
8. Lafazani P., Myridis M., Ramnalis D., 2000, Electronic election maps of Greece. (In Greek).
9. Langton John and Morris R.J., 1997, The electronic Atlas of Industrializing Britain.
10. Monmonier S. Mark, 1982, Computer-Assisted Cartography, Principles and prospects.
11. Oberholzer Clemens, 2000, Visualization of change in the interactive multimedia Atlas of Switzerland.
12. Rhines P., Swift J., 1999, About Electronic Atlases.
13. Richard Daniel, 2000, Development of an Internet atlas of Switzerland.
14. Schneider Barbara, 1999, Integration of Analytical GIS-Functions in Multimedia Atlas Information Systems.
15. Spiess Ernst, 1995, some problems with the use of Electronic Atlases.
16. Tsoulos Lissandros, 2000, the digital Atlas as a setting mean of demographic phenomena. (In Greek)
17. United Nations, 1999, Creating electronic Atlases.
18. White Ben, 1988, Electronic Atlases: In theory and in practice.