Through Spatial Data Infrastructure in Turkey

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Key words: cadastre, e-governance, metadata, CORS, NSDI.

SUMMARY

Turkey has taken the important steps in Pre-Accession Term to European Union (EU) although it is not a member state. General Directorate of Land Registry and Cadastre, one of the leader organizations in Turkey on maps-land registry-cadastre, has executed spatial_based projects on the way Accession to EU. Project for National Geographic Information System Infrastructure (NGISI) is one of the main projects and INSPIRE Directive has been taken as fundamental tool. Many inter_organizations (institutions) meetings had been realized in 2008 as initial studies for NGISI. After counseling adjudication in January 2009 technical studies will start for National Spatial Data Infrastructure (NSDI).

The act for National Spatial Data Infrastructure (NSDI) is designed in Act Plans for 2006-2010 which is attached to Strategy for National Information Society. NSDI in Turkey is named as "Act 75" under "Modernization in Public Administration". In this concept two big sub_projects had been executed. One of them is Metadata Portal Project. The system design and software studies were completed. It is ready to register their metadata to all map_related institutions and organizations using ISO 19115 standards and to search to all people on http://hbb.tkgm.gov.tr/metadata/. The other project is CORS-TR (Continuously Operating Reference Stations) Project. Within the scope of this project, Istanbul Culture University (ICU), jointly with the General Command of Mapping (GCM) and the General Directorate of Land Registry and Cadastre (GDLRC), has proposed an extremely crucial project for Turkey to TÜB□TAK (The Scientific and Technological Research Council of Turkey). TÜB□TAK, and upon scientific assessment, has decided to support this nation-wide "Project of Research and Implementation Related to the Establishment of Networkbased Stationary Real-Time Kinematic (RTK) GPS Terminals and Determination of Cellular Transformation Parameters". The aim 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.

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Anahtar Kelimeler: Kadastro, e-devlet, metaveri, CORS, UKVA.

ÖZET

Türkiye, henüz Avrupa Birliği (AB) üye ülkesi olmamasına rağmen Avrupa Birliği'ne Katılım Öncesi Dönem'de önemli adımlar atmaktadır. Türkiye'de harita-tapu-kadastro çalı□malarında önder kurumlardan olan Tapu ve Kadastro Genel Müdürlüğü, AB'ye üyelik yolunda mekana dayalı projelerin yürütücülüğünü yapmaktadır. Ulusal Coğrafi Bilgi Sistemleri Altyapısı Projesi (UCBSAP), Genel Müdürlüğün ana projelerinden birisidir ve INSPIRE Direktifi yararlanılan temel kaynaktır. UCBSA Projesi için ilk çalı□malar olarak 2008 yılında kurumlar arası toplantılar gerçekle□tirilmi□tir. 2009'da Danı□ma Kurulu'nun belirlenmesinden sonra Ulusal Konumsal Veri Altyapısı (UKVA) teknik çalı□malarına ba□lanacaktır.

Ulusal Konumsal Veri Altyapısı (UKVA), Ulusal Bilgi Toplumu Stratejisi ekli 2006-2010 Eylem Planı içerisinde yer almaktadır. Türkiye'deki UKVA "Kamu Yönetimi Modernizasyonu" altında "Eylem 75" olarak adlandırılmaktadır. Bu kapsamda iki büyük alt_proje çalı□maları yürütülmektedir. Bunlardan birisi Metaveri Portalı Projesi'dir. Sistem tasarımı ve yazılım çalı□maları tamamlanmı□tır. Portal, harita ve harita bilgileri ile ilgili tüm kurum ve kurulu□ların ISO 19115 standartlarını kullanarak metaverilerini yayınlayabilmelerine ve tüm kullanıcıların http://hbb.tkgm.gov.tr/metadata/ web adresi üzerinden sorgulama yapabilmelerine hazırdır. Diğer proje CORS-TR (Continuously Operating Reference Stations), TUSAGA-Aktif Projesi'dir. Bu proje kapsamında, □stanbul Kültür Üniversitesi, Harita Genel Komutanlığı ve Tapu ve Kadastro Genel Müdürlüğü ortaklığı söz konusudur, TÜB□TAK (Türkiye Bilimsel ve Teknolojik Ara□tırma Kurulu)'a ortak proje teklifi sunulmu□tur. TÜB□TAK "Ağ prensibinde çalı□an gerçek zamanlı kinematik (RTK) prensipli sabit GPS istasyonlarının kurulması ve hücresel dönü□üm parametrelerinin belirlenmesine ili□kin ara□tırma ve uygulama projesi"ni, bilimsel değerlendirmeler sonucunda destekleme kararı almı□tır. Amaç; tüm ülkeyi kapsayacak □ekilde, her ilde, günün 24 saati faaliyette olan, hassas konum belirleme yeteneği bulunan istasyon kurmaktır.

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1. BACKGROUND OF THE PROJECT OF NATIONAL SPATIAL DATA INFRASTRUCTURE

In the concept of The Prime Minister's Office Notice dated as 04.12.2003 and numbered as 2003/48, e-government Transformation Turkey Project Short Term Act Plan had came into force. Act47 as "Initial Study for Turkish National Geographic Information System (TNGIS)" had been executed by General Directorate of Land Registry and Cadastre with participation of the different institutions, organizations, universities, private sector, municipalities and presented to T.R. Prime Ministry State Planning Organization after application term. At the end of the study of Act47 a report had been prepared. In this report the geographic information system studies in our country and abroad had been investigated, the detailed analysis for existing situation had been made, the problems and the expectations had been determined, The Application Plan for 2005 had been suggested.

The Application Plan for 2005 had been prepared in the coordination of State Planning Organization (SPO) to avoid waste of time during transition to information society in our country. And also the aim is to economize the time durint the period to prepare the information society strategy document. Thus "e-Transformation Project in Turkey, Act Plan for 2005" came into force on 1st April, 2005 as appendix to High Planning Committee Decision dated on 24th March, 2005. The Act36 is another action article for Act Plan for 2005. It is for "Initial Infrastructure Studies for Natioanl geographic Information Systems in Turkey". In Act36 the goals are:

- to determine standards for classification data, metadata, production data, storing data, quality and sharing data,
- to prepare National GIS Infrastrucure Policy/Strategy Document containing descriptions of communication infrastracture, institutional organization duty and responsibilities.
- To determine legal arrangement requirements.

In the scope of Act36, three commissions were constituted as Table1. The commissions' reports were evaulated on Act36 Intermediate Meeting on 12th October 2005. Immediately following it, Act36 Policy and Strategy (Draft) Document had been prepared. On Act36 Main Meeting dated 28th February 2006 this draft document had been discussed and resulted.

In Act36 Policy and Strategy Document, the following road map (application plan) is determined:

Step1: To make legal arrangements te determine responsible people for TNGIS policies, concept and data.

Step2: To make studies to adapt National Data Exchange Format (NDEF) to ISO 19136 standards using TNGIS Policy and Strategy Document by General Directorate of Land Registry and Cadastre (GDLRC).

Step3: To get ready metadata related to TNGIS by their institutions that they are responsible and to present institutional GIS portals.

Step4: To determine and to determine common standards for geographic data that will be used for TNGIS Administrative Infrastrucure.

Step5: To prepare TNGIS data by all related institutions.

Step6: To present TNGIS data on related institutions' portals in the scope of TNGIS legal arrengements.

Commission No	Commission Name	Tasks
1	Standards Commission	To determine TNGIS Pocedure Scope To determine TNGIS Data Scope To determine TNGIS Standards
2	Technical Infrastrucure Commission	To determine TNGIS Comunication Infrastrucure
3	Administrative/Legal Infrastructure Commission	To determine TNGIS Institutional Organization Principles To determine TNGIS Institutional Duty and Responsibility Principles To determine TNGIS Legal Arrangement Requirements

Table 1: The commissions under Act36 Studies.

After Act36, National Information Society Strategy and its appendix Act Plan for 2006-2010 came into force on 28th July 2006 to determine policies and steps for information society. In "Act Plan for 2006-2010" there has been an important title "Modernization in Public Management" that aims to develop cooperation and interoparability among public institutions, to decrase resorce waste, to increase productivity during work processes, to develop policy and decision processes based on information and communication technology. In the same Act Plan, Act75 had planned under title MPM. Act75 has projected "Establishing Geographic Information Infrastructure". In the scope of the action, it is aimed to determine the concept of the geographic data and the standards of data exchange and to create portal that provides sharing the geographic information (http://www.bilgitoplumu.gov.tr). Act75 has been replaced in GDLRC budget as RESEARCH PROJECT.

Until today contact units in each institution, execution committee, technical committee and project execution ofice have been constituted related to Act75 that is under responsibility of GDLRC. On 17-18/12/2008 the procurement document for consultancy services was completed by Technical Committee and presented to Execution Committee. In the Execution Committe the required corrections were made and completed on procurement document in accodance with decisions of Execution Committee. The members of Technical Committee began to sign the last procurement documents on 28/01/2008. The final document was sent to SPO. The directive that determines the contact units and the study principles was accepted by Execution Committee and the directive came into force by publishing on website www.tkgm.gov.tr.

2. FUTURE OF THE PROJECT OF NATIONAL SPATIAL DATA INFRASTRUCTURE

In Turkey TNGIS infrastructure studies have been going on for along time under responsibility of GDLRC. Now Consultancy Service Procurement on Geographic nformation Systems Infrastructure is ready. The qualifications in the concultancy service procurement announcement are listed as following:

1. Investigate and reporte of Institutional Roles, policies, funding, relations, GIS based objectives and activities of organizations in TR due to preperation of implementation tender documents,

2. Investigate and report of current used software/hardware, network infrastructure, services and securities of relevant institutions,

3. Investigate and report of International works, International Geographic Information Infrastructure and data contents and data standards at sample countries due to develop Geograhic Information System Infrastructure at national level,

4. Purchase 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,

5. Purpose alternative NSDI Strategies and models to develop CBS-A at national level

6. Prepare feasibility report,

7. Organize first workshop,

8. Prepare tender documents for implementation of NSDI,

9. Consultancy on controlling and acceptance stage during establishment of NSDI,

10. Organize econd workshop,

11. Prepare a report which include legal requirements of institutional geographic data production, data sharing, development and management of NDSI at national level.

3. THE PROJECTS THAT ARE RELATED TO NATIONAL SPATIAL DATA INFRASTRUCURE

3.1 Metadata Portal

"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 beed developed. All instutions 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 Standarts. 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 entegrated with GoogleEarth to provide broad visual capabilities (Yalçın/Bakıcı, 2008).

3.2 Continuously Operating Reference Stations Project

Within the scope of this project: stationary GPS stations will be 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 will be possible;
- All users will be able to get service from the centers to be established;
- Service will be provided nation-wide;

- Basis of all geo-information technologies will be constituted; and
- The relationships between ED50 and ITRFyy datums will be provided.

In brief, CORS-TR Project will remove the necessity of ground construction in the field of mapping in our country to great extent; will provide the users with high-tech's convenience and products.

Currently, there exist more than 2000 GPS receivers in the entire country. These GPS users, benefiting from static or RTK (real-time) techniques, are forming their own base stations, and then computing coordinates with the use of rover receivers. In static measurements, depending on the baseline length and applied method, rovers are required to collect data for periods extending from 15 minutes to multiple hours. When using RTK, on the other hand, solution can be acquired up to 5-10 km from the base station. This project will provide the existing and new GPS receivers with the capability to determine coordinates faster, more economical and more accurate that before, thus increasing their efficiency largely. The CORS-TR Network approach will provide the capability to determine static and RTK positions with 1-2 minute intervals, if not down to mere seconds. When using RTK, solution will be provided up to 75 km away from the base station. Points determined with such easy and economical approach can be marked in the field with practical and cheap materials.

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. Thus, with the assistance of this system:

- It will not be necessary to search for leveling benchmarks nor polygons for geodetic measurements or activities of mapping and cadastre;
- For GPS measurements, the necessity for further reference/base stations will be removed, and instead of the current status of having 1-2 bases and few rovers, we will have 1 reference station and tens even hundreds of rovers usable simultaneously; and coordinates will be produced with a single national format and standard.

CORS-TR system will be 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.

CORS-TR Project has significant implications for GDLRC:
- GDLRC will guarantee great savings in time and cost regarding its geodetic activities. For instance, the budget allocated for the year 2005 for such activities was around 20 millions US Dollars, the majority of which would have been saved had this system been ready.
- GDLRC will be able to conduct its cadastral works in a much better fashion, with higher quality, less cost and faster execution speeds.

GDLRC will be able to acquire the necessary information for TAKBIS to conduct coordinate transformation, and to gather new data (Yalçın/Yıldırım/Bakıcı, 2008).

4. CONCLUSION

GDLRC is the fundamental institution especially big scale maps and ownership rights. It has initiated big projects recent years. One of these projects is Map Production Following Center Project (MPFCP) named as Metadata Portal under Land Registry and Cadastre Information System. The other project is CORS-TR Project. The are highly relevant to all public and private establishments and individuals who deal with geographic data. That is why, and since the starting point of the projects, relevant info, idea, and recommendations of our colleagues are highly appreciated.

Both of these project are sub_projects for National Spatial Data Infrastructure named as TNGIS Infrastructure project. Turkey has taken the important steps in Pre-Accession Term to European Union (EU) although it is not a member state. General Directorate of Land Registry and Cadastre, one of the leader organizations in Turkey on maps-land registry-cadastre, has executed spatial_based projects on the way Accession to EU. Project for National Geographic Information System Infrastructure (NGISI) is one of the main projects and INSPIRE Directive has been taken as fundamental tool. Many inter_organizations (institutions) meetings had been realized in 2008 as initial studies for NGISI. After counseling adjudication in January 2009 technical studies will start for National Spatial Data Infrastructure (NSDI).

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URL1: http://www.bilgitoplumu.gov.tr

URL2: http://www.tkgm.gov.tr

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