NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI) FEASIBILITY STUDY IN TURKEY

S.Bakici[1], A.Kisa[2], B.Erkek[3]

[1]General Directorate of Geographic Information Systems, *ANKARA ,TURKEY, sbakici@tkgm.gov.tr*
[2]General Directorate of Land Registry and Cadastre, *ANKARA, TURKEY,akinkisa@gmail.com*
[3]General Directorate of Land Registry and Cadastre, *ANKARA, TURKEY, berkek@tkgm.gov.tr*

Commission IV, WG IV/1

KEY WORDS: NSDI, Metadata, Data Sets, Feasibility, NSDI Organization, NSDI Management

ABSTRACT

Turkish National Spatial Data Infrastructure activities have been started by the motivation of Circular No. 2003/48 which was declared by Turkish Prime Ministry in 2003 within the context of e-Transformation of Turkey Short-term Action Plan. Action No.47 in the mentioned action plan implies that "A Feasibility Study shall be made in order to establish the Turkish National Spatial Data Infrastructure" whose responsibility has been given to General Directorate of Land Registry and Cadastre.

In 2005, by the coordination of State Planning Organization, e-Transformation Turkey 2005 Action Plan has been declared with the Supreme Planning Council decision of 2005 / 5. In that action plan, the responsibility of Action 36 with the subject of "Preliminary Works for Establishing The Turkish National Spatial Data Infrastructure" has been assigned to General Directorate of Land Registry and Cadastre. The implementation works of TR NSDI has been started with Modernization of Public Administration - 75 (KYM-75) and Geographic Information System - Infrastructure" project in 2007-2008. Finally, the service of preparing a feasibility study for the implementing Turkish National Spatial Data Infrastructure has been purchased directly from Turksat within context of the Law No. 67 of 5809 under Article.

Feasibility report of NSDI has been completed in 10th of Dececmber 2010. After decision of Steering Committee, feasibility report has been send to State Planning Organization for further evaluation. This paper perents some headlines and preliminary results of feasibility report as an indicator during implementation phase.

1. INSTRUCTIONS

Turkey has a long history of protection of property rights. More than 99% of land in Turkey is mapped and registered, and the Turkish Land Registry and Cadastre Agency (TKGM) completed the registration by 2008. Nevertheless, significant improvements are needed to fully modernize the TKGM and bring it to European standards. Depend on core data set cadastre; TKGM has been implementing some projects which will be support NSDI portal.

2. NSDI RELATED PROJECTS

2.1 Metadata in Implementation Rules in INSPIRE as The First Step

 "Metadata Portal for Maps" that is named as "Map Information Bank" is intended to be established by General Directorate of Land Registry and Cadastre (GDLRC). The aim is to Monitor Map Production in Turkey in one way and to prevent duplicate mapping activities. Metadata Portal in Map Production Monitoring Center (MPMC) is based on Articles 103, 104 and 105 in Large Scale Maps and Map Information Production Regulation (LSMMIPR) legally and the duty to establish this metadata portal is referred to GDLRC. Technically MPMC is embedded in Information System for Land Registry and Cadastre (TAKBIS). In this scope a web_based prototype has been developed. All intuitions that are realed with map production in Turkey are members of this study.

Web interface is designed accordance to the ISO 19115/TC 211 Digital Geographic Information System Standards. MPMC data sets and web services are saved in GIS PORTAL TOOLKIT of ESRI. Users can directly connect ArcIMS Web Service to present geographic data and ArcSDE/SQL Server ise used as database. ESRI GIS Portal Toolkit provides technology and service solution for National Spatial Data Infrastructure in Turkey.

In Metadata Portal Project, Metadata User Interface is created for users to register, publish, query and access to the spatial information. It can be said that this national level GIS portal application has many type of functions on Metadata User Interface: Administration functions, online metadata registration functions, query metadata functions. In addition to these Ground Control Points (GCP) Function is developed to search information related to GCP. Metadata and GCPS are integrated with GoogleEarth to provide broad visual capabilities.

2.2 Continuously Operating Reference Stations Project- Tusaga-Aktif (Coordinate Reference Systems in Annex1)

Within the scope of this project: stationary 146 GPS stations established to serve the whole country, operating with Real-Time Kinematic (RTK) functionality, based on the network concept, and the capability to transform from ED50 datum to ITRFyy datum will be provided. Thus;

- Real-time usage of the system is possible;
- All users are able to get service from the centers to be established;
- Service is provided nation-wide;
- Basis of all geo-information technologies is constituted; and
- The relationships between ED50 and ITRFyy datums will be provided.

In brief, Tusaga-Aktif Project removed the necessity of ground construction in the field of mapping in our country to great extent; provided the users with high-tech's convenience and products.

The target here is to establish one station in each province, in order to provide a system that will cover the whole country, functioning 24 hours / day, and able to provide the capability of accurate position determination

Tusaga-Aktif system is being used in projects of planning, infrastructure, municipality, vehicle tracking, agriculture, forestry, GIS/LIS... etc. This system will be highly beneficial for measuring Ground Control Points necessary for the operations of photogrammetric map production, ortho-rectification, ortho-photo production... etc.

Tusaga-Aktif Project has significant implications for GDLRC:

- GDLRC guaranteed great savings in time and cost regarding its geodetic activities.
- GDLRC is be able to conduct its cadastral works in a much better fashion, with higher quality, less cost and faster execution speeds.

2.3 Turkish Land Registry And Cadastre Information System-TAKBIS (Cadastral parcels- Annex1)

People have great expectations in accomplishing such services, they need correct, reliable, easy and quick accessible land register and cadastral survey information. The importance of the LR&CIS (Land Registry and Cadastre Information System) project is arisen from such a reason.

The project aims to form the basic data of all kinds of projects prepared based on positional map data in the standards of the Geographic Information System;
to provide accurate, valid and reliable land information required for land and land related activities and decision markers,
to transform land register and cadastral survey works and information into a multi purpose land information system to plan, manage and activate the services by the organization in a better, quicker, more reliable and more effective way to ensure that the data given to other institutions and organizations are used more broadly.

The LR&CIS is a parcel-based Land Information System. It contains geometric cadastral information and property information with respect to ownership. It covers all activities carried out in the General Directorate of Land Registery and Cadastre, in Regional Directorates (22),in Land Registery (957) and Cadastral (81) Offices.

The main objective of TAKBİS is to form the property/ non-property rights and cadastre data on the basis of locality dimensional information. Today, for these kind of services; correct, reliable, easy&fast-to-access land registry and cadastre data are needed. The importance of TAKBIS project for the development of the country originates from this reason. In this wise, it is possible to share the data generated in standard and electronic media to local authorities, about 50 fields and sectors such as transportation, forestry, agriculture, energy, justice, finance in a reliable and updated way.

Turkey has been started to develop and put into applications very large e-government projects. Turkish Land Registry and Cadastre Information system is one of most important part of Turkey's e-government structure those servers to other state information's systems that has been developing or deploying by other state offices. In near future, system will be deployed to whole Turkey step by step.

There are two main projects which are support TAKBIS. These projects are "Agricultural Reform Implementation Project" and "Land Registry and Cadastre Modernization Project".

Agricultural Reform Implementation Project has been completed. Ongoing project is Land Registry and cadastre Modernization Project. The overall goal of the project is to contribute to government agenda to improve quality and effectiveness of public services through spreading and making effective e-government applications. The specific objective of the proposed project is to improve the effectiveness and efficiency of the land registry and cadastre services. This objective will be achieved through: (i) renovating and updating cadastre maps to support digital cadastre and land registry information; (ii) making the digital land registry and cadastre information available to public and private entities (iii) improving customer services in land registry and cadastre offices; (iv) improving human resources in the Turkish Land Registry and Cadastre Agency (TKGM); and (v) developing policies and capacity to introduce best international practices in property valuation.

As a top project of mentioned project above, the service of preparing a feasibility study for the implementing Turkish National Spatial Data Infrastructure has been purchased directly from Turksat within context of the Law No. 67 of 5809 under Article.

3. NSDI FEASIBILITY STUDY

Before starting feasibility study, project management organization established. Depending on decision of e,Transformation executive committee, a steering committee and a technical committee established by agreed stakeholders officially. On the other hand a Project Coordination office and institutional contact person organized by officially. Steering committee person who are top level manager of leader institutions and technical committee twenty five person who are experts in geographic information related area. A regulation

prepared and confirmed by the steering committee for committees duties and rules. Technical committee was responsible for investigation of technical documents and preparation reports for steering committee. Steering committee was responsible to take decision and confirmation, advising or rejection the reports prepared by technical committee. More than 120 people who are contact person are elected by their institution to provide relationship during the feasibility study. Five people aimed for project coordination office as a secretariat. NSDI feasibility Project considers eleven Ministries, more than fifty institutions and four major municipalities. After that a contract signed between TKGM and TURKSAT A.Ş in 16 December 2009 including following works;

- Investigating and reporting of Institutional Roles, policies, funding, relations, GIS based objectives and activities of organizations in Turkey due to preparation of implementation tender documents,
- Investigating and reporting of current used software/hardware, network infrastructure, services and securities of relevant institutions,
- Investigating and reporting of International works, International Geographic Information Infrastructure and data contents and data standards at sample countries due to develop Geographic Information System Infrastructure at national level,
- Study visit of technical committee to sample countries,
- Purchasing of ISO 191XX standards from TSE and deliver to TKGM in digital form and prepare of a national draft standard in Turkish Language based ISO 191XX (translated standards as a Turkish or original standards as a current situation) and OGC standards, deliver national standards to TKGM after discussion and revision in the workshop,
- Purposing alternative NSDI Strategies and models to develop CBS-A at national level
- Preparing of feasibility report,
- Preparing of a report which include legal requirements of institutional geographic data production, data sharing, development and management of NDSI at national level
- Preparing of tender documents for implementation of NSDI
- Organization of a workshop

3.1 Needs and Capacity Analyzing Methodology

A web based analysis form which contains eight category and 109 questions were prepared to estimate needs, current situation and expectation of institutions. At the beginning of the project analysis form are discussed at the two awareness workshop by attending top level manager of all related institution, technical committee, contact person and representative of other institutions and confirmed by the both committees. These eight categories and context are;

- **Administrative infrastructure**: questions of institutional responsibility, interest area, activities, GIS units and human resources.
- **Legal infrastructure:** questions of current legal status related geographic data, legal responsibilities and expectation of organizational NSDI structure.

- **Financial infrastructure:** questions of institutional investment for GIS related software, hardware, education and data collection and beneficiary.
- **Institutional infrastructure:** questions of institutional GIS related projects, used standards, human resources and expectation of geographic data and metadata
- **Software infrastructure**: questions of number of open source or licensed GIS related software, databases, operating systems and purposes.
- **Data infrastructure: questions** of institutional raster and vector data needs, owned datas and data structure, type of safeguard, formats, projection and providing type.
- **Hardware infrastructure**: questions of used hardware for data production and data presentation.
- **Network infrastructure:** questions of current used network structure and security of institutions.

Not only filling analysis forms by institutions but also NSDI awareness, clarification and discussion of analysis forms has been implemented by face to face meeting at the ministry level with all related institutions.

On the other hands two different web based analysis forms prepared for local governments and universities as additionally of the related institutions due to determine current situation and needs. Local government analysis form has 57 questions and Universities analysis form has 37 questions.

3.2 Some Headlines of Feasibility Report

headings or section headings are to be centered, in bold capitals without underlining, after a triple line space (two blank lines) and followed by a double line space (one blank line). After filling analysis forms by institutions, visiting and discussion with stakeholders and visiting to the best successful six sample countries (Spain, Italy, Germany, Holland, Norway and Finland) implemented NSDI due to investigate technical infrastructure, administrative infrastructure, legislative infrastructure and to realize alternative strategy and models by technical committee feasibility report has been prepared by TURKSAT A.Ş.

Some purposed headlines are indicated below from feasibility report which is included needs and capacity analysis, socioeconomic analysis, risk analysis, implementation budget, NSDI institutional structure, technical infrastructure and related tender documents, legislative infrastructure, etc...

- There should be GIS units which collect data, manage data, serving data and having GIS experts in every GIS related institution.
- There should be a unique institution which is responsible for NSDI management based a law.
- There should be more investment for GIS education
- Duplication in hardware, software and data production investment should be prevented.
- National standards should be revised according to ISO and OGC standards
- There should be a legislation for data access, data sharing and data pricing, etc
- There should be more awareness activities about NSDI
- Base data theme and data producer are identified

- Duplicated data production should be prevented
- Central or distributed system node are purposed

4. RESULTS

After discussion feasibility in the workshop that attended more than 200 people and sending to State Planning Organization the new legislative arrangements launched as a preliminary results of NSDI feasibility report.

A first arrangement is related to Ministry Level. Now there is only one Ministry which is Ministry of Environment and Urbanism responsible for establishment, operating and all national level activities of NSDI.

Second arrangement is related to institutional Level. The most important law with related NSDI is the establishment of General Directorate of Geographic Information System under the Ministry of Environment and Urbanism due to;

- To do or to have do works and activities with related to the establishment of National Geographic Information Systems (NGIS), usage of NGIS and improvements of NGIS.
- to do coordination and to do promotion for effective and efficient usage of contemporary geographic information technologies in the country.
- to provide determination of data sharing policy standards, data quality standards and data production standards in national level with its fundamental strategies and policies and to prepare required legislation
- to represent of our country in activities about Geographic Information Systems organized by national and international institution and foundation, to coordinate collaboration and compliance works
- All matters covered by the National Geographic Information System, to provide usage and evaluation by the Ministry units of the data which are produced by public and private agencies and organizations
- To establish and develop Ministerial spatial data infrastructure and to provide all kind of needed data due to effectiveness of Ministry
- To do all necessary arrangements for Urban Information System Standard to provide usage widely
- To establish and operate portal to serve spatial data produced by public and private institutions and organizations in the concept of National Geographic Information System
- To join international data sharing network
- To provide certification and accreditation works with related Geographic Information Systems
- To carry out application, arrangements, developments and monitoring activities with related to remote sensing and management, automation and documentation of navigation system supplement to GIS applications.
- To do IT works of Ministry

Now the time is implemetation phase including other legislation.