National Geoinformation System Development in the Republic of Uzbekistan

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***Abstract* – Geoinformation systems (GIS) are widely being implemented all over the world. They are helping in solving many economic and industrial issues. This paper describes how a national geoinformation system is being developed in Uzbekistan, as well as, policies, standards and technologies that are used to build a nationwide GIS infrastructure. Moreover, the national GIS concept is being analyzed and we propose a 5 year development plan based on modern international demands and trends.**

Keywords-GIS; Cadastre; National concept; Standardization.

I. INTRODUCTION

The National Geographic Information System (NGIS) creation in Uzbekistan has been carried forward by the strong will of the Republic of Uzbekistan as a part of the economic reform to use land and natural resources more efficiently based on a rapid information technologies (IT) development and application of the information and communication technologies (ICT) inside and outside of the Republic of Uzbekistan. The NGIS shall support the decision makers of Uzbekistan in different sectors of the government such as territorial development, land administration, environmental protection, social development, etc.

A. The rapid development of ICT in the Republic of Uzbekistan

The wide developments of ICT and computerization have been a global tendency of the world development for the last decades. Especially, the rapid development the ICT industry has been a driving force of the economic development with job creation and attraction of investment. Also, management effectiveness can be maximized and cost reduction in information exchange between market's participants can be expected by combining IT with production/management activities.

In the "Program for Computerization and Information-Communicative Technologies Development for 2002-2010" [1] and in the resolution of the President of the Republic of Uzbekistan "On measures for further development of a national information and communication system of the Republic of Uzbekistan" [2], the Government of Uzbekistan emphasized the significance of the economic development and improvement in the nation's well-being through ICT. In addition, Uzbekistan agencies are encouraged to attract foreign loans and grants for this program in the Resolution of the Cabinet of Ministers in 2002.

B. Rising necessities for utilization of natural resource

Abundant land and natural resources are important elements of Uzbekistan. In order to protect and allow reasonable usage of natural and land resources, the economic potential of the land must be analyzed. This can be done if there is enough information of the status and the usage pattern of the land, including natural resources and their infrastructures. Thus, the need for the construction of a national geographic information system is being emphasized.

In line with the public priorities of Uzbekistan, the project aims to develop and build the NGIS, which is the most efficient tool of the complex presentation and the analysis of the information about territorial development of Uzbekistan.

The NGIS will allow analyzing and valuing in real time different actual and reliable cartographic and other data in order to support the decision makers in different spheres: territorial development, land administration, environmental protection, social development, etc.

C. The proven economic and technical effects from research and studies

By introducing the geographic information technologies and systems, many research and studies have proven that it has many benefits over the economic and technology sectors. Protection and rational use of natural resources also benefit from similar effects.

Positive financial results of Cadastre services' activity provide additional income to the budget at the expense of the land correction and the other real property taxation.

D. Achieve the economic reform through IT application

Uzbekistan is seeking a development of the economic and the national welfare. In order to achieve this, Uzbekistan government considers ICT industry as a strategic method. Uzbekistan government particularly emphasizes national geographic information system creation.

Further, Section II gives the main idea on the GIS project in Uzbekistan and its directions, Section III describes components of each subsystem and designations, and Section IV discusses the target and the architecture of the project.

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II. UNDERSTANDING THE OBJECTIVE

The NGIS target goals are to provide the basic foundation and the basic platform support of "E-government" system of Uzbekistan. The implementation of the NGIS application at the government level including ministries, departments and local administration, will gradually utilize for "e-government" system.

The NGIS shall be a basic information resource of future e-government system. The NGIS and its components should be integrated with other state information of e-government systems.

The main objective of project is to develop and build the NGIS of Uzbekistan which collects and manages the data regarding the rational use as well as natural resources preservation in order to support timely and transparent the decision making for balanced socio-economic development across country and sectors.

The NGIS will increase the level of public authorities' information awareness and enhance the reasonability of the administrative the decision-making process.

The objective summary and system description are as follows, and are followed by the objectives of each project components:

- Establishment of State Satellite Geodetic Network.
- Digital Base Map Delivery and DPW Installation.
- Implementation of Information Analytical Centers and Automatic Working Stations.
- Development of pilot system for the National System of Cadastre and Real Property Registration (NSCRP).
- The NGIS Standardization and Master Plan.

III. THE OBJECTIVES FOR EACH SUB-SYSTEM

The main objective of project is to develop and build the NGIS of Uzbekistan which collects and manages the data regarding the rational use as well as natural resources preservation in order to support timely and transparent the decision making for balanced socio-economic development across country and sectors. It will become a basic platform part of e-government system which Uzbekistan government plans:

(a) Public administration: the NGIS will increase the level of public authorities' information awareness and enhance the reasonability of the administrative the decision-making process.

(b) Accuracy: New state satellite geodetic network will create conditions for position prompt fixing of objects with high accuracy.

(c) Integration: Unified NSCRP will provide an opportunity to render public services by the interactive system "one stop shop" [3-4].

(d) E-government: With the implementation of the NGIS application at the governmental level, Project aims to be gradually utilized for E-government system.

(e) Governmental Authority Users: The actual end users by Project are the Central Information-Analytic Centers (IAC), 14 Regional IACs of the NGIS, and Situation Centers (Emergency) for state and regional governmental authorities

A. Establishment of State Satellite Geodetic Network

The general definition of a CORS Network is the terrestrial infrastructure (equipment and software) designed to deliver Positioning Service based on the National GNSS technology. It is intended to cover the whole region of Uzbekistan with different levels of accuracy.

A new state satellite geodetic network will create conditions for position prompt fixing of objects with high accuracy. Also, various public services shall be created. These services will cover a wide range of applications, not just for geodesists, but also for public users and end users.

B. Digital Base Map Delivery and DPW Installation

The digital cartographic basis objectives are quickly and accurately establishing the basis for the latest digital cartography for the basis of land management.

The digital cartography map can be used in various sectors of the government (economy, science, national defense and etc.) which will increase the business processes efficiency and improve the quality of public services.

Private sectors, job creation, productivity enhancement and other various effects can be expected.

C. Implementation of IAC and AWS

The actual end users by project are IAC, the 14 Regional IACs of the NGIS, and the Situation Centers (Emergency) for the state and regional governmental authorities. Therefore, IAC building objectives and AWS are improving the efficiency of the administration tasks using the results of the NGIS for the actual end users of the system.

D. Development of pilot system for NSCRP

Unified computer-based NSCRP will provide an opportunity to render public services by an interactive system "one stop shop". By developing pilot system for NSCRP, land/real estate information can be realized and statistical information of land use can be calculated as well. Policy information on land use development and monitoring system for land use status, standard, procedure and other technical element shall be established as well. It is important to develop one's own system rather than purchasing a ready solution (Table 1)

TABLE I. COMPARATIVE ANALYSIS BETWEEN PACKAGE- AND CUSTOM-BUILT SOFTWARE

Parameter	*Packaged Software*	*Custom-built Software*
Development period	Dependent on degree of customization agreed upon by vendor and Purchaser, deployment may be immediate	8 to 12 months, including detailed functional analysis
Degree of compliance with required business processes and rules	Depends on software, average ranges from 50% to 75%	Almost 100%

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Parameter	*Packaged Software*	*Custom-built Software*
Total cost of ownership	Initial license costs may be high; Maintenance fees will depend on the type of maintenance agreement;	No licenses required; Development costs usually lower than the license costs. If creation of an IT department is needed, then the cost can be higher. Delayed implementation may lead to high costs
IPR ownership	Vendor owns source code, including those developed during	Purchaser owns source code
Maintenance and upgrades	Maintenance and upgrade is more or less assured, but subject to payment of annual maintenance fees	Maintenance subject to agreement with developer or may be done by Purchaser's IT unit, when present; Upgrades are not usually available;
Flexibility	Limited to the extent that the vendor would allow	Highly flexible, as required by Purchaser
Integration with other legacy systems	Limited	Integration parameters can be included in the functional specifications and design of the system

E. The NGIS Standardization and Master Plan

The main benefits that can be gained from the standardization will be budget waste prevention and synergy creation. Standardization means establishing a common system and enabling a range of different users to share data or the system. This will provide efficiency and interconnectedness between projects and users.

Therefore, the standardization objectives are to define the standardization object, standardization method, standardization procedures and standardization organization. It is necessary to establish what will be standardized, which method will be used for the standardization, which procedure will be used for the standard and who will establish and define standardization.

IV. UNDERSTANDING OF THE TARGET SYSTEM

Based on the above project work scope, the concept diagram of the target system is shown in Fig. 1.

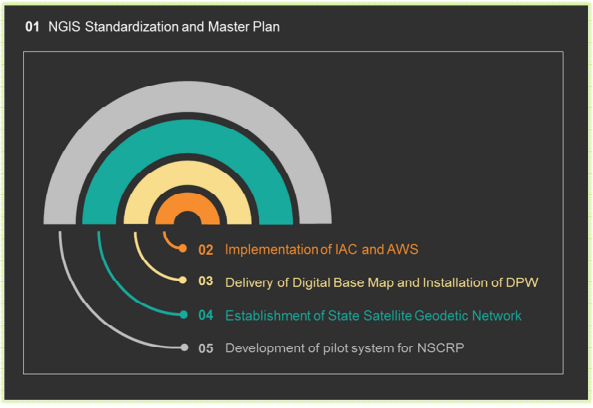

Figure 1. Conceptual Diagram of the Targeted System - Overall

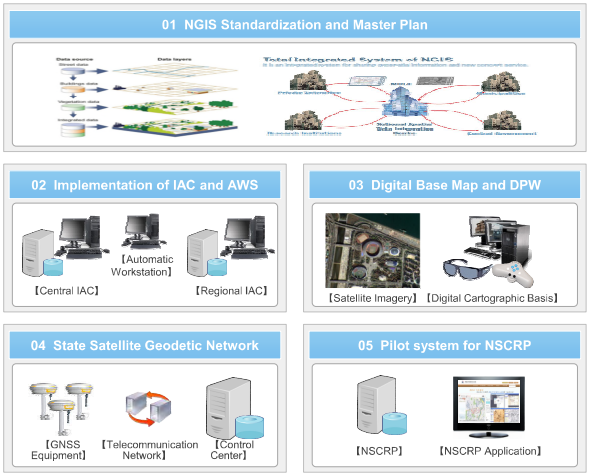

Figure 2. Conceptual Diagram of the Targeted System - Concrete

The first thing to establish within this project is the NGIS standardization. The satellite image based digital map can be produced with the standardized procedures and methods where it can be used for base map in various GIS applications. Accurate location information collected from GNSS CORS and digital map can be combined and integrated into a central information analysis center. Integration of all various GIS information can be collected, classified, refined and analyzed by the user of the Central IAC to create new contents and services which then results in service quality improvement of public services and the application of the digital map within the governmental level (Fig. 2).

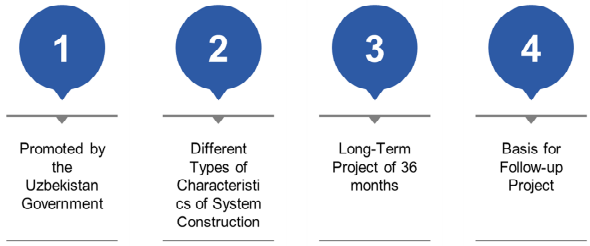

Figure 3. Characteristics of the project

For the successful project implementation, it is important to have a clear project understanding. Therefore, it is important to derive project characteristics based on the objectives and project background (Fig.3).

V. EXPECTED RESULTS

Project completion will provide the end users with convenience in the NGIS service. In addition, the end-user agencies will benefit from the higher efficiency in their business management through automation. In particular, the government will get increased control, management and monitoring ability by the rational use of the geographical information provided by the NGIS.

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A. *Scientific the decision-making by the use of centralized geographic information*

The NGIS supports the rational state policy required for development and land preservation and natural resources through the view of current status of the nation-wide geographic information and the expectations. Various methods for geospatial analysis will help the decision-makers to shape systemic and scientific policies with visibility and accuracy.

B. *Reduced processing time and efforts in public sector by the common use of geospatial information*

The sharing of gathered information based on the sole standard will enable the central IAC to oversee the full extent of data as well as the regional IACs to interact through interface.

The common use of the geospatial information among different government agencies enhances synergy in public sector and will no longer allow government spending for duplicated efforts to construct individual piece of information by agency.

C. *The economic effect creation by the introduction of value-added service*

Once gathered, integrated national GIS information will promote various GIS-applied sectors in the private sector. Small and medium-sized companies will obtain business opportunities to get involved in public and private sectors respectively.

Increased opportunities will generate technology development and the accumulation of GIS-related skills and knowhow in the business.

Value-added jobs new creation will contribute to the moderation of unemployment problem.

D. *Convenient service for end-users*

The digital cartographic base and the 3rd dimension information regarding land will be provided as the form of 'One-stop Shop' service. The geographical information inputted in the existing public service for citizens will greatly improve citizens' convenience.

The easy access and use of a geographic information will give individual end-users, private or public, to process the digital map to be fit for each one's purpose.

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