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DEVELOPMENT AND USE OF GEOINFORMATION IN IRAN

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Development and Use of Geoinformation in the Islamic Republic of Iran

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ABSTRACT

This report outlines development and use of geo-information such as aerial photography and satellite imagery as well as digital mapping in Iran. The involvement of various sectors is described including governmental institutions and organizations, private companies and user community.

After a brief introduction, different effective sectors which have important role in geo-information in the country will be described. It follows with a summary about national plans for spatial data production and usage and the situation of the country in terms of available map and spatial data as well as standardization and international activities. Then use of geo-information in different area such as disaster management, urban planning, cadastre, management and planning, forestry and so on will be discussed.

1 - Introduction

Development of Geomatics within the last half century in Iran has faced considerable challenges in different aspects and was not possible without great efforts of spatial data producers. The issues such as growing demand for cartographic products and GIS ready geo-information, revolutionary movement towards digital technology, standardization efforts in this field and popularity of use of GIS and remote sensing can demonstrate development and use of geo-information in the country.

In Iran, national organizations, ministerial and municipal offices as well as private companies are active in the field of mapping and geo-information production which is needed by decision makers and general users. The national organizations concentrate their efforts on national base mapping of the whole country and other governmental surveying offices and private companies are mostly involved on high resolution geo-information production needed for provincial and local projects.

Most research in the fields of photogrammetry, remote sensing, GIS and digital mapping is carrying out by national organizations, research institutions and universities. However a few private companies have also made remarkable researches for their commercial products and services.

2 – Development of Geo-Information in Iran

In this section the geo-information producers, strategic plan for mapping activities, policy makers in related to development geo-information, standardization and international activities in related to geo-information in Iran are explained.

2.1 – Geo-Information Producers

Spatial data producers from governmental and private sectors are taking part to produce photogrammetry, remote sensing and GIS products in Iran. Some of major data producers consist of the following groups:

- National Mapping Organizations: The main national mapping organization of the country is well known National Cartographic Center of Iran (NCC) which works as a branch of Management and Planning Organization of Iran (MPO).

It was established in 1953 and takes the responsibility of coordination among various mapping activities as well as centralizing all surveying and geographic activities, production of base maps and other spatial information needed for national constructive projects and supervision on private sector activities. Since then, NCC has been responsible for various mapping projects at various scales but the emphasis has been and still is on production of national base maps and databases. Nowadays, rather than map and spatial data production activities, almost entire aerial photographic missions and aerial triangulation activities for civil projects are carried out by NCC.

In order to facilitate rapid and accurate access of military section to the geographic information, National Geographic Organization (NGO) was established. This organization is recently equipped with a ground receiving station with ability of receiving imageries from different sensors of Indian IRS-1C/1D satellites

- Private Sector Companies: In the past few years, the government decided as a general policy, to decrease gradually the number of employees in the governmental organizations including NCC, which culminated in increase the contracts for mapping projects awarded to private companies. As a result to this policy, one can compare the number of private firms in the field of photogrammetry and remote sensing which increased with a rate of 4 (from 8 companies in 2000 to 35 companies in 2004). In the same period, the growth rate of all mapping and surveying companies can be observed as 2 (from 42 companies in 2000 to 90 companies in 2004).
- Ministerial and Municipal Mapping Departments and Offices: Most of these offices and departments are established within ministries and municipalities in order to deal with their need for map and spatial data. Some of them such as surveying office of oil ministry were equipped with photogrammetric equipment and image processing systems but with the recent growth in private sector, companies and service providers in this field, many of them are basically changing their tasks to contracting out, technical supervision, data handling and/or providing very specialized products for specific uses. Among these offices, a few of them can be addressed as:
 - a. Tehran Geographic Information System Center (TGIS) which was founded by Tehran municipality in 1991 in order to establish a Geographic Information System for the capital. The base data is 1:2000 map series of the city which produced by private sector with cooperation of NCC in 1996. The data was capable to serve different projects at city level.
 - b. Iranian Cadastre Center was established under supervision of the Land Registration Office to centralize cadastral activities nation wide. This center is equipped with advanced analytical stereorestitution instruments, proper software systems and trained personnel for photogrammetric map production. Fortunately, the management board of the center has recently convinced to reduce their mapping activities by using available large scale maps of the other mapping projects and concentrate their efforts on establishment of huge cadastral database of the country.

- c. Iranian Remote Sensing Center (IRSC) was established in 1972 in order to coordinate remote sensing activities in Iran, to promote remote sensing through training specialists, to reproduce and distribute satellite data and related services and to guide related researches in this field. In addition to different image coverage of satellite data which is distributed by this center, its ground receiving station is able to receive different types of data from Indian IRS satellites, NOAA and Terra MODIS sensor. This center's name has recently changed to Iranian Space Agency (ISA) and now is responsible for research, design and implementation of space technology, remote sensing as well as development of national and international space technology and communication networks. The aim of ISA is to promote peaceful use of space technology and science to help the development of the country in different aspects. According to ISA's new organization and objectives, it is mostly concentrated on coordination among different active sectors in this field, issuing policies and promoting application oriented researches in this field.

2.2 - Policy Makers in related to Geo-Information Development

- Supreme Council for Mapping: The main body in the country in charge with issuing policies in this field is the Supreme Council for mapping which works under direct supervision of deputy of the Iranian President. Council members consists people in high management levels from data user community, major data producers and research and education sectors. The main responsibility of this council is issuing policies in this field, coordination and planning for different sectors, performing evaluation programs to assure the effectiveness of strategic plans and so on.
- Technical deputy of Management and Planning Organization of Iran (MPO): Besides the above mentioned council and NCC as its secretary, technical deputy of Management and Planning Organization of Iran (MPO) is also involved in this task. Among other responsibilities of MPO, one can consider some other objectives such as planning, budgeting and supervision on national and provincial constructional and infrastructural projects. According to this, technical deputy of MPO is in charge with preparation of technical specifications and procedures, planning and supervision and issuing the technical frameworks of project contracts (in terms of financial and legal aspects) in the domain of Iran technical and executive system; a system which includes more than 70 percent of the running projects of the country.

2.3 - Standardization

Standardization activities in Iran in the field of Geomatics are being conducted at different levels. The aspects of national and international activities relevant to this report will be addressed below.

2.3.1 - Surveying and Mapping Standards and Specifications

Standards and specifications required for surveying and mapping are developed by the NCC's Standards Committee in the context of the Management and Planning Organization. The scopes of these standards are extended in accordance to scientific advances and requirements. As an example, specifications for development of GIS and Topographic Databases were added when the need arose.

User needs are gathered through communication with the National Council of GIS Users. NCC's Standards Committee conducts the necessary studies to develop required standards based on these user needs.

A list of standards and specifications that have been developed or are under development in the framework of the "Unified Specifications for Surveying and Mapping" are as follows:

- Volume 1: Geodesy and Leveling
- Volume 2: Photogrammetry (General)
- Volume 3: Geospatial Information System (GIS)
- Volume 4: Cartography (General)
- Volume 5: Microgeodesy
- Volume 6: Gridded and Raster Data
- Volume 7: Digital Topographic Mapping at 1:500 Scale
- Volume 8: Digital Topographic Mapping at 1:1000 Scale
- Volume 9: Digital Topographic Mapping at 1:2000 Scale
- Volume 10: Digital Topographic Mapping at 1:5000 and 1:10000 Scales
- Volume 11: Hydrography

In addition to the documents stated above, NCC has also developed standards and specifications for:

- Gravimetry
- Digital Topographic Information at 1:25000 Scale
- Digital Topographic Image Maps at 1:50000 and 1:100000 scale
- Digital Topographic Maps at 1:250000 scale

Due to the importance of the 1:25000 scale as the scale for base mapping and the National Topographic Database (NTDB), this scale will be further elaborated on.

The standard for 1:25000 scale consists of 5 volumes, covering the different aspects of data acquisition, topographic databasing and presentation of geospatial information for the NTDB and base maps:

- Content and feature definition
- Coordinate system and projection
- Conceptual model
- Cartographic presentation
- Metadata
- ...

The conceptual model for the NTDB has been designed based on user requirements stated by the National Council of GIS Users. The NTDB will serve as the primary layer for the national GIS. Revision of parts of this standard is being planned for the current year.

2.3.2 - Cooperation with International Standardization Bodies

The Institute of Standards and Industrial Research of Iran (ISIRI) is the national standardization body. Mirror technical committees within ISIRI represent Iran in the International Organization for Standardization (ISO). NCC is the chair and secretariat for ISIRI/TC211 which is responsible for commenting and voting on ISO/TC211 drafts.

ISIRI/TC211 consists of experts representing different organizations in Iran which are related to Geomatics and Geospatial Information. Iran is currently an O-Member (Observer) of the

ISO/TC211 Technical Committee, but is in the capacity building phase in order to be able to elevate to P-membership in the future.

2.3.3 - Promotion of the ISO19100 Standards in Iran

Realizing the importance of the ISO/TC211 activities (and the associated ISO19100 series of standards) concerning standardization of geospatial information, NCC has taken the initiative of promoting these standards in Iran. The standards are translated to Farsi and adopted through the national standardization process. NCC's Standards Committee, in coordination with ISIRI and other relevant organizations, is responsible for this activity concerning the ISO19100 series.

At present, the following standards are being translated into Farsi and are in process:

- ISO19101- Reference model
- ISO19105- Conformance and testing
- ISO19111- Spatial referencing by coordinates
- ISO19113- Quality principles
- ISO19114- Quality evaluation procedures
- ISO19115- Metadata
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2.4 - Data Production Policy

Until recent years, the only comprehensive program for map and spatial data production in the country was limited to 1:25000 base maps and associated data bases. In this perspective, the situation of private sector was not very satisfactory in view of the fact that their customers was limited to a few number of governmental constructive project owners. During these years, considerable efforts have been made to introduce capabilities of digital maps and geographic information systems to actual and potential users. In order to have a proper interaction with user community, as already mentioned, National Council of GIS Users was established. Preparation of the above mentioned strategic plan and approval of national mapping projects such as completion and updating large scale digital maps of cities with an estimation of 50 million US dollar expenditure can be considered as some results of this policy. These medium term plans for mapping with direct support of the government culminated in a rapid development of private sectors and we are observing increasing amount of governmental contracts with private companies during the recent years. The following table shows the number and amount of photogrammetric digital mapping contracts with private companies during 2000 – 2003:

Year	Number of Contracts	Total Amount in US\$
2000	53	1 100 000
2001	77	1 980 000
2002	105	3 750 000
2003	145	5 330 000

2.4.1 - Photogrammetric Digital Mapping Systems

Digital map production has been started in Iran since 1993 by upgrading analogue stereo plotters of NCC and the upgrading program was so successful so that within less than 5 years, all the photogrammetric systems in the country were upgraded. Nowadays, the reported sold number of Iranian Paradeyes™ photogrammetric workstations goes over 200 sets. It is worth mentioning that just 25 of these systems are installed in NCC.

In order to give an idea about the increasing approach in acceptance of digital photogrammetric systems, the number of scanned aerial photographs could be a good indication. The following table shows this figure during the period of 2000 to 2003:

Year	Number of Scanned Photos
2000	8300
2001	12800
2002	21200
2003	33000

2.5 - Proposed Strategic Plan and Related Projects

In 2002, strategic plan for mapping activities in Iran has been proposed by NCC to the government. It has been designed to fulfill future national requirements in the field of Geomatics. This plan is mainly concentrated in the following issues:

- Training and education;
- Standardization and documentation of technical procedures;
- Research and development;
- Privatization;
- Developing the applications of spatial information;
- Revising the legislations in this area.

Although, the present structure has the technical and educational ability to meet today's needs, but due to rapid changes in technology and user requirements, a few national projects have been planned which some of them in relation to this report can be addressed as follows (some of them have already begun):

- Completion and updating the 1:25000 scale base maps and National Topographic Database (NTDB);
- Development of national DEM with 10m resolution;
- Completion and updating large scale digital maps of cities;
- Production of 1:10000 scale maps of rural areas around cities with more than one million population;
- Development of standards required to fulfill these projects;
- Large scale mapping and development of topographic database for rural areas with population greater than 200 families;
- Development of National Spatial Data Transfer Standard.
- Development of Iranian NSDI;

This strategic plan and related national projects can guarantee a stable development of the country in terms of spatial data production and usage. In any case, many efforts have been made during last decade to change the situation of the country in terms of available map and spatial information. It implies a drastic change in this regard in comparison to ten years ago. The following paragraphs briefly explain the current situation.

2.6 - National Geo-Information Projects

2.6.1 - Digital Topographic Maps and National Topographic Database (NTDB)

Fortunately, the current situation of available topographic maps compared to ten years ago, signify a remarkable change, not only in terms of number of map sheets available, but also concerning the restrictions of individual access to geographic information. In order to explain the current situation in terms of topographic maps and database, the following projects has to be addressed:

- 1:25000 scale base map series: This project was started in 1991 using analogue technology and then switched to digital products. By the end of 2005, the number of digital maps produced in this project passed the number of 8000. Note that the country will be covered by about 10000 map sheets in this scale. The remaining parts mostly consists border areas that confront with some security problems for aerial photography. In the mean time, preparation phase for updating these data has been finalized and proper action is going to be started this year.
- National Topographic Database (NTDB): As a consequence to new digital technology, NCC decided to create National Topographic Database of the country based on above mentioned 1:25000 base maps. The first step was design and standardization of this database followed by applying necessary changes to production line. The NTDB standard was published in 1994 and creation of this database started at the same time. First version of NTDB has been produced in a sheet wise manner and stored in a file-based style. Based on this data, NCC has started execution of it's Geodatabase project containing different data rather than just 1:25000 map sheets. It contains some other data such as Landsat ETM+ imageries or data from other organizations like Geological survey of Iran. In this new project NCC is developing a multi-user seamless database accessible for different organizations based on interoperability concepts.
- Digital Cartographic Maps: Based on 1:25000 scale maps and by using cartographic techniques, digital maps at various scales such as 1:50,000, 1:100,000, 1:250,000 are under production.
- 1:2000 scale map series of the cities: In 2001, increasing demand of governmental and private organizations for reliable and updated large scale maps of cities for various purposes motivated the MPO to assign the NCC as responsible organization for this project. This project started with responsibility for producing maps for 630 cities but it exceeded to 1026 cities during past three years. Even though, so far digital maps of about 490 cities have been produced, but still considerable numbers of cities (about 536 cities) are suffering from lack of updated maps and spatial data. In case of allocating proper budget to this project, it is planned that the productions phase of theses data to be finished within 5 years. Obviously the updating process has to be started during this period.

2.6.2 - Image Maps and Digital Elevation Models

In the past, limited numbers of photo maps were produced using conventional aerial photography and analogue photo rectification techniques in NCC. During the last few years, there has been a revolutionary increase in demand for different types of image maps in Iran. Thanks to accessibility of high resolution remotely sensed data, proper software systems and very fast computers.

During last year, 20 large and medium scale image mapping project have been performed by NCC which shows a growth rate of 4 comparing to the year 2002. It is planned to develop the role of private sector in image map production by increasing the users request for these products.

In order to promote remote sensing activities in Iran, NCC decided to facilitate accessibility of users to geo-referenced and geometrically corrected image data. For this purpose a pilot project was executed with a full coverage of Landsat ETM⁺ imageries for whole country which goes through a rectification process using 1:25000 base maps and 10m DEM of Iran. The final product of this project is presented as ortho-rectified 14.25m PAN and 28.5m multispectral satellite imageries in a block-wise manner. Note that the country has been divided to about 139 blocks with dimension of 1.5 degree in longitude and 1 degree in latitude. This product can also be used as background of 1:250,000 scale maps of Iran. This project has been finished.

Digital Elevation Model is another key element of every image mapping and remote sensing activity. In response to this need, in 1997, NCC has produced and presented a DEM of entire country with resolution of 25 arc second. The source data for this product was digitized 1:250,000 paper maps. Another DEM data with 100m resolution was created in 2000 by Iranian Remote Sensing Center using the same data source.

In 2001, NCC decided to produce a national DEM from 1:25000 base map series with 10m resolution. At present, 74 percent of the country is covered by these DEM data with height accuracy of better than 6 meter.

2.6.3 - Cadastral Activities

In 1995, due to lack of a comprehensive and effective cadastral system, the government decided to execute a cadastral project under supervision of land registration office of Iranian judiciary. The planned cadastral system was based on cadastral maps with scale of 1:500 to 1:1000 for urban areas and 1:1000 to 1:2000 for rural areas. In order to increase the speed of this project, an agreement has been made to use the 1:2000 digital maps of cities in combination with additional field works for this purpose.

Besides this national project, a number of rural cadastral projects are carrying out every year by private companies according to different contracts. One of the biggest cadastral projects in this group was executed during last three years in response to request of Gilan provincial water authorities in northern Iran. For the first time in the country, a combination of topographic maps, orthorectified images as base data and extensive field work were used in order to perform a cadastral project. This project covers an area of 1000 km² and costs about 1.4 million US dollars.

2.7 - Development of SDI for Iran at National and Provincial levels

By approval of Economy Council and Managerial Board (Executive Board) of MPO, NCC was assigned the responsibility of preparing the SDI plan for Iran. This document has been prepared in cooperation with the MPO's National Land Use office and some other relevant ministries and organizations.

The plan defines the high council steering committee and its technical subcommittees which have the responsibility for studying, implementation, development of SDI at national and provincial levels.

The study of existing situations of different SDI components in Iran has been started and a committee consist of members from different organizations and ministries took this responsibility.

One of the critical requirements for SDI implementation is design and development of a spatial data clearinghouse for which feasibility study and requirement analysis has been carried out by NCC and will be implemented with the cooperation of other organizations in the current year.

2.8 – International Activities

In order to be in touch with professionals, experts and cooperate with regional and international bodies and any other relevant concern, NCC is involved in the following well known regional and international societies:

- Permanent Committee on GIS Infrastructre for Asia and the Pacific (PCGIAP): In this committee NCC is acting as chair of Working Group 2 (Regional fundamental data) and executive board member.
- International Steering Committee for Global Mapping (ISCGM): Iran is a permanent member of this committee and as a result, recently published global map of Iran which is accessible through ISCGM web site (www.iscgm.org).
- International Cartographic Association (ICA): NCC participates as representative of Iran in this association.
- United Nation's Group of Experts in Geographical Names (UNGEGN): NCC as representative of Iran is chair of south-west Asian countries other than arabic language countries.

Iran also cooperates with the following international organizations:

- ISPRS ordinary member category 3
- International Hydrography Organization (IHO)
- Intergovernmental Oceanographic Commission (IOC)

In recent years, rapid development in different fields of Geomatics was motivated NCC to increase its cooperation with academic centers in order to promote application driven researches in them. Some examples in this respect are as follows:

- Cooperation in the field of GIS: A Memorandum Of Understanding (MOU) between NCC of Iran & NGI Of Republic of Korea.
- Tectonic movements and inferred seismic hazard: A Collaborative Program Between, NCC, Iran, and Institut fur Geologie und Palaeontologie (IGP), University of Hannover, Hannover, Germany
- Continental tectonics and inferred seismic hazard: A collaborative program between French and Iranian institutions (NCC and University of Montpellier II, University of Grenoble, National Research Center of France).

In light of collaborative program by French institutions, so far several expert exchange programs have been carried out between two countries and also 10 training and research courses have been carried out by French side for a period of one to two months for participants from NCC and also two participants from NCC have completed their postgraduate studies at France.

3 – Use of Geo-Information in Iran

3.1 - Policy Makers in related to Geo-Information Users

Major policy makers are as follows:

- National Council of GIS Users (NCGISU): With this strong belief that appropriate consideration of spatial data user's requirements in map production phase may lead to produce more attractive data, this council established at 1993 under approval of MPO. This council is a major active body to make effective measures in promotion of awareness of GIS users in national level and also to organize and harmonize different activities in design and development of a National GIS. NCC is Chair & secretariat of this council and director of NCC is it's chairperson and GIS manager is acting as secretary. This Council consists of representatives from 22 different ministers and organizations related to GIS. Challenges of this council resulted in increase of formally established GIS departments in different ministries and organizations from 3 in 1998 to 15 in 2006. Necessary actions are taken based on requirements collected through these users' needs. This council has a regular monthly scheduled meeting and relevant issues are considered and discussed in these meetings. Four different technical committees have been operated under supervision of this council and some of them are still operational. These committees are as follows:
 - Committee on Geospatial feature coding
 - Committee on Urban GIS
 - Committee on policy for underground facility management and mapping
 - Committee on policy for Geospatial Information Exchange
- Provincial Council of GIS Users (PCGISU): In order to promote NCGISU achievements and building a better relationship with governmental and nongovernmental companies and organizations in other parts of the country, establishment of PCGISU in different provinces approved by NCGISU. Establishment of PCGISU in different provinces started since 1999 and so far it is established in all 30 provinces of country.

3.2. Application of Geoinformation in Iran

3.2.1. Using geo-information in civil projects

Due to needs of civilian projects such as dam, utility network and so on to geo-information, a huge amount of these data are produced every year. In order to give an idea about amount of data which are produced for civilian projects, the amount of money consumed for producing such a data could be a good indication. The following table shows this figure during the period of 2003 to 2005:

Year	Total Amount in US\$
2003	14229000
2004	17790000
2005	12730000

3.2.2. Reducing the Poverty in Iran by GIS

It is one of the main goals of the government to decrease the provincial differences and increasing the decrease development. Hence, definition of development and identifying developed or not developed states is necessary.

Base on different study, a number of criteria in the province or even region, city and village are determined. Though, much works are done to reduce the gap between developed and non-developed provinces in Iran, unfortunately; they do not have so positive result. Geo information system (GIS), as a system for spatial decision making could help decision maker by different methods including geo-statistical analysis, managing heterogeneous data (satellite images, maps, attribute data and so on), network analysis and so on.

In a project for management and planing organization, we designed and implemented pilot system to show potential of a GI system to the decision makers,

It has the following properties:

1. statistical analysis over the criteria
2. calculating the coefficient of the criteria from the raw data for the Kerman province
3. presenting of result by graph, thematic maps, report, graph maps,....

The system inputs were as follow:

1. the result of studying about less developed region in Iran (2001) produced by management and planing organization.
2. the raw data with about, 100 items belongs to the Kerman province
3. the 1:250000 maps prepared by NCC as the base map of this project

3.2.3 Using Geo-information in Disaster Management

Over the past few decades, disaster losses worldwide have grown exponentially. Iran has also a high record in disaster losses especially in earthquake. In parallel with this there has been a growing awareness within the disaster management community for greater impetus on comprehensive disaster risk management rather than just post-disaster relief or better response preparedness. In such a context, analysis of a systematic geo-referenced inventory of disasters could help provide surrogate indicators for disaster risk. Systematic tracking of occurrence of disasters will provide the necessary disaster intelligence to keep a tab on the emerging patterns of disaster risk and then look at the underlying causes.

In summary, towards setting up a system of tracking the emerging patterns of risk in Iran, a colaboration with UNDP has been started in order to set up a system of building systematic

geo-referenced databases of disasters at a high resolution. In order to reach this goal, DesInventar has introduced which is a georeference database with useful tools like statistic charts, reports and spatial queries about any disaster in any state or sub-state in Country. DesInventar is one of existing methodologies and tools for building disaster databases. It permits the homogeneous capture, analysis and graphic representation of information on disaster occurrence and loss.

Data about different disasters has been collected in the countries which are using DesInventar for 30 early years.

The DesInventar methodology has been extensively tested and used in Latin America and the Caribbean to build their disaster inventories. Many national emergency agencies in this region of the world have used and are using DesInventar as an input to their risk analysis, risk mitigation, the formulation of early warning systems, as well as a tool to follow up the success or evolution of their preparedness and mitigation plans along time, and even in many disaster situations as in the cases of El Nino disaster in Peru, hurricane Mitch in Honduras, and Armenia (Colombia) and El Salvador earthquakes.

The DesInventar methodology includes a software product with two main components. The DesInventar module is a relational and structural database through which the database is fed by filling in predefined fields (space and temporal data, types of events and causes, sources) - which also can be done via internet -and by both direct and indirect effects (over life, houses, infrastructure, economic sectors). The DesConsultar module allows access to the database by queries that may include relations among the diverse variables of effects, types of events, causes, sites, dates, etc. This module allows at the same time to represent those queries with tables, graphics and thematic maps.

3.2.4 Creating Geo-DataBase for Urban GIS, Forestry and Provincial GIS Applications

Geodatabase containing geo-information can be accessed through a network such as Internet or Intranet. Therefore users can use common geo data source in order to fulfill their related tasks such as urban management or forestry. In this regards different projects have been defined for implementing geodatabase for different applications. Some of them are as follow:

- Developing and implementing geodatabase for urban management for Qom, Gorgan cities
- Developing and implementing geodatabase for management of forests in Iran

3.3 Training of geoinformation's users

Rather than university educations, due to continually increasing demands from different governmental and also private companies to have well trained people, in order to handle their newly upcoming GIS projects, GIS department of NCC and some university affiliated authorities are holding GIS and relevant software training courses regularly. Just as an example, holding several training courses in GIS for 300 participants from Water Resource management of Power ministry and 150 participants from provincial electricity distribution companies by NCC, is a clear indication of this argues.

3.4 Research activities

For a better accomplishment of promotion of application driven researches, NCC established the NCC Research Council which aimed to define, guide, support, supervise and assess research projects at NCC. One of the major achievements of NCC in relation with Tehran University is design and development of domestic photogrammetry workstation which is

fully operational within NCC and many private companies. This cooperation resulted in the first R&D in Geomatics private company in Iran who is highly active in developing hardware and software systems in the field of photogrammetry and remote sensing, and recently started to concentrate on GIS projects.

Recently NCC decided to establish the first Geomatics research center in order to develop its role and presence in the research domain. This center started its activity in the field of photogrammetry with a research topic about LIDAR with the title of "Comprehensive Evaluation of the Potential of LIDAR for 3D Geospatial Data Collection" and nowadays is coordinating different research activities in different disciplines in Geomatics, particularly in GIS.

4 - Conclusion

As it is mentioned in this report, huge amounts of geo-information have been produced in Iran. Thus from geo-information production point of view Iran has a good position in the world. However the usage and application of geo-information has not been expanded in different areas. Development and implementation of spatial data infrastructure can increase the usage of geo-information in Iran.

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