

National and Regional Spatial Data Infrastructure (NSDI & RSDI) and National Cartographic Center of Iran's Activities about it

Peyman BAKTASH, Iran

Keywords: Information Society, Sustainable Development, Spatial Data Infrastructure, SDI Hierarchy, Warehousing, Clearinghouse, Information Technology (IT), Regional SDI, GIS users Councils, CGI Market.

SUMMARY

Spatial Data Infrastructures (SDI) have become very important in determining the way in which spatial data are used throughout an organization, a nation, different regions, and the world. SDI is now accepted as a central component in supporting decision making for economic and social development.

Regional Spatial Data Infrastructures (RSDI), Constitutes a set of relationships and partnerships that enable data sharing, production, update and integration. Clearing more about relation and situation of RSDI and Information Technology (IT), cause leading all activities in both of them especially in National and Regional Level and in information extent and also realizing information society scopes. SDI is an initiative intended to create an environment in which all stakeholders can cooperate with each other and interact with technology, to better achieve their objectives at different political / administrative levels. RSDI is the response to spatial data requirement for disaster management. With SDI, not only up-to-date spatial data is always available, but also many other advantages will be gained in Regional and Global level such as:

- Removes parallel workings in production data and redundant data collection
- Removes parallel and redundant data editing and customizing
- Cause Compatible spatial dataset with one standard in regional level
- Cause dataset of one kind and complete
- Removes inefficient expenditure of public funds due to doing it work in parallel or duplicate
- Provide users with an appropriate datasets among the existing ones
- Makes easy integration of different datasets from different sources with each other

Islamic Republic of Iran began her participation in the Global map project and SDI activities in 1998. In this related, National Cartographic Center (NCC), as the representative of Iran, started the job with identifying the suitable sources of data for creation of those layers stated in the specifications of Global Mapping. NCC started making GIS Users Councils (National & Provincial Councils) for the making National SDI and Local SDI too. Now, NCC is doing some activities to joining its National SDI to Regional and Global SDI.

This paper in first section, discuss about SDI as basic point in Information Technology (IT) and analyze NSDI & RSDI situation in strategic programming and CGI Marketing. In second

section, SDI situation in IRAN and National Cartographic Center's roles in realization of future scope of RSDI and GSDI is discussed. (NCC is one of the greatest Map Producer organizations in IRAN).

The way that be applied, is analyzing of fundamental points especially Sustainable development, IT and SDI and their complementing policy in Information Society. These include some applications in National, Regional and Global levels.

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1. INTRODUCTION

The concept of a Spatial Data Infrastructure (SDI) has emerged globally to facilitate the transit of spatial information from data producers to a vast and ever-growing community of users. At global level, the Global SDI (GSDI) plays a major role by bringing national mapping agencies onto one platform. An SDI encompasses the policies, technologies, standards and human resources necessary for the effective collection, management, access, delivery and utilization of spatial data for a specific jurisdiction or community. The best use of geospatial data, which is being produced more every day for sustainable development, requires some infrastructure, which facilitates search, query, access, share and use of the data. Such an infrastructure is called SDI, which ranges from local, provincial, national, and regional to global levels. The history of establishment of a data-sharing framework dates back to 1960's when the idea of development of information societies has been considered (Mapping Science Committee, 1993).

Till 1990's due to rapid growth in technology from data, hardware and software point of view, the idea of spatial data sharing has been faded. We focused in this paper on Regional Spatial Data Infrastructure (RSDI), but we know that rich to RSDI don't succeed if don't have some National SDIs. Therefore I discuss about NSDI and application of it in realization of Information Technology (IT) in each country, and then we can conclude RSDI has effective to realize of IT in region. Also a regional SDI is one of example of an international SDI that has potential to facilitate different regional members, organizations and other regional users for sharing and using regional spatial data and simplifying their communication channels. Fundamental in making decision is existence of accurate and up to date information. This information can be optimized applied in sustainable development if it has spatial infrastructure. Applying operational methods in gaining sustainable development goals and it technology is possible by encouraged. Required infrastructures are of the important information is spatial information and especially national spatial information. It helps as an important interface between spatial infrastructure and other phenomena in society and cause successful plans for countries that applying ICT as a pioneer such as Islamic Republic of Iran.

2. REGIONAL SPATIAL DATA INFRASTRUCTURE (RSDI)

2.1 SDI Components

Many of National and Regional SDIs in world, describe common components as bellow:

2.1.1 Institutional Framework

GIS applications of many different disciplines have a recurring need for a few themes of data. The framework is a collaborative community based effort in which these commonly needed data themes are developed, maintained, and integrated by public and private organizations within a geographic area. Local, regional, state and federal government organizations and private companies see the framework as a way to share resources, improve communications, and increase efficiency. Institutional framework defines the policy and administrative arrangements for building, maintaining, accessing and applying standards and datasets (Clarke, 2001). A fundamental framework to exchange data across many countries in a region. A Regional SDI can provide the institutional framework and the technical basis to ensure the regional consistency and content of fundamental datasets to meet regional needs in the context of sustainable development.

2.1.2 Technical Standards

Exchange data formats are very crucial, as different organizations have adopted differing formats for the creation of organizational spatial data. The success of the NSDI will depend upon the adoption of exchange formats easily understood by agencies. Technical Standards define the technical characteristics of the fundamental datasets. There is no doubt that consistent standards are required for data models, metadata, transfer and interoperability of storage and analysis software.

2.1.3 Fundamental Datasets

Fundamental datasets are the central component of a SDI. They are the spatial data produced within the institutional framework and fully complying with the technical standards.

2.1.4 Technology

Technology involves all of the means for getting spatial information or datasets to the users such as access and distributing networks and clearinghouse. It also involves the acquisition, storage, integration, maintenance and enhancement of spatial data.

2.1.5 People

People include users, administrators and custodians of spatial data and also value added resellers. People is an important factor in succession or failing of SDI.

2.1.6 Existing Models

Based on the strategies, aims, objectives and status of individual SDI initiatives in different levels, two models namely product-based can be identified in contemporary SDI development. The product-based model represents the main aim of an SDI initiative being to link existing and potential databases of the respective political/administrative levels of the

community, whilst the process-based model presents the main aim of an SDI initiative as defining a framework to facilitate the management of information assets.

2.1.7 Metadata

Metadata or "data about data" describe the content, quality, condition, and other characteristics of data. See the Clearinghouse section (2.1.8.) in bellow to learn more about how metadata is used in Internet-based clearinghouses to search for specific data sets. The generic term 'SDI Metadata' stands for data concerning SDI content and information availability.

2.1.8 Clearinghouse

The Clearinghouse Activity is a decentralized system of servers located on the Internet, which contain field-level descriptions of available digital spatial data. This descriptive information, known as metadata, is collected in a standard format to facilitate query and consistent presentation across multiple participating sites. Clearinghouse uses readily available Web technology for the client side and uses the ANSI standard Z39.50 for the query, search, and presentation of search results to the Web client. A fundamental goal of Clearinghouse is to provide access to digital spatial data through metadata. The Clearinghouse functions as a detailed catalog service with support for links to spatial data and browse graphics. Clearinghouse sites are encouraged to provide hypertext linkages within their metadata entries that enable users to directly download the digital data set in one or more formats. Where digital data are too large to be made available through the Internet or the data products are made available for sale, linkage to an order form can be provided in lieu of a data set. Through this model, Clearinghouse metadata provides low-cost advertising for providers of spatial data, both non-commercial and commercial, to potential customers via the Internet. Clearinghouse allows individual agencies, consortia, or geographically-defined communities to band together and promote their available digital spatial data. Servers may be installed at local, regional, or central offices, dictated by the organizational and logistical efficiencies of each organization. All Clearinghouse servers are considered "peers" within the Clearinghouse activity (There is no hierarchy among the servers) permitting direct query by any user on the Internet with minimum transactional processing.

2.2 Objectives in Developing an SDI

The Principal objective in developing SDI is to achieve better outcomes for the specific level through improved economic, social and environment decision making recognizing that the cost, quality and longevity of spatial data are critical in the application of the technology. There are a number of other objectives that should be considered when developing an SDI:

Produce Standardized fundamental spatial datasets

Avoid unnecessary duplication of cost in developing and maintaining those data

Facilitate access to and application of those data

Enable integration of other application specific data by all users.

2.3 Regional level of SDI

At the regional level of an SDI, there are three ongoing SDI initiatives in the Asia-Pacific, Europe and the Latin American regions. This paper tells about the Asia-Pacific SDI (APSDI). APSDI is coordinated by the permanent committee on GIS infrastructure for Asia and the Pacific (PCGIAP). Many countries are developing SDI at different levels ranging from local to state/provincial, national to regional levels and from regional levels we reach to global level to better manage and utilize spatial data assets.

The global SDI is as an umbrella that encompasses all the components of SDIs at levels below such as regional SDIs.

2.4 Information Society

Information Societies that are based on common concept use information for free communication and endeavor in realization of their goals. It can be done with applying strategies and policies such an information different organization in these societies. Output of this organizing is different products and information services that are included and also applied different part of societies such as policy management culture and technology to gain their plan's goal.

2.5 Sustainable Development

Society improvement is possible if influence of development progress is sustainable. We need executive sustainable development program to have it in different part of society and it can be done if we consider economical and social and political factors in our decision.

2.6 IT Position in NSDI

We can see an overview of this topic in Figure 1. The main point of this diagram is it position and effective factors on it that cause IT modern concept by putting strategies and policies in spatial data infrastructure.

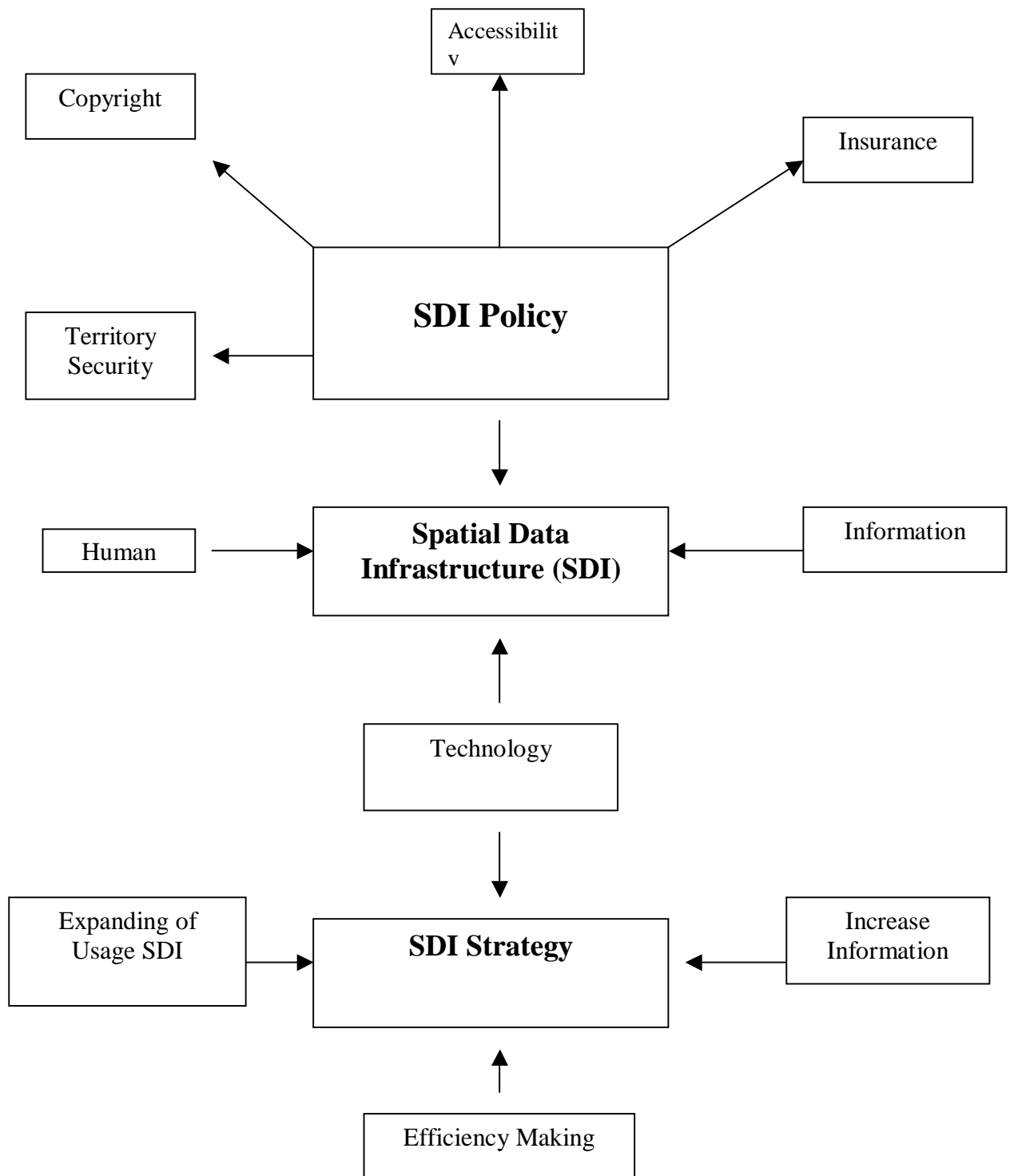


Figure 1: An Overview of IT position in SDI

3. PRINCIPLES AND SPECIFICATIONS OF SDI IN NATIONAL CARTOGRAPHIC CENTER (N.C.C.) OF IRAN

3.1 Islamic Republic of IRAN

Iran has been considered as fundamental and economical transit land between open seas and the commonwealth countries. After the Islamic Revolution in 1978, there have been a large number of construction activities in the country and therefore, the need to produce, update, maintain, standardize and manage huge amount of geospatial data in an organized framework has been highly considered.

3.1.1 Map Producing Organizations in Iran

Many administrative organizations in Iran have been to dealing with production, usage, management, education and research on SDI and spatial data in Iran. In public sector, the major organization working on SDI is National Cartographic Center (NCC).

According to its duties and needs, the scope of these organizations' activities is defined as follow:

National Cartographic Center (www.ncc.org.ir)

National Cartographic Center of Iran is responsible for producing base maps of the country and centralizing all surveying and geographic activities.

National Geographical Organization (www.ngo-iran.com)

National Geographic Organization is responsible for producing maps for military activities and around the international borders of Iran.

Geological Survey of Iran (www.gsi-iran.org)

The Geological survey of Iran is authorized to prepare, complete, and publish geological maps of Iran.

Iranian Remote Sensing Center (www.iran-irsc.com)

The most important activities of the Center consist of providing production and distribution of satellite data, processing these data through remote sensing technology or using latest technical and practical developments, promotion of remote sensing technology, design, construction and presentation equipments and possibilities.

Tehran GIS Center (www.Tehran-gis.org , www.Tehran-gis.com)

One of the duties of Tehran GIS center is producing maps of Tehran in urban scale for urban GIS purpose.

Cadastral Plan of Iran

Producing cadastral maps of Tehran

Private section

Private Companies and centers are producing maps too, but it is necessary all of maps, which are producing out of the NCC, were approved supervised and technical controlled by NCC.

3.2 National Cartographic Center (NCC) of Iran's Roles Related to Local, National, Regional and Global SDIs and Realization of IT in Each Step

3.2.1 NCC's Departments

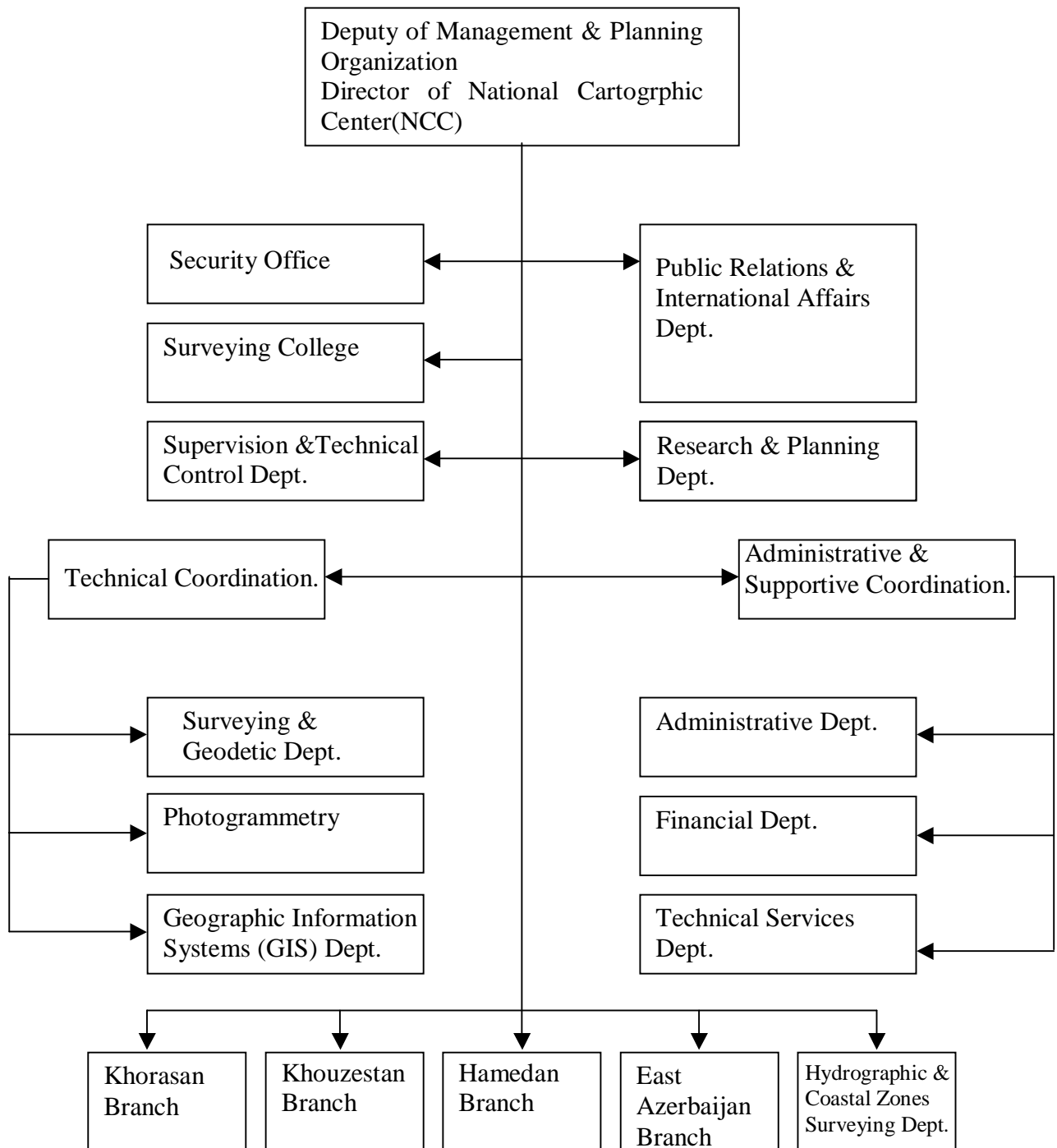


Figure 2: Chart of NCC's Departments

3.2.2 Last Situation in NCC

National Cartographic Center of Iran (NCC) with an area of more than 29,400 sq.m and built-up area of 14,600 sq.m is situated in the west of Tehran. This organization was established as affiliate of Plan & Budget Organization in 1953 from 1973 to 1979 it was affiliated to the Ministry of Defense (The former Ministry of War).

In 1979, this organization was separated from the Ministry of Defense and was affiliated to Plan & Budget Organization with new tasks.

Till 1992, NCC used analogue techniques in its map production line and then shifted to digital era resulted to implementing the new science and technologies such softcopy, GIS, GPS, remote sensing and image processing of satellite images such as SPOT, IRS and IKONOS in production and updating of medium to large scale maps and databases.

During the production of NTDB, a national standard for production, editing, cartography, updating, quality control and assurance have been developed and updated.

3.2.3 Current Development of SDI Situation in NCC

The spatial data produced from local to national levels include 1:200 to 1:1,000,000 map scales. Significant efforts have been undertaken towards the development of a nationwide digital map and topographic database (NTDB) at scale of 1:25,000 by NCC, which is responsible for national surveying, mapping and GIS activities in Iran. The project (NTDB) consists of about 10,000 sheets at scale of 1:25,000.

Undoubtedly GIS has a very powerful relationship with data transference in an organization or among the organizations. In such system, it must be identified which level of information could be available for who and how. GIS users are not limited to the special group, but many people with different knowledge and profession use these systems. Hence regular and correct use of GIS system needs requirement analysis and scientific and technical capacity evaluation. On the other hand, relation between producer and consumer, contribution of organization in preparation and compilation and exchange of geographic data, are the other points that must be considered. Recognizing these necessities, NCGISU was established to coordination and leading GIS activities in national level. This council plays a key role in spreading GIS culture and reasonable use of that. In the following pages we point to some activities carried by NCGISU.

The development of national and provincial councils of GIS users headed by NCC, the activities undertaken by other public and Government organizations, which can be used to develop NSDI in Iran, and the development of a conceptual framework for Iranian NSDI, will be covered.

3.2.3.1 Producing Digital Maps in NCC

Large-scale maps

Producing urban maps in the scale of 1:2000 plan was putted on Formula in NCC before that, maps of some cities was made by case study in 1:1000 and 1:2000 but this plan are for all of cities that one prioritized in 800 cities. Maps of 32 cities finished in 1380 year and making

maps of other 40 cities have been programmed in 1381 year and are finished soon. Cartography and photogrammetry step was performed for these maps apart from NCC.

Medium-scale maps

The Islamic Parliament as one of the most important projects approved the national project of preparing base maps at the scale of 1:25,000 after the Islamic Revolution.

The maps include 10,000 sheets, of which 3000 belong to desert areas, and 7000 sheets cover the other areas. The size of the sheets is 7.5 x 7.5 longitude and latitude.

The area, which a sheet at the scale of 1:25,000 covers, is about 158 sq.m.

The formerly produced maps were in the form of line maps and after technology transfer in NCC they have been produced in digital form.

Producing Digital Terrain Model

Digital Elevation Model (DEM) is an important product for many of applications. For example for producing orthophoto and orthoimage maps, DEM of the area is need. In many of applications need to DEM feels as one of the graphic data's components.

NCC as a national organization on planning, coordination, and map production produce DEM in different accuracy and area. This production is ready for users:

- DEM of Iran with 25 geographic second (600 meters), geometry accuracy.
- DEM with 10 meters geometry accuracy and 7.5 ×7.5 geographic minute dimensions.

3.2.3.2 National Topographic Database in 1:25,000

Establishment of National Topographic Data Base in 1:25000 scale and linking attribute data to graphical elements is one task of this department.

National Topographic Data Base (NTDB) build up on the 1:25000 base map and contain 169 informational layers such as contours, population centers, rivers, transportation and so on. It could be use in geographic information systems.

This products is available for users in the following formats:

Microstation (dgn) + Oracle (dmp)

Microstation (dgn) + Access (mdb)

Arc view (Shape file).

3.2.3.3 National Topographic Database in 1:1,000,000

Layers:

Population Centers

Transportation

Drainage

Heights (contour lines)

Boundaries

Names

Projection system and datum:

Projection of Digital maps in this TDB is conformal Lambert conical.
Comparison ellipsoid in this TDB is Hayford.

3.2.3.4 Topographic Maps in Other Scales

As user requirements to different scales of spatial data, NCC produces 1:25000, 1:50,000, 1:100,000, 1:250,000 and 1:750,000 map.

All this products is based on standard specification, which provide by Standard committee. These products are available for users in the dgn formats and they can be prepared for printing.

3.2.3.5 Development of National Council of GIS Users (NCGISU)

NCGISU was established in 1372 in order to policy, planning and coordination GIS activities, requirement analysis, applying all scientific and technical capacity and professional ability to set up a GIS system and practical use of that under direction of NCC.

NCGISU try to spread GIS' wings and also transfer experience and results in regional, national and international level. Council members are full expert of administrations and executive sections and NCC has its chairman. GIS department of NCC as a secretariat of this council provides essential facilities to hold council meetings and perform its approval. Up to now this council has been holding more than 75 meetings and makes deliberate decisions on different matters.

National Council of GIS Users Activities

The important actions and activities, which have been done:

- Making decision about national topographic database features in the scale of 1:25000. NCGIS within many meetings and researches has considered user views in how we can establish a NTDB and determine its requirement in the scale of 1:25000. After identification of requisite features, NCGISU within discussion and agree on conceptual model, determines topographic data production standard that is suggested by standardization committee of NCC. This standard is compiled on order to achieve an approach in graphical data production in national level and facilitate data exchanges for possible contribution in national or international activities of geographical features attributes in the scale of 1:25000.
- Making decision about geographical database features in the scale of 1:1000000. The significant and necessity duty of a national map-making organization is a topographic database establishment in different scale. In order to achieve this important goal, NCC as a fundamental national map-making organization in Iran charged irreplaceable role in designation and execution database project and GIS system in the scale of 1:1000000. After analyzing by an expertise team, the input data layers were identified and their report was submitted to the council. Then council members debated and discussed and at last different kind of information for each level was approved.

- Provincial council of GIS users conformation
Although NCGIS have carried out policy and coordinating GIS activities in national large scale, but it is quite clear that each province has its own individual problems requirements such as different social, economical, environmental and cultural status. Recognizing this fact PCGISU conformation was recommended to NCGISU to achieve highest social, economical and environmental applying of geographical information for each province. Recognizing requirement and facility of each province PCGISU has done its best policy and coordinating GIS activities and also holding GIS training course in province. PCGISU statute was approved by NCGISU and up to now PCGISU was established in 21 provinces of all 28.
- Facility, images and satellite information analysis in NCGISU member organizations to produce image map in the scale of 1:100000
Images and satellite data are one of the main source of data production. Today with technical development in remote sensing and image processing, it is possible to produce high resolution satellite data that if was applied correctly, are useful for producing different map with different urban and land use application. Therefore NCC decided to cover some parts of country which had limitation of providing map in the scale of 1:25000, with image map in the scale of 1:100000. Hence NCC suggested facility and images and satellite information analysis to NCGISU and in some meeting and prepared some questionnaires to identify existed facility and type of satellite information. The questionnaires were distributed in member organizations. After collection of questionnaire, they made decision on images coverage for region with no map and images resolution. Because of no up to date available satellite images and no coverage for region that are needed and other issues related to images receiving and submitting, this plan is not performed yet.
- Approval of duty description chart for suggested GIS department in administrations and other related executive organization in provinces.
Today there is an expansion in applying GIS technology as a powerful tool in preparation different management and controlling program. In our country which is in construction and development time. It seems more than any time essential to set up such a system. Considering these essential needs, conformation of GIS department plan in administrations and national and executive organizations were developed in NCGISU as an organized center for leading and constructing duty description chart that is suggested to NCGISU was approved in 68th meeting and submitted to management and plan organization for other legal step in final adoption.
- National topographic database features encoding plan in the scale of 1:25000.
It can be more facilitate to access and retrieve the elements, which identified by a unique code. Generally simple and rapid updating and exchanging related information to each element. Determining features that need national unique code and analyzing different methods and mechanism is in NCGISU agenda and also other aspect of that are mentioned by specialist consideration.
- Policy on format of geographical information exchange.
Undoubtedly using geographical data avoids wasting of time and expense. Hence production and applying data sharing commonly recommended in GIS system, but since each organization and administration use different data format to input in diverse GIS

systems, in the first stage, it must be possible to convert data format and the second one is that converting o data must be done in accord with existed standard. Recognizing this problem, information exchange standard was submitted to NCGISU. The problems that appear in standardization of data formats cause NCGISU considered the same data format for data exchange. In order to identify used data formats in country and also determine data exchange volume, some special forms was prepared and given to the NCGISU member organizations. After totalization of implemented forms for data formats the most useful one in application was selected to consider in mechanism compilation of data exchange. (Approaches of exchange and transference data and media). Following to that plan NCC intended to change available data in NTDB in the scale of 1:25000 to the most requisite format for all users.

- Approval of preparation and updating digital maps for special cities in the scale of 1:2000
NCC produces different scale of map to response users need. Existence of maps in suitable scale is an essential need for all planning and urban services. Since digital maps in the scale of 1:2000 is completing useful for any urban application problems, NCC recommended preparation and updating of digital maps in the scale of 1:2000 for strategic cities to NCGISU. This suggestion was analyzed in different aspect such as city selection factors and technical and economical issues in preparing maps and use requirement and met approval of NCGISU.
- Establishment of data clearinghouse.
In order to improve special data management in country and inform in an effective way, NCC submitted a plan that was called data clearinghouse center to NCGISU. This plan includes different aspect such as standard compilation and software issues and work circulation plan and rules. Since up to this time technical committee ISO/TC211 supported NCC standardization committee and compilation of standard has been continued, therefore establishment of such a center in statue quo and in short time is not operational, But for solve this problem and cover all needs in country NCGIS established a national information system as a short time solution. In this system a list of available special data attributes such as data on identification of data collection, data resources and their dates, necessary data for exchanging, geometric attributes of data and cadastre issues is implemented on NCC homepage site for different organizations especially executive ones. This plan is in hand in NCGISU.
- Leading and conducting national topographic database collection and compilation committee activities in the scale of 1:25000.
In order to input data in predicted records of non_ graphical attributes table, there is a committee which its member are specialist of GIS department of NCC and expert of others executive organization to find suitable solution for problems and difficulties and planning and coordination to complement and compile non_ graphical data. Recognizing above matters, specialist of GIS department set up required facilities and held training course for expert of others executive organization. Power ministry and construction and mine and metals administration and jihad-e- saزندegi and agricultural ministry and statistical center are organizations that will be collected and input their data into database. Up to now statistical center delivered their data to GIS department of NCC and power ministry has 40 percent progress in data collection and others have advised have

advanced progress in their work. They submitted their progress and problems to NCGIS meetings and discussed and agree on their solutions.

- Other activities
- Each NCGIS member submitted its newest program and activities and technical and scientific outcome of his work in the form of news and reports. These actions and activities could be done in national or regional or international level, aims:
- Experiment exchanges.
- Consultation on GIS common issues.
- Avoiding wasteful duplication and elimination of redundant tasks.
- Coordination and contribution among NCGISU member executive organizations.
- Applying available facility in GIS system.

3.2.3.6 Province Councils of GIS Users (PCGISU)

Following to Provincial Council of GIS Users conformation plan, the statute approval of this council in 45th meeting of National Council of GIS Users dated 4.8.1376, NCC duties which was charged by Dr.Najafi, previous general director of Management and Planning Organization, in order to coordinate and arrangement of GIS activities in provinces, programming to set up a GIS system and holding continues PCGISU meetings in all provinces of country and also leadership of these committees by GIS department of NCC, the PCGISU was created.

Membership of PCGISU consists of all executive organizations in province that is geographical data users. It seems necessary that these councils have regular and continuous meetings in province to coordinate and organize issues related to apply and use of GIS technology. This problem includes of spreading GIS culture in provinces, establishing of provincial GIS making major contribution between organizations and council members in set up and apply GIS, achievement to a common language for Geographic Information Systems in province, avoiding wasteful duplication and elimination of redundant tasks, experiment exchanges, consultation on GIS common subjects.

Consideration to above mentioned statute and importance of conformation of these councils to gain goals, follow of NCGISU duties and improve relationship with other executive sections in provinces, at the first stage GIS department of NCC provided essential and initiate arrangements and coordination in its structure.

In this department all provinces divided into some groups. This division was in accord with regional division of country in NCC and distribution of survey management in provinces. In the second stage, perfect specialists were determined and their responsibilities were arrangement and coordination of holding meetings and technical support of member organizations in each province.

Council meeting agenda in the first stage generally is as follow:

- Issues related to human resource training and its content.
- Holding training course in the level of experts and specialist and also technician of that province.

- Holding half-day seminars for directors.
- Recognizing distribution of questionnaire about kind of produced spatial and non-5. Spatial data and human resource and equipment availability.
- Implementation and collection of the questionnaires and report presentation in council meeting.
- Continue and support of formation of GIS core in all provincial executive organization.
- Determination of different kind of required common spatial data among all provincial organization in provincial scale.
- Determination of different kind of required common non_spatial (attribute) data according to spatial data among all provincial organization in provincial scale.
- Determination of fundamental and basic map for provincial database.
- Determination of different kind of spatial and non-spatial data for urban planning. (Large scale)
- Determination fundamental and basic map for city and for urban planning. (Large scale)
- Approval of work instructions about map production (in provinces and cities).
- Decision making to product of basic maps for provinces and cities and determining the corporation of executive organizations for providing of these maps.
- Corporation of executive organizations for delivering and exchanging the existed information.
- Publishing journal and papers about GIS in province.
- Organize and support of surveying offices in management and planning organization.
- Use of standards and NCC maps.

3.2.3.7 Development of Standards

Standards Committee

Recognizing the importance of a National GIS for the country, NCC made a fundamental decision to produce the 1:25,000 scale maps in digital format as input to the National Topographic Data Base (NTDB). The existing conventional specifications were modified to support the digital production line, but due to the characteristics of digital maps and the database requirements necessary for development of a national spatial information system, these modifications were not sufficient. Therefore, the Standard Committee for Digital Spatial Data (SCDSD) was formed in 1994 with the objective of developing the new standards, which would cover the different aspects of digital mapping on spatial databasing.

The primary objective of the standard committee was to develop standards for the National Topographic Database and the 1:25000 scale digital base maps.

At present scope and organization of the committee has been extended to encompass further geographic information needs of the user community.

The objective of NCC 's standardization efforts is to develop standard for digital graphic data in the framework of topographic mapping and data basing that can server as a base for GIS. The standards will cover different aspects of digital mapping and spatial databasing including the acquisition, processing, presentation, management, and transfer of data.

The documents listed below have been developed:

- Standard for Digital Satellite Image Maps at 1:100000 Scale.

- Proposed Standard and Specification for 1:50000 Digital Maps Generalized from 1:25,000 Maps
- Standard for Digital Topographic Data at 1:25000 Scale
- Standard and Specification for Digital Maps at 1: 2,000 Scale
- Standard and Specification for Digital Maps at 1: 1,000 Scale
- Standard and Specification for Digital Maps at 1: 500 Scale.

A national Standard Data Exchange (NSDE) is being developed which will be a refined version of the survey of Iran Digital data standard. Titles of metadata serve standard have been designed and developed by NCC for Iran too.

3.2.3.8 Iran's Membership in PCGIAP

Through the efforts of the united nation regional cartographic conference for Asia and the Pacific region and following its 13th conference in Beijing may 1994, the national mapping agencies in Asia and the pacific region formed the permanent committee on GIS Infrastructure for Asia and pacific in 1995 to develop a regional SDI for Asia and pacific region aimed maximize the economic, social and environmental benefits of geographic information in accordance with agenda 21 by providing a forum for nations across the region to cooperate to the development of the global infrastructure.

Iran is one of the PCGIAP executive board members for three consecutive periods and has working group2 (fundamental data) chairmanship in the last period up to 2003. Iran has participated in all annual meeting of PCGIAP.

3.2.3.9 Contributing in Preparing Global map

NCC has especial program for preparing and applying global map and fundamental data set of Asia and Pacific region. Iran is member of International Steering Committee for Global Map (ISCGM).

3.2.3.10 Creating Clearinghouse

NCC is creating a national clearinghouse. It will be join with APSDI clearinghouse. In this clearinghouse would collect and provide data about the existence and suitability of datasets is recommended. This concept should aim to support participating nations so that data can be found, may be browsed, viewed, may be ordered, and delivered and paid for through regional infrastructures or regional data-nodes. The clearinghouse system might employ a distributed architecture that permits the search of many servers through a single interface with a user interface style similar to those used in web search engines, and must be based on minimal system requirements, enabling all member nations to access with minimum system requirements.

In bellow you can see the current situation of NCGISU as a potential leadership mechanism for Iranian NSDI:

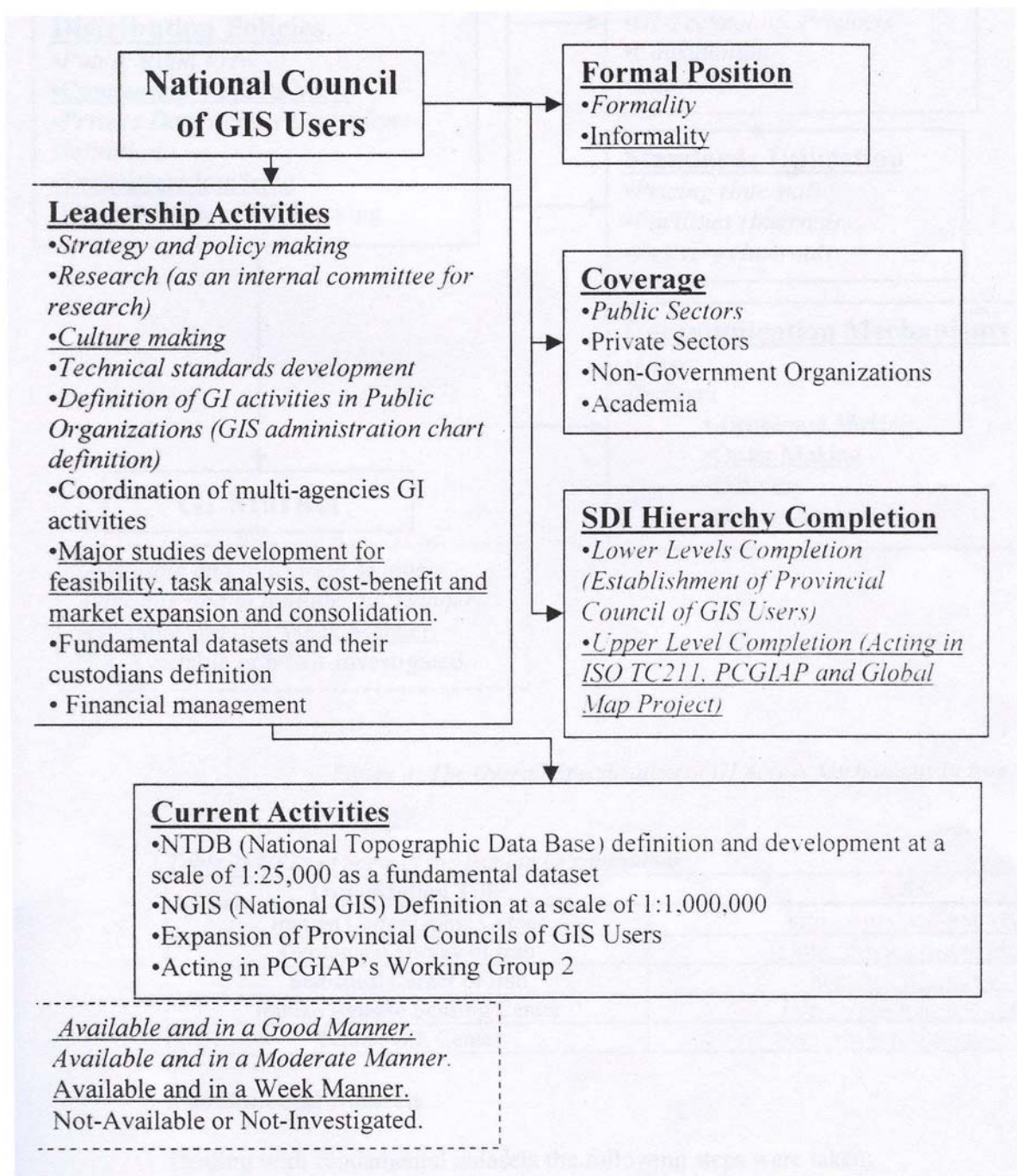


Figure 3: The Current Situation of NCGISU as a potential leadership mechanism for Iranian NSDI

In below you can see the overall specification of Geographic Information (GI) access mechanisms in Iran:

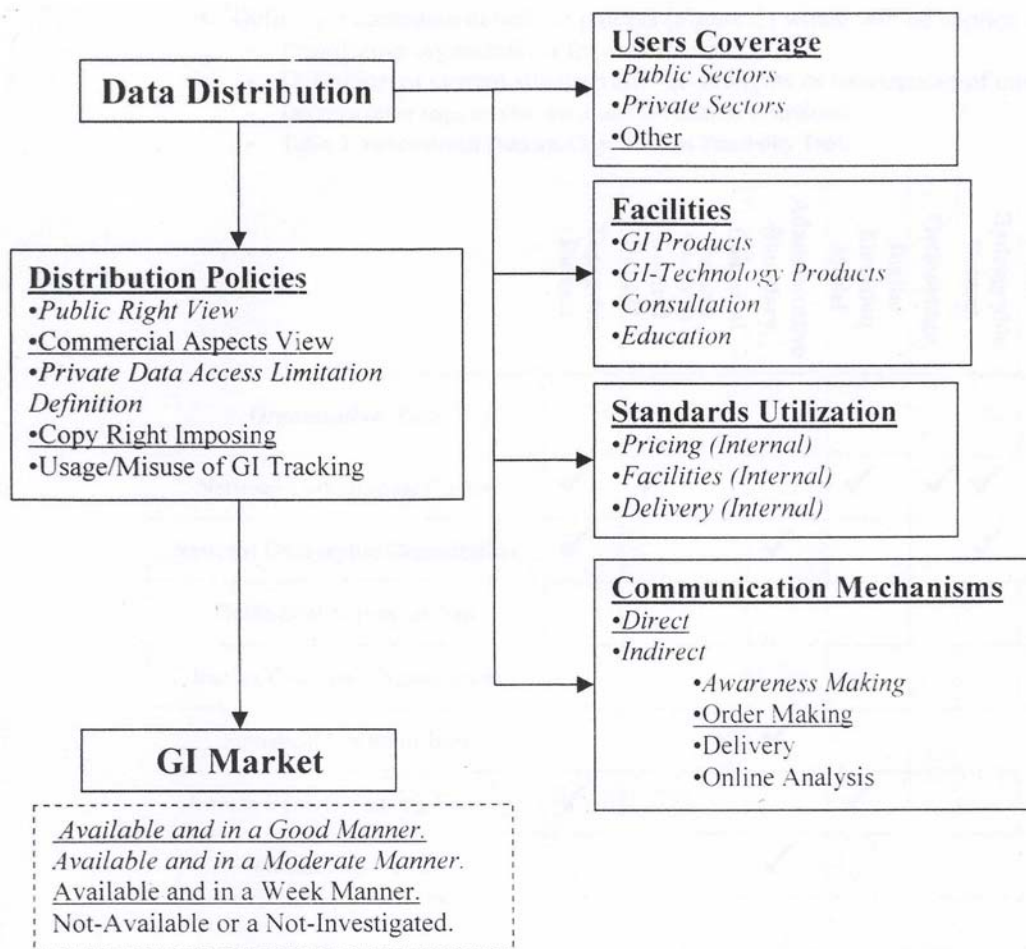


Figure 4: The Overall Specification of GI Access Mechanisms in Iran

3.2.4 Future Development of SDI Situation in NCC

3.2.4.1 Futures NCGISU Research

- NCGISU has especial program for its prospective meeting and follows special work plan such as analyzing and discussing on:
- How we can use global map and fundamental dataset of Asia and Pacific region.
- Applying international standard in GIS system like (ISO/TC211 GIS standards).
- Establishment of data clearinghouse.
- Compilation of data exchanges standard.
- Finding effective solution for NCGISU and PCGISU member organizations in set up and apply GIS systems.
- Effective endeavor to access ideal statue in applying GIS systems in country.

- In an advanced organization, setting up a GIS system included in a progress of technical transference. In other hand, a complete transference is started from awareness of GIS technology existence step and ended to adoption step. Only in this case setting up a GIS system will be successful. In an ideal organization directors and designers ensure that applying GIS functional analysis in different task can solve environmental problems and could be very practical to achieving best outcomes. In an ideal case people who live in society know that these geographical information are national wealth and consider importance of applying GIS systems to execute different scale projects in accord with different reasonable and logical ideas and expectation with mention to appraisal cost and estimation of our capability and facility. In ideal statue each organization will be done experiment transference and technology information exchanges to the other organizations and contribution in geographical data production. In such a society special data infrastructure has particular importance and achieve outlined goals following activities are expanded:
 - Standard and work plan compilation.
 - Metadata documents and presenting and displaying them with the help of practical and potential clearinghouse.
 - Determination of fundamental data layer with specified quality and coverage.
 - Compilation of statutes and rules for different matters such as data security and owing of data and responsibility of quality and quantity of data, the way of contribution and other related issues to producer and consumer of information.
 - Recognizing above outlined matters NCGISU will be done lots of work to obtain ideal and suitable statue in country for GIS system. Hence these councils do their best, in order to preparation facilities of applying GIS system in whole country and for all users.

4. COMMENTS AND CONCLUSIONS

SDI, Consistent means to share geographic data among all users could produce significant savings for data collection and use and enhance decision-making. National Spatial Data Infrastructure defined as the technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community. The goal of this Infrastructure is to reduce duplication of effort among agencies, improve quality and reduce costs related to geographic information, to make geographic data more accessible to the public, to increase the benefits of using available data, and to establish key partnerships with states, counties, cities, tribal nations, academia and the private sector to increase data availability. The NSDI has come to be seen as the technology, policies, criteria, standards and people necessary to promote geospatial data sharing throughout all levels of government, the private and non-profit sectors, and academia. It provides a base or structure of practices and relationships among data producers and users that facilitate data sharing and use. It is a set of actions and new ways of accessing, sharing and using geographic data that enables far more comprehensive analysis of data to help decision-makers chose the best course(s) of action. Much has been accomplished in recent years to further the implementation of the NSDI, but there is still much to be done to achieve the vision of current and accurate geographic data being readily available across the country. NSDI in each country has important role to realization of IT. In the other hand, we reach

Regional SDI to some NSDI. Then we can conclude, If we have good NSDI in each country, then we will have a successful RSDI for realization IT in a region such Asia and Pacific Region.

There are some problems and difficulties experience in exchanging data in I.R. of Iran as: lack of standard format of data exchange; lack of uniformity in used software in different sections; Different Farsi language support utilities in different sections. N.C.C. Is thinking about these problems and is solving them. One of the great strategies in Iran is making GIS users' councils to reach the national SDI goals and then reach to Regional SDI purposes.

We can find out from NCGISU background in Iran that that up to now this council as a policy and making decision origin with presenting useful comments and plan, has an effective role in coordination and integration GIS activities, presentation training course, spreading GIS culture, preparation topographical database in different scale, requirement determination, analyzing database in various kind of information and available potential facilities, setting up special multimedia system and propose practical useful plan and suggestion in national level. Now and approval of the committee are quite significant to organize action and activities and improve special data management in member organizations but influences of all that things in private sections are not satisfied. In order to shared use all benefit of applying GIS systems and appear positive results of that technology in our society, the following points are recommended:

- GIS core in each executive organization should be played an active role.
- Private and public organization parallel to each other can activate in contribution of GIS systems performance.
- GIS training courses will be held periodically and regularly for directors, specialist, operator and technician and all GIS activities and actions regularly execute in private or public organizations.

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CONTACTS

Peyman Baktash
Head of Coordination section for GIS Users Councils
Department of Geographic Information System (GIS)
National Cartographic Center (NCC) of Iran
Azadi Sq. Meraj Ave
P.O. Box:13185-1684
National Cartographic Center, Tehran
IRAN
Tel. + 98 21 603 0459
Fax + 98 21 600 1972
Email: baktash@ncc.neda.net.ir