DEVELOPING OF TURKEY'S DISASTER MANAGEMENT STANDARDS FOR E-GOVERNMENT

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ABSTRACT

Since Turkey was included in eEurope + Initiative, Turkish Government has considered e-Government projects and disaster management systems, and struggled in last years. One of those projects is Disaster Emergency Management Information System (AFAYBIS) which is being carried out by Yildiz Technical University staff on behalf of The Office of Turkish Prime Ministry and Governorship of Istanbul.

AFAYBIS project is being designed for a chosen pilot area (Istanbul Metropolis). It is being carried out according to the latter geographic information technologies. ISO 19000 standards, DIGEST, S-57, ICSM, ALKIS-ATKIS-AFIS, ESA, TABİS projects and the others have examined, and feature coding catalogue, metadata definitions, quality assessment procedures, application schema are determined in order to supply international conformance. Information system was designed with the object oriented approaches and object-relational data models. Unified Modelling Language was used to design the data models.

In this paper, the development of AFAYBIS project standards and approaches are described.

1. INTRODUCTION

Using of current information technologies provides delivering the public services to the citizens, employees and private sector. Nevertheless, these technologies enable us to coordinate the relational network between the public and government, to use the sources productive and effective, to plan and organize the investments, to decide efficiently and develop decision-support systems and to obtain opportunity equality to the people. These public services between citizens and government are executed easier, faster and secure with the use of on-line communication. These on-line services are provided by e-Government technology.

E-Government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions (World Bank).

Generally, disaster management information systems are one of the sub-projects of the e-Government project in the establishment process of electronic administration. However, this kind of systems should be widespread country and designed appropriate for the interoperability. Besides, that information system should be appropriate for the international standards.

Because of necessity of standards for GIS, many universities, companies and agencies have been studying on the international GIS standards. Especially, the International Organization for Standardization (ISO) and NATO published their GIS standards. ISO standards are collected under ISO 19000 standards which is prepared by ISO / TC 211 Committee. ISO 19000 standards have brought in common language for concepts of GIS. ISO / TC 211 and other ISO committees, DGIWG, IHO, OpenGIS Consortium, FGDC, etc. are cooperating for GIS standards (ISO / TC 211).

Nature originated events which can turn the conditions into disasters occur very frequently in Turkey. This situation is especially consequences of the geology, topography, climatic state and settlement habits of Turkey. When the damages are considered based on disasters in Turkey, 64% earthquakes, 16% landslides, 15% floods, 4% fires, 1% avalanches, storms, underground water arises and other metrological originated events are being appeared (TBMM, 2003). The statistics of death ratios and structural damages based on disasters exposed that the biggest portion of the losses are related to the earthquakes. This portion is 2/3 of the all losses based on the disasters. Therefore, earthquake is synonym with the disaster in Turkey (Ergunay, 2003).

After terrible consequences of Kocaeli-Korfez earthquake on 17th August 1999, several projects are being carried out in Turkey in order to begin debates on the disaster management concept, risk analyses, GIS etc. AFAYBIS project is one of those projects. It is being carried out by YTU and aimed to support both disaster management and e-Government studies in Turkey. The first stage that includes feasibility, analyses and design, is completed by project staff. Approximately 50 institutions related to the

disaster management are examined during the analyses stage.

2. VARIOUS APPROACHES OF AFAYBIS PROJECT

There are 4 basic phases in the disaster and emergency management:

- Preparedness
- Mitigation
- Response
- Recovery

The laws about the disaster management are generally related to the post-disasters which are response and recovery in Turkey. When the situation is considered locally, central government, local administrations, non-government agencies, universities and other institutions and foundations have legal or spontaneous responsibilities.

Disaster and emergency management is vertical application from the view of GIS, that is to say, it is connected to the several institution and data. It is determined that there are 3 data groups as base for disaster and emergency management (OAS, 1990). These are as follows:

- Natural hazards information, which denotes the presence and effect of natural phenomena. This information should ideally include the location, severity, frequency, and probability of occurrence of a hazardous event. Location is the easiest for planners to find; the rest can often be obtained from sectoral agencies, natural hazard research and monitoring centers, and, increasingly, integrated development planning studies.
- Information on natural ecosystems (e.g., slopes and slope stability, river flow capacity, vegetation cover), which provides the basis for estimating the effect natural hazards can have on the goods and services these systems offer and also determines the factors or conditions that create, modify, accelerate, and/or retard the occurrence of a natural event.
- Information on population and infrastructure, which is the basis for quantifying the impact natural events, can have on existing and planned development activities. Large scale data describing lifeline infrastructure and human settlements, for example, are critical elements for preparing vulnerability assessments and for initiating disaster preparedness and response activities.
- And other inventory data.

The organizational approach of AFAYBIS project is as follows: It is appropriate for founding National GIS and Remote Sensing Data and Data Coordination Center affiliated to Prime Ministry, and developing of NSDI (National Spatial Data Infrastructure) together with the institutions, private sector and universities. Clearinghouse portal which includes the metadata and catalogue data of data producers like public institutions will be available over internet. Institutions and citizens will attain the data from the web portal based on the metadata. It is thought for AFAYBIS Project that the city databases are required backing up the data in the Disaster Management Center (DMC) in case of disconnection. The data and the information of disaster and emergency management will be available in The GIS and Remote Sensing Data Coordination Center in Disaster Management Centers for cities and districts.

The connection between the institutions and the center will be used during the implementation of database in the beginning; the connection will be used for updating of the database after the implementation. Furthermore after the disaster, the institutions which have missions for disaster management will transfer the information about their missions via DMC during the response and recovery phases.

The data transfer from the center to the institutions will be available after implementation. Related institutions will reach the required data via Internet and copy them into database's according to the given access permissions. All the prepared data, information, products and prepared products by internet users on the database will be available in the center for the according to the access permissions.

3. THE EXISTING STANDARTS FOR THE SPATIAL DATA AND GIS

Standards are documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, processes and services are fit for their purpose (ISO).

Advantages of improving the standards and applying them for GIS are as follows (ISO / TC 211):

- Support the understanding and usage of geographic information
- Increase the availability, access, integration, and sharing of geographic information, enable inter-operability of geospatially enabled computer systems
- Contribute to a unified approach to addressing global ecological and humanitarian problems
- Ease the establishment of geospatial infrastructures on local, regional and global level
- Contribute to sustainable development

The spatial data and GIS standards have been developing and applying for years in many countries, institutions and nowadays in international platforms. Since the developing technologies contribute the GIS applications, standards and developments of standards studies for spatial data and GIS are became available for all and appeared as new extent and relations in 21st century. Current and past applications and considerations are being adapted to the innovations, and the advantages of developments of IT technologies are leveraging the standardization for GIS. Consequently, NSDI and GSDI (Global Spatial Data Infrastructure) are accepted as a connection of countries, data and civilians in many countries. It is certain that studies in USA, EC CEN/TC 287 studies, OpenGIS and ISO/TC 211 committee studies have effective role in these approaches. The required

standards for the establishment of GIS are as follows (FGDC, 1996):

- Data standards
  - Data classification
  - Data content
  - Data symbology or presentation
  - Data transfer
  - Data usability

- Process standards
  - General (specific) data transfer procedures
  - Existing data access procedures
  - Classification methodology
  - Data collection
  - Storage procedures
  - Presentation standards
  - Data analyzing procedures
  - Data integration
  - Quality control and quality assurance

Nowadays, addition to these standards, copyright, publish over internet etc. topics are added to the standards, and documentation with CASE tools, project management etc. topics will be added soon.

As far as GI (Geographic Information) standards are concerned, GI actors first grouped themselves either on a national or a professional basis. Thus national groups gave birth to a first generation of national 'de jure' standards such as National Transfer Format (NTF) in the UK, EDIGéO in France, Spatial Data Transfer Standard (SDTS) in the USA and Spatial Archive and Interchange Format (SAIF) in Canada. Professionals also organized themselves into international groups to create a first generation of 'de facto' standards such as: Digital Geographic Information Exchange Standard (DIGEST) by the Digital Geographic Information Working Group (DGIWG) of NATO, Transfer standard for digital hydrographic data (DX-90/S57) of the International Hydrographic Organization (IHO) and Geographic Data File (GDF) by the automotive industry (Frank, 2000).

Whilst the digital spatial data standards were taken part in four groups as institutional, regional, national, and international standards, nowadays the groups are became global-national standards owing to globalization efforts like internet, e-Government and eEuropa. Nowadays, "interoperability" concept is being researched and applied for both the applications and the data.

4. AFAYBIS GIS STANDARDS

As far as eEuropa+ and e-Government (conversion) action plans are concerned which are approved by Turkish Government, it is notified that the current standards will be used in actions directly or they will be used after adapting them. Nevertheless, new standards will be developed if necessary (EU a, 2002; b, 2001; Circular, 2003).

Nowadays, INSPIRE (Infrastructure for Spatial Information in Europe) project has been carried out for spatial data infrastructure for entire Europe (INSPIRE, 2004). It is planned EU Countries to make available their core data and some thematic data over internet by 2015, in direction of INSPIRE project standards and methods. Therefore, member of EU countries and candidate countries of EU are struggling to establish their own NSDI. However the studies are being carried out for years in some countries, the standards are not shared. INSPIRE working groups are cooperating with ISO/TC 211 and adapting those standards to EU. Turkey is one of the countries in the world which can not achieve the NSDI. Some studies were made, however not finalized (UBS, 1999). The 47th action of e-Government Circular of Turkey is directly and 10 action of it is indirectly related to NSDI and GIS. TKGM (General Directorate of Land Registry and Cadastre) is planning to prepare a report about this topic by 2004. Consequently, AFAYBIS project is carried out according to the directions of INSPIRE and ISO/TC 211.

After examination of the all standards and formations, It has been decided to prepare feature attribute coding catalogue (FACC), metadata, quality, application schema, product, transformation, web portal and web mapping standards and data model with UML. The standards of the AFAYBIS project presented in the following sections will be completed when 2nd and 3rd phases of the project are finished. The data which is collected from the institutes will be converted in to required form of standards in the beginning; afterwards data will be obtained for updates in the form of the project standards.

4.1 The Data Standards

The topics covered by the data standard are as follows:

- Data classification, content
- Digitization, accuracy and quality
- Exchange format
- Standards of documenting

Mainly, FACC, metadata, data exchange with GML and representation of models with UML are full filling the requirements of this standard.

4.1.1 Feature Attribute Coding Catalogue (FACC): The existing FACCs in Turkey are as follows:

- TABIS (Turkey Disaster Information System); A Catalogue developed for the topography and disaster management data in the accuracy of 1/5000 scaled map (ITU, 2002)
- Feature catalogue of regulations of large scaled map and production of the map data (Proposal) (HKMO, 2002).
- General Command of Mapping- DIGEST FACC; A scale independent catalogue.
- National Information System (FACC): A catalogue based on DIGEST- FACC (UBS, 1999).

As different from catalogues above, it is required to take part the feature relationships and optionally operations according to the ISO 19110 "Geographic Information - Methodology for Feature Cataloguing" rules. Additionally these are needed to be available in digital form. As far as the existing catalogues are considered in Turkey, one of the most suitable catalogues for ISO 19110 rules is TABIS. However, this catalogue is not including the feature relationships, operations and required some features and attributes.

During the research of FACC for AFAYBIS project, DIGEST, S-57, German ALKIS-ATKIS-AFIS catalogue, New Zealand ESA, South Africa, Iceland, Austria, and Malaysia catalogues are examined.

In this manner, FACC of AFAYBIS is prepared using the ISO 19110, TABIS, other country and international institution's approaches, and they are taken as consideration for the design.

AFAYBİS FACC includes the features which can take part of designed spatial data set, feature attributes, relationships, operations, definitions and descriptions. The basis level of the classification in the catalogue is feature, and it is available in digital form. Nevertheless, all the features, operations of features, attributes of features and relationships are defined with a unique name.

4.1.2 Metadata: ISO 19115 Metadata standards are taken as base for AFAYBIS project. Metadata is utilized to describe the geographic data.

4.1.3 The Parameters of Projection and Datum: In AFAYBIS project, most of the used data is produced in European 1950 (ED 50) geodetic datum. 1/1000 and 1/5000 scaled existing maps are produced with 3˚ UTM parameters. Since the 30˚ eastern central meridian is very close to Istanbul, 3˚ wide zone is used for the maps. Therefore, the errors in 3˚ wide zone maps are less than 6˚ wide zone maps. 27˚ eastern meridian is taken as central meridian for part of Municipality of Silivri administration boundary and around Municipality of Çatalca boundary (İBB, 2003).

The core data of AFAYBIS project is 1/1000 scaled. Those data was produced using photogrammetrical methods by Istanbul Metropolitan Municipality in adjacent area, and related parameters are used which is explained above. The data is up-to-date for 1997- 1999 years. In the beginning, other data than the core data will put into the system by taking those data as reference. However, if the INSPIRE and TUTGA (Turkish National Fundamental GPS Network) projects are accepted, all the data will be converted into these standards, and the updates will be applied easily.

4.1.4 Quality and Time: There will be two types of data transfer in AFAYBIS. Most of the data is the existing data which has been produced for years in Turkey, bereft of quality with the exception of some quality components. There might be structure for international quality for updating, after the system establishment.

The temporal changes of data will be solved by versioning and attributes.

Both the data groups will take place in the metadata records of data set.

4.1.5 Data Exchange: GML is appropriate for data exchange according to the perspective of ISO and INSPIRE. However, this will be valid after the system implementation for updating and receiving the data from the system.

4.2 The Product Standard

In general, the product standards are including the map and screen layout view content, symbology, accuracy and quality, documentation standards.

Reference product will be the maps in AFAYBIS. By-product is reports etc... The quality of the map is directly based on the existing data. Although there are several symbols for disaster management, none of them have international acceptance. It has been decided to use the symbols mainly in use. There will be information about the products in metadata.

4.3 The Process Standard

The process standard includes the process content and documentation standards. There are software are documentation dimensions. The general processes of AFAYBIS project are as follows:

- Data input
- Data update
- Find and locate
- Planning
    - Conventional planning: planning in the preparation phase according to grading results of the risk zones and alarm degree.
    - Unexpected situation planning: planning according to the information received from the base during response phase
- Response data input and monitoring

In the project, application interfaces will be developed for the entire process group. UML will be used for data input-process- output loop of these interfaces.

4.4 The software Standard

The software standard includes the geometry, topology, data storage structure, SQL, interoperability, web mapping standards etc… This standard requires using software which is appropriate for ISO/TC 211 and OpenGIS standards.

4.5 The Implementation of GIS

There is already almost no standard for GIS establishment. However, Rational Unified Process which is followed for AFAYBIS, is accepted to be used in several projects.

5. CONCLUSION

While the technology is became the top for the data communication, the important issue has appeared to manage the data appropriately. Nowadays, the data management means to produce, update the data/information in coordination, according to the standards without duplication of data. Additionally this procedure requires a communication infrastructure to be appropriately structured and developed for available data sharing and using.

As far as the importance of the data- information exchange and share between the member and candidate countries of EU considered, it is clear that the necessity of preparation of the standards is inevitable.

Respect to these truths, AFAYBIS Project is prepared by Yildiz Technical University in order to manage and orient the tools, required information/data and institutions which have effective role in reducing the damages and losses to least by modern technological possibilities. During the period of the project, 1st stage of the project including feasibility, analysis and design is completed.

After evaluation of ISO/TC 211, INSPIRE and other projects, it has decided to prepare the following standards: the feature attribute coding catalogue, metadata, quality, application schema, product, data transformation, web mapping. The approach of the standards of the AFAYBIS project presented in this paper will be completed when 2nd and 3rd phases of the project are finished.

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