ENABLING EFFECTIVE SPATIAL DATA MANAGEMENT FOR TRABZON, TURKEY

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Various GIS projects have been produced by different public institutions in Turkey. But, spatial data users need to use the data collaboratively to provide noteworthy benefits to environmental, social, and economic context. In this study, a preliminary work to build Spatial Data Infrastructure (SDI) for Trabzon province of Turkey at local level was executed with the aim of using and sharing data effectively. Spatial data collected from different resources was managed on Geodatabase as to database design for many applications from environment and land management to statistics and economic analysis. Spatial data was controlled and updated by related user groups with the using of ArcSDE. Geodemographics, landslide hazard, tourism services management, and health planning applications were produced with the using of ArcGIS functionalities, and were presented to different thematic user groups on internet with the using of ArcGIS Server.

1. INTRODUCTION

Geographic Information (GI) has a major role to play in addressing societal demands and exploiting the opportunities opened up by policy and technology. GI has economic value as a major component of Public Sector Information and has social and policy value for providing the basis to integrate policies and to provide tangible benefits to citizens, business, and governments (Craglia, 2004).

Information Systems (IS) that support information management in concerned working group have been re-conceptualized as Information Infrastructure (II) concept that supports effective and corporate decision making by various institutions in a large user community. While Geographical Information Systems (GIS) were largely designed to serve specific projects or user communities, the focus is now increasingly shifting to the challenges associated with integrating these systems into a society perspective. Similar to II, this can be explained with Spatial Data Infrastructure (SDI) concept. SDI encompasses policies, technologies, standards for the effective collection, management, and access of GI to stimulate better governance, and to foster environmental sustainability by reducing duplication and facilitating integration at different administrative levels (Aydinoglu et. al., 2007). SDI concept started to develop on a perspective starting at local level and proceeds through state, national, regional, and global levels. Most countries in developing world are

in the process of building SDI at different administrative levels in order to enable effective spatial data management. ESRI GIS Software enabled to manage spatial data effectively. Especially, ArcGIS 8 and later versions provide considerably functionalities for using spatial data from different sources. And, ArcSDE and ArcGIS Server technologies support browsing and sharing the data on networked environment. By this way, ESRI technologies have become integral part of many GIS and SDI based applications at different levels all over the world.

In Turkey, various GIS projects have been produced by different public institutions. These projects have not reached at expected level. Because there is not common standardized approach to manage spatial data, sharing spatial data through thematic applications from environment to statistical analysis is impossible. In this study, spatial data collected from different public institutions of Trabzon was collected in Geodatabase designed. This geodatabase was produced as a preliminary work of buildind SDI at state level. By this way, with the using of ArcGIS functionality and ArcGIS Server architecture, the data was presented to various users with different user interfaces. For example, while a user can update statistical data, another user can reach demography web site and can see updated census distribution map currently. Beside this, a variety of case studies such as environmental management, health services management, and geodemographics were produced.

2. SPATIAL DATA USAGE IN TURKEY

Information and Communication Technologies (ICT) started to be used commonly in 1990s. Public Institutions increased investments for ICT hardware and software since 1995s. The importance of GIS has been realized by many public and private organizations within Turkey since 1990s. A variety of GIS Projects were produced by different public organizations. But, there projects were developed independent from each other because there was no accepted standard or policy framework. According to The Networked Readiness Index (NRI) by World Economic Forum (WEF, 2005) that defines the degree of preparation of a nation or community to participate in and benefit from ICT developments, Turkey ranks 52nd out of 102 countries in 2005, ranked 56th out of 104 countries in 2003 and 2004

Turkey has speeded up her efforts to transform into an information society with eTurkey initiative which is almost identical to eEurope+. After 2003, these actions are combined in e- Transformation Turkey Project that aims at fostering the evolution and coordination of information society activities in a participatory manner. As a sub section of this project, the actions devoted to building Turkey National GIS were initiated and activities are continuing towards National SDI vision.

Telecommunication infrastructure with new regulations and some telecom investments are into process to reach Information Society level. Turkey needs governmental activities and more time to put e-government, II, and SDI initiatives into practice. To exceed IS vision, internet usage is not at expected level among citizens. Internet and network possibilities were developed in Public Institutions using GI. Data sharing among public and private institutions electronically are unable. Almost all central public institutions have possibilities to invest and use GIS software. However, these institutions do not have productive GIS working environment, because requirements were not identified at

adjudication level and they do not use customized GIS programs. As explained above, GI users in public institutions and private companies can not use the data in corporate way to support decision making process because software and data standards were not determined yet. Data quality issues should be examined to determine the usability of the data in various environmental areas from urban planning to waste management. People working in GIS industry are not capable to share and manage data socially and technically. The most critical problem is that there is no a coordination body to develop policies and build mechanism in SDI implementation.

3. DESIGNING GEODATABASE FOR TRABZON PROVINCE

A SDI approach can be described as collaboration of systems that support the using and sharing of geographic information across local, provincial, regional, and national level. An application-driven model based on an analysis of the intended uses is designed to serve a set of useful applications. In other words, the design of information model follows the requirements of application algorithms. This model is focused on the application and use of information, rather than a specific organization's workflow.

Trabzon, one of 81 provinces of Turkey, was chosen as a pilot area in this study (Figure 1). Base principle is that if geodatabase was modeled for Trabzon, it can be a model from local to national level for all provinces of Turkey. As a result of this modeling process, building a Data Sharing Information Model meets the needs of local, provincial, regional, and national level.

Figure 1. The location of Trabzon in Turkey

At local and provincial level, public/private institutions and organizations of Trabzon that produce and use spatial data were determined. A survey was executed to these institutions. As seen figure 2, applications, information products / data needs are documented through a series of Application/Data Matrix.

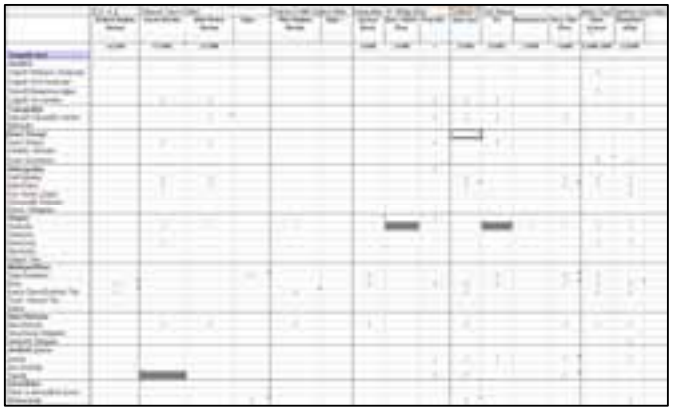

Figure 2. Example of Application/Data Matrix

Geodatabase model was produced for Trabzon province depending on user requirements. Data Sets such as administrative units, hydrography, topography, land cover, etc. were determined. Spatial data layers were designed for all data sets, depending on Application/Data Matrices, current data standard of Turkey, and European standards prepared by thematic working groups such as INSPIRE, EuroGeographics. As seen Data Sharing Information Model of section figure 3, data layers in data sets are modeled that enables various information products for different thematic areas.

4. CASE STUDIES ENABLING SPATIAL DATA MANAGEMENT

On scope of KTU GISLab projects, spatial data was collected from different sources including Provincial Management, Public Works Directorate, Turkey Statistics Institute, Turkey Statistics Institute, and Municipalities in Trabzon, Turkey. As to geodatabase model, data was converted and collected on ArcGIS Geodatabase environment. That enables data sharing among spatial data users and producers. As seen on figure 3, modeled data layers in data sets were used and combined for a variety of applications. Data sharing information model section of figure 3 briefly presents data layers of administrative units, topography, and statistical data sets. By this way, applications and information products were produced from national to local level by using geodatabase dynamically.

As seen Figure 3, the data collected from different sources was organized in the geodatabase. With the using of Data Sharing Information Model, various applications and information products were produced from national to local level. For example; census data table and BOLG data layer produces Region Census Density Map. MAKO data layer and EPID data table produces District/Village Cancer Incidance map. Besides, from national to local level, Sub-Regions Immigration Map, Provincial Administrative Unit Map, County Literacy map, District/Village Census Density Map, Street Address Map were produced. Also, different environmental and tourism applications were produced for different users.

With the using of ArcSDE and ArcGIS Server architecture, this geodatabase was managed on the server. Various applications were produced as *.mxd* file and executed as web map services. And then, queries and tasks were produced, depending on application needs, with the using of ArcGIS Server functionality. If explained with two example, figure 4 presents web Based Address Services and figure 5 presents web based demography maps. Users can update related data by permission. For example, while health user can manage health table, demography user can change census data. The users can browse the changes on web applications in real time.

5. RESULTS

In Turkey, Collecting spatial data from different sources have difficulty. Because there is no standardized data structure, sharing data to produce different thematic applications is impossible. Similar to these case studies, an advanced geodatabase model that enables sharing the data should be designed for user needs. By this way, Data Sharing Information Model can enable various applications/ Information Products from local to national level.

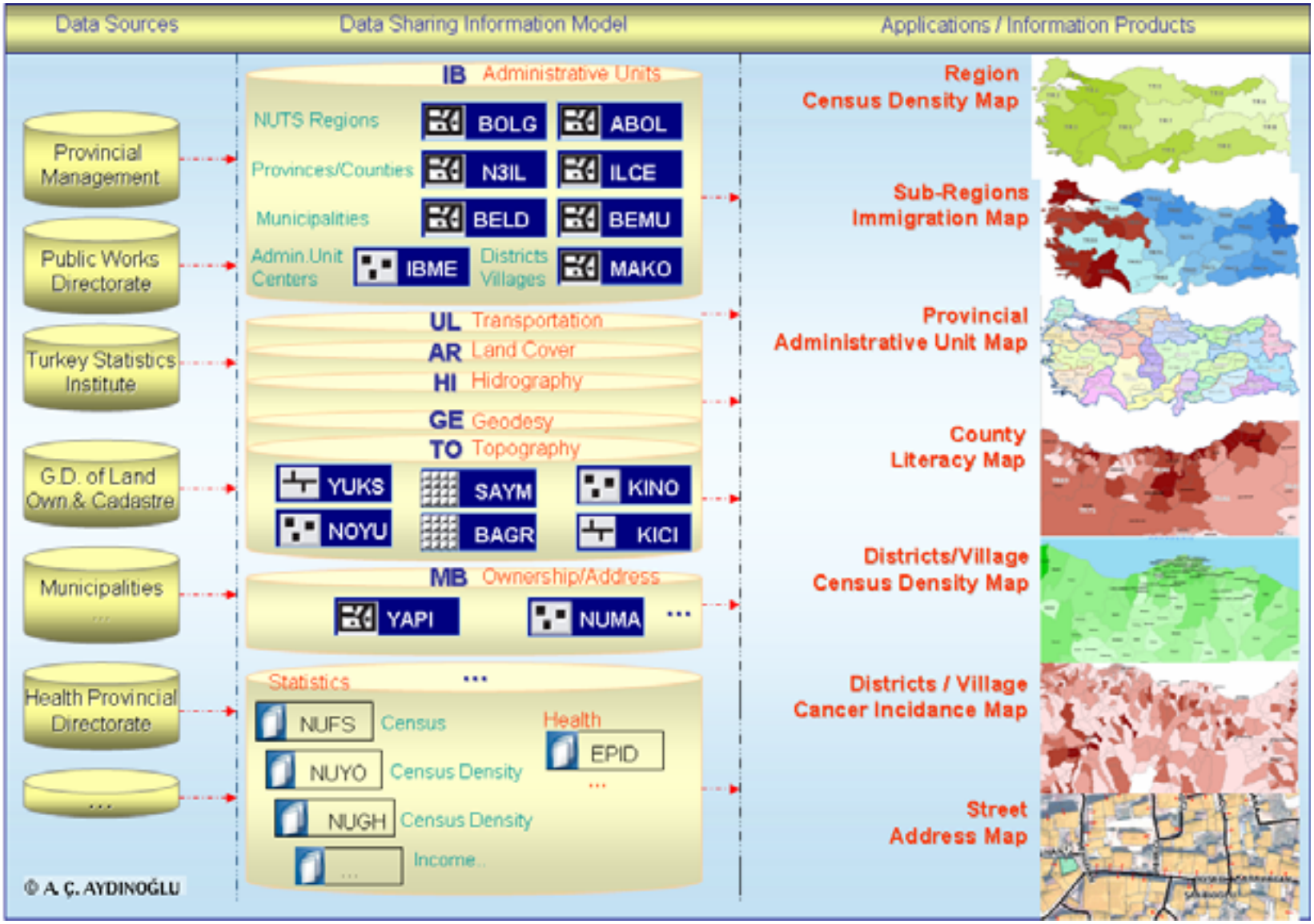

Figure 3. Data- Application/Information Products

Figure 4. Web based Address Services

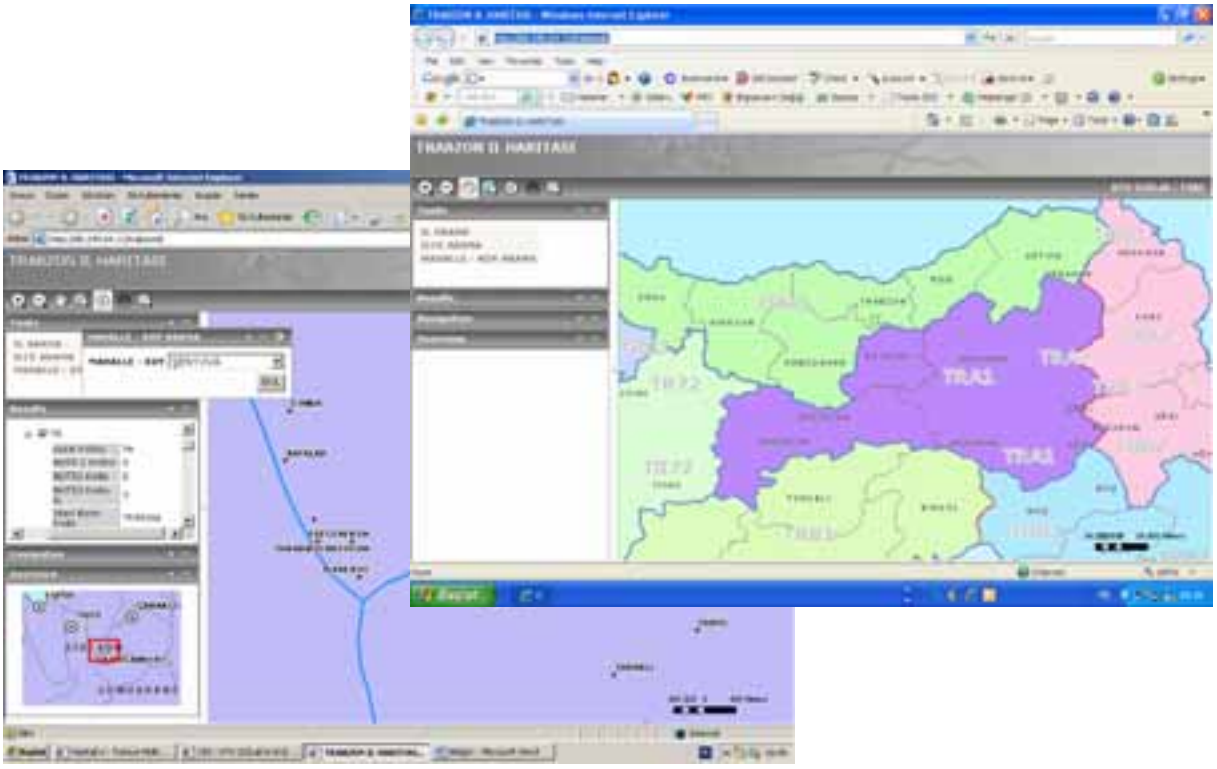

Figure 5. Web based Turkey/Trabzon Map

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