National Geographic Information Infrastructure: A Perspective View

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Abstract

The aim of this paper is to discuss the nature, concept and to provide a perspective view of National Geographic Information Infrastructure [NGII]. The objective of NGII is to integrate the existing data and also data that will be generated in future from various sources and to disseminate the same to the users in a Clearinghouse concept, in which the leading organizations should design a new working policy framework, coordinate the organizations involved in the programme and to provide standard data/information. With this, the country will benefit economically as it will minimize the data duplication and in the mean time maximize the data sharing. Finally, the paper recommends the activities to be initiated for the development of NGII.

Introduction

National Geographic Information Infrastructure [NGII] represents a major step forward in the direction of developing digital environment in Nepal, as the basic data necessary to establish, improve and upgrade NGII has already been developed into digital form. The basic data was generated in digital form from the recently published topographic base maps at the scale of 1: 25 000 for southern area and that of 1:50 000 for northern area. NGII takes account of maintaining standards in digital spatial data, and access and use of these data to meet requirement of users community. It is believed that the system will assist in building in good relationship between the organizations involved in Geographical Information System and support its continuing development. This paper tries to provide perspective view of National Geographic Information Infrastructure.

Concept of NGII

NGII is a computer based system of creating, handling, processing and dissemination of digital data/information. The schematic diagram of NGII is given in Annex I. The information demand coming from various users are related with geographical information applications. Keeping in view of the demand, the information suppliers has to design/create metadata and data base, and to integrate various data, maintain standards, coordinate the users, and to make best utilization of data base. Finally the clearinghouse concept will be introduced to disseminate data/information to the users in which access to metadata services will guide the users to obtain their required data/information.
The most challenging parts of NGII are

- Integration of the data
- Coordination of the related organization
- Maintenance of data standards
- Capacity building
- Clarity of meta data
- Flexibility in data transportation
- Updation of data base
- Easy accessibility to the system
- Educate the stakeholders

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Information Supply

As mentioned earlier, NGII is an integrated approach in which number of organizations need to participate to create, develop and supply information. The organizations can be categorized into two groups.

The first group generates the **fundamental data sets**. It contain the followings

- Geodetic Data
- Topographic Data
- Digital Elevation Model
- Administrative Boundary
- Geographical Names

The second group generates the **framework data sets**. It contain the followings

- Land use data
- Geological data
- Soil data
- Cadastral data
- Hydrographical data etc

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Metadata services

The establishment of metadata services is an obvious activity of NGII and therefore, plays an important role in implementation of NGII. It also helps to maximize the data sharing and to minimize the data duplication. Consequently, the metadata services shall be given a high priority, as the users are always having problem of finding the information sources that are relevant to their needs. The success of data sharing between the organizations depends upon the coordination policy and the data integration approach. The information users always look after the quality and contents of the data. So, the information supplier should concentrate on the generation of standard data, based on the users requirement.

In general, the metadata should contain the following

- Information Policy
- Data Standards
- Architect of the data
- Specifications
- Procedure of data access
- Security and protection of data
- Pricing Policy
- Copy rights policy etc.

Database services

The effectiveness and efficiency of the development and implementation of NGII, basically, depends upon the existing capacity and number of staffs possessing management skills on Geographic Information. So, it is necessary to increase its capacity and to develop human resources for effective database services.

The capacity building includes the instrumentation and to provide and develop comprehensive package of software suitable to local environment. The programme for human resource development should be related with three levels namely decision makers, professionals and technologists so as to enable the users towards practical application of GIS.

An adoption and implementation of new technology need organizational restructuring. The management should affirmatively respond to necessary change in the structure of organization and need to communicate and create an atmosphere to accept the changes by the members of the organization.

The major phases of NGII implementation are as follows

- Preparation of concept of NGII comprising of need, user requirement, modification of existing policy, implementation procedure etc.

- Restructuring the organization of the implementing agency and establishment of unit with proper human resources and equipment
- System design including overall task of the system such as specifications, definition of hardware/software; training component, format of end products etc,
- Implementation of NGII comprising of procurement of hardware/software and installation, staff training, database preparation, processing and procedure development, system maintenance, integration of various information system, coordination of several user.

In the mean time Information Management should ensure the following

- Prevent duplication of creation and management of information
- Develop common standards for quality assurance
- Develop format to effectively sharing of information
- Ensure the standards that are achievable within the constraints in terms of economy, technology, human resources, hardware/software, etc.
- Store and retrieve data efficiently and make it easily accessible to all users
- Maintain organizational ownership and security of data
- Ensure the decision regarding confidentiality, security and equity of access to information
- Ensure that the data is meaningful to all the users

Information Demand

Basically the users who demand the information may be grouped as following

Public Sectors : Ministries, Departments, Local authorities, etc.
Private Sector : Planners, research institutes, IT vendors, etc.
Representatives from various groups : NGOs, INGOs, Donors, Associations, etc.

The development of Information Technology has revolutionized the way of handling the system of stakeholders. In general, they are, now-a-days, embarking on reengineering programmes to be able to use new technologies such as GIS, GPS, Remote sensing, Database, internet technology, etc. The GIS refers to all forms of computerized data basically, categorized as fundamental data sets and framework data sets as mentioned above. It is being applied to a network of interconnected systems that manage a wide range of spatial information. In order to fulfill this demand, efficient and effective GIS based information technology become urgent in which a system must be developed for data collection, updating, storing, sharing, and dissemination.

Dissemination of Results

The data/information to be disseminated are the part of the outcomes of NGII and need to evaluate which products could be distributed. The users need to be informed about the details of the products and procedure to access. It could be through a regular publication of information in a form of report or newsletter or web pages. Alternatively, an effective way is to organize regular meetings, interaction programmes or seminars.

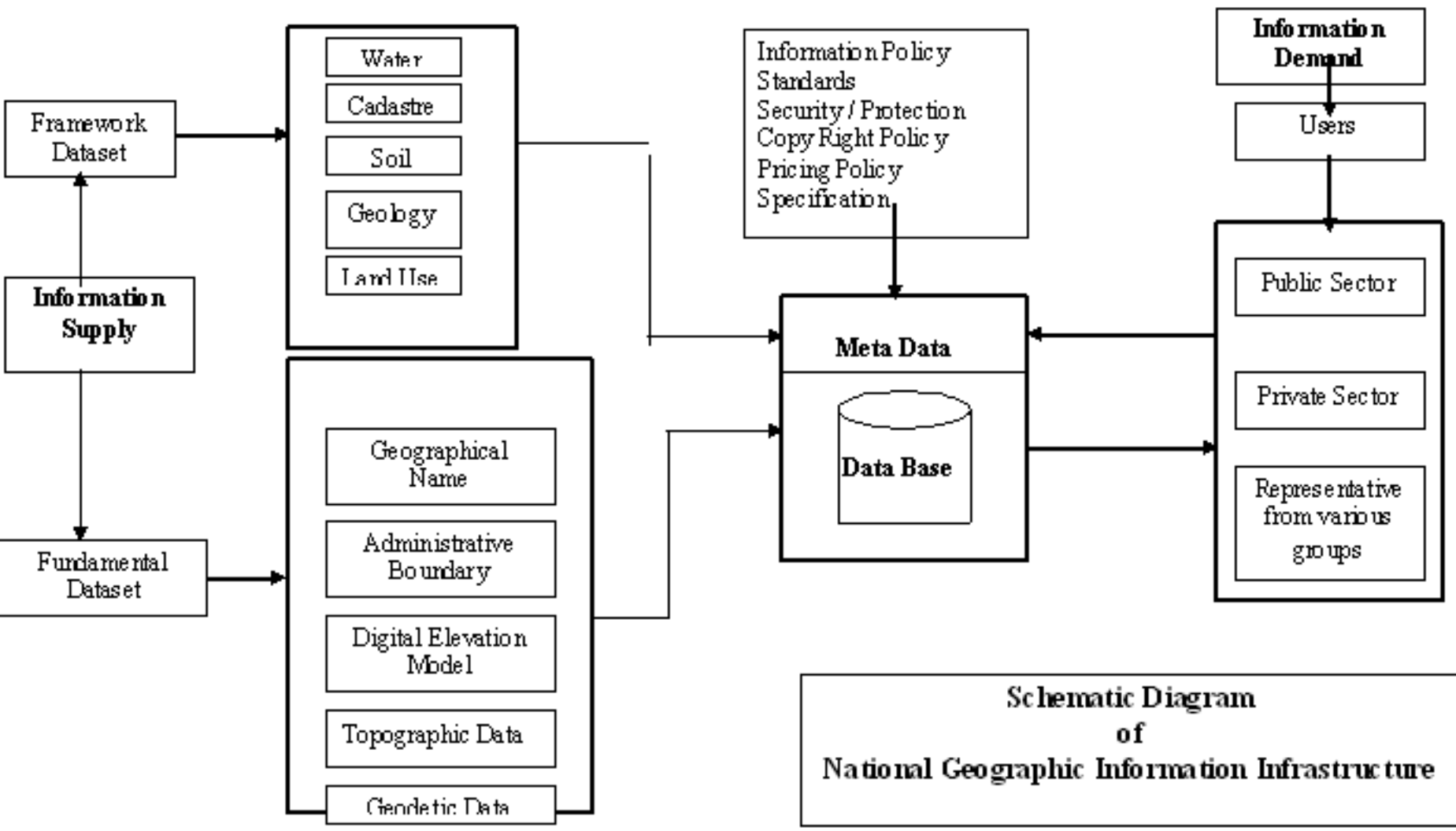
The function of data dissemination is partly referred to as an "NGII Clearinghouse" which is defined as a central internet site containing metadata in which the stakeholder could identify and evaluate the existing dataset, put queries of their interests and to understand the procedure for ordering the dataset. So, the NGII clearinghouse is conceived as a facilitator for exchange, sharing and dissemination of dataset. By using a PC with an internet browser a stakeholder could be able to access NGII clearinghouse through which the particular stakeholder will assess and select the data as per their requirement and place an order for the data as directed by it. Then, the organization will send the requested data to the user after fulfillment of the prescribed formalities.

Conclusion and recommendations

It is obvious that application and implementation of new technology have to overcome challenges in terms of capacity building, human resources development and organizational restructuring. Therefore, in order to implement NGII, it is necessary to outline the specific objectives, design effective working model and create environment to participate by number of organizations. The success and full potential of NGII will only be realized if there is affirmative support from the Government and total commitment from the related organizations.

It is also realized that NGII, being a new approach in Geographical Information Technology in our context, it is necessary to educate the decision makers, professionals and stakeholders in order to obtain full support and facilitate the maximum participation of the diverse community of GI users and potential users in NGII.
Finally, efforts should be applied to perform the following activities :

- To launch an awareness progarmme to educate the related persons
- To develop a new working policy framework
- To establish a clearinghouse for effective data dissemination
- To develop human resources through relevant training programme and academic courses
- To initiate capacity building to establish standard dataset and to integrate the data from several sources.
- To design a mechanism for maintenance of the total system.



Schematic Diagram of National Geographic Information Infrastructure

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Appendix 1

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