

Concept of the Polish Spatial Information System

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Abstract. The paper presents major aspects of the concept of the Polish Spatial Information System, reflecting results of investigations performed within the framework of the research project PBZ-024-13 “Concept of the Polish Spatial Information System” ordered by the Ministry of the Interior and Administration and commissioned by the State Committee of the Scientific Research. The project was conducted by the Institute of Geodesy and Cartography. The works within this project covered a period of three years – from July 1998 to March 2001. The main aim of the project was to propose a general concept of the national spatial information system (SIS), which would function as an integrated system, based on existing and future geographic information systems. The basic data for preparation of this paper were contained in the “Synthesis” of this project.

1. Introduction

Serious research works on the concept of land information system, known under code name TEREN had started in Poland in seventies. They were crowned with mature concept, of course taking into account technical resources of information at that time, favourably appreciated by theoreticians and experienced persons. However, concept was not implemented into practice on a broad scale. There were probably several reasons, between them lack of readiness from the state- in financing and material sense to carry proposal into effect. In eighties works on so called multitask cadastre had being taken, as a next stage of research. The same misfortune happened to this concept as to the previous one. Then in 1989 a conception of land information was created and numerous detail studies were elaborated. In 1992 the study “Land Information System. Modernization programme” was adopted as a basis for establishing of land information system. During the years 1994-1995 the SIS Programme Council worked out guidelines for conception, diagnostic and prognosis of the future system.

In January 1997 the Minister of the Interior and Administration commissioned an elaboration of SIS concept for Poland from the State Committee for Scientific Research (KBN). Project implementation was handed over to the Institute of Geodesy and Cartography (IGiK) as a winner of competition announced by KBN.

The project has been implemented in cooperation with Warsaw University of Technology, Academy of Mining and Metallurgy in Cracow, Warmia-Mazury University in Olsztyn, Silesian University as well as other units and individual experts and consultants. An advisory team comprised of the representatives of different Ministries has supported the project performance.

The works within the project were executed in six thematic blocks, comprising the following tasks:

- Analysis of demand for output spatial information;
- Analysis of operating and designed spatial information systems in Poland of branch and regional type from the point of view of their scope of contents as well as functional integration;
- Comparative analysis of the selected foreign systems in aspect of their utilization for SIS establishing in Poland;
- Analysis of structural and functional connections of the national SIS with public registers PESEL, NIP, REGON and with branch and regional information systems;
- Analysis of SIS relations with national statistics system as well as with cadastral system (land and buildings registration) on the levels: local, regional and national;
- Model of the structure and rules of function of SIS;
- Studies on methodology of the integration of information from different cartographic sources;

- Definition and choice of the invariable elements in natural information;
- Study on legal aspects of SIS. Elaboration of rules and procedures of the legal regulations for creation and functioning of SIS and attaching the features of documents, which will be respective in administrative and judicial proceedings of the output information;
- Study on internal structure, functional model and mutual relations of the SIS participants in Poland;
- Analysis and rational unification of the processes of receiving and updating of input information for the system and concept of its future modernization;
- Technical and functional standardization of SIS with taking advantage of the results of national research and foreign models, especially from EU;
- Economic analysis of the systems: costs, expenditures, terms of pricing, part of partners-SIS participants;
- Concept of system financing (taking into consideration prospect of its commercialisation);
- Simulation and testing of SIS functioning on the selected thematic layers;
- Elaboration of the final version SIS in Poland.

2. User requirements

The analysis of the SIS user requirements is treated by theoreticians as well as by pragmatists as a first stage and at the same times as a basic one for system design. Its results have decisive impact on the shape of future system, for characterization of SIS scope of objects and for definition of thematic range of data basis of the system.

The crucial result of research has been defining of scope of contents of SIS data base for the three levels of system. Scope can be enriched with other information required on local, regional and national levels.

Local level consists of 11 information groups, including data and information products. There are following groups:

- land divisions,
- land development and function,
- environment,
- technical infrastructure,
- social infrastructure,
- remote sensing materials,
- statistical data,
- inventory of ground and buildings(real estate cadastre),
- basic map of the country,
- geodetic nets (ground control),
- geodetic information (great-scale basic map, sheets indices).

Regional level consists of eight information group. There are as follows:

- land divisions,
- land development and function,
- environment,
- technical infrastructure ,
- social infrastructure,
- topographic data; TBD(topographic data base),
- remote sensing data,
- statistical data.

National level includes four following information groups:

- state, territory, organization,
- environment,
- society,
- economy.

Passing as from local level through regional level to national level participation of detailed information decreases or completely vanishes, on the other hand increases participation and significance of statistical information concerning economy, environment and society.

3. SIS Model

The research works have been related to the basic registers, which serve for original identification of the objects in public registers run by government and self-government administration and into structural and functional connections of the national SIS with branch and regional information systems. The following registers: REGON, PESEL, POLTAX and TERYT have been analysed. In addition to standardized characteristic the all elementary information potentially connected with spatial information was judged. Works resulted in a technical report, which includes detailed characteristics of those registers.

On the basis of carried out research works a concept of relation between SIS and cadastre as well as public statistics was presented. It was proposed to undertake by the decisive bodies some actions determining insertion of the permanent and legally fixed relations between public statistics and cadastre as well as SIS.

In the frame of works under the SIS pattern, an analysis of basic problems connected with creation and functioning of the spatial information systems was performed. An assessment was done on an impact of these problems on the condition of organized actions connected with SIS. It was proposed a classification of the SIS types, which enabled to determine part and an effect of particular system groups on the shape of spatial information infrastructure.

There were distinguished the basic groups of participants which take part in creation and functioning of the spatial information systems and their scope of activity and mutual relations were determined. Taking advantage of the said division, the scheme of information flow in typical target spatial information system was elaborated and subjected to functional analysis. The organizational scheme of the spatial information system was drawn up with distinguishing of the main government and self-government institutions taking part in creation, functioning, coordination and dissemination of the SIS. The proposal for establishing of the National Council for Spatial Information at the prime-minister level has been prepared. The main task for this institution shall be monitoring and coordination of the SIS development in Poland.

The main partners creating spatial information systems according to the SIS pattern are: creators of the spatial information, disposers, integrators, distributors, recipients, co-ordinators, propagators and trainees.

The crucial components to the conceptual SIS model are *SIS Centres*, which shall fulfil the role of spatial information integrators. At the SIS Centres possessing dedicated staff, there, apart of integration will have been taking place data processing. These data will have been made available to recipients and data distributors. In one of the considered organizational variants there is a proposal to base the SIS structure upon the geodetic and cartographic documentation centres: local, provincial and the central.

4. Informational and legal aspects of SIS

Legal frames are ones of the most important aspects of SIS surroundings. There are strong relations between legal rules and technical architecture. Legal acts can make easier design of technical architecture but on the other hand can also make difficult to find solutions fulfilling legal terms. For effective use of the future SIS are of great importance standards applied in the process of SIS design as an integrated information system, for modelling of spatial data and data bases structure, as well as technical standards making possible SIS efficient and secure functioning.

The following issues have been analysed:

- legal authorization of SIS consider in context of one legal regulation or insertion of entries into existing acts applied to collecting, updating and making available spatial data;
- legal definition of spatial data and information;
- methods of legitimising in legal regulations a circulation of spatial data and information and making decision, on the basis of these data, in administrative proceedings (legal and evidential force of an electronic document);
- legal basis for spatial data exchange within public administration units, between these units and between public administration and other subjects of social and economic life;
- legal basis for fees of access to spatial information.

SIS development takes place in the midst of economic and administrative reform courses as well as of legal system harmonizing with requirements of European Union. Including of European standards for domain of spatial information into Polish Standards is just one of the element of legal system harmonizing with European Union requirements. Since the 1 June 2001 the Commission for Standardisation Problems (NKP) no. 297 for GI appointed at the Polish Standardisation Committee will be responsible for adaptation of European standards. There are also questions connected with protection of copyright (intellectual ownership), privacy protection and unrestricted access to government documents - all of them should be also harmonized with European law.

Studies revealed that one of the essential problems to be solved during creation of the national SIS was definition of the uniform cartographic projection for great scale maps for the whole territory of country. The accepted projection should be complete one i.e. it should include procedures for computation of plane orthogonal coordinates x, y from coordinates B, L and inversely as well as procedures including distortion and projection reductions which on the present stage of informatics technology are nor any longer a barrier for applying them. The team elaborated as a proposed solution a concept of Gauss-Kruger projection in wide projection zone.

The national spatial reference system was introduced through decree of the Ministers Council dated 8 August 2000. In decree there are defined: geodetic reference system, elevation system, four-zone Cartesian plain coordinates system "2000" for large scale maps and plain orthogonal coordinates system "1992" for maps at scale 1:10 000 and smaller.

5. Final concept of Polish SIS

The results of research in SIS functioning indicate that there are available technical sources indispensable to data processing (collecting, archiving, making access and interchange) such as computer and telecommunication equipment as well as software in domain of databases, tools systems and applications. Professional knowledge of the staff is sufficient. However, too little attention is paid to proper and efficient implementation and organization as well as to applying of adequate legal instruments, which enable to preserve cohesion of the all SIS and not making barriers in the cooperation with local or branch systems. Once designed and agreed SIP infrastructure should be consistently implemented and rigorously enforced. The same is applied to standardisation, metadata issues and data replication in derivative databases. Explicitly reliable institutions such as the National Council for Spatial Information, national and regional spatial information centres and local and branch SIS centres should come into existence. SIS infrastructure should be design in detail, especially structure and organization of management on all levels, with detailed definition of the parts of all participants from public and private sector.

Simulation and testing of SIS functioning on particular levels and on examples of various layers confirm rightness of assumption adopted in conception of the system structure.

The final version of SIS concept in Poland just now elaborated was based upon the results of research made in all thematic blocks of the project and preceded by simulation research and testing in real environment. Conceptual works on the spatial information system in Poland are parallel in time

with economic and administration reforms as well as with harmonizing of our judicial system with EU standards. For this reason many solutions in the concept have some variants.

Spatial Information System is the whole of undertakings which enable collection, gathering, processing (including integration, updating and analysing) and making access to spatial information (SI) with the broadest (possible on specific stage) using of information sources that is computers, software and tele-information nets. SIS enables the fulfilment of demand on SI for public administration, local government, public services, businessmen, investors and citizens. SIS will be a component of state information infrastructure, essential for its proper functioning.

The concept essence is integration of spatial information on the levels: local (community, settlements, districts), regional (voyvodships or province) and national. Concept comprises system structure, its architecture, legal regulation and terms of financing. Concept respects demands of wide range of users between them the main is public administration. System will be coordinated with other existing information systems (public registries). The base for the system on national level will be national data base of general-geographic data with information level corresponding with cartographical elaboration at scale 1: 250 000 and smaller, just created at Head Office of Geodesy and Cartography.

Basing on the results of economic analysis and national and foreign experiences it is recommended:

- Building and implementation SIS Centres to base on regional agreements of implementation participants (agreements or undertakings should define benefits and mutual commitments of participants);
- To make use of joined SIS Centres and centres of geodetic and cartographic documentation (ODGiK) as elements of National Cadastre System (KSK);

Taking into consideration that cadastre data are considered as a one of more important component of spatial data and with regard to necessity of building KSK and SIS data bases first of all on local level - it seems essential to lead to using by both systems the same information infrastructure (servers and data base software as well as Internet servers and application software) and organizational infrastructure which secures service of information infrastructure.

- Taking advantage of LIS/SIS past experiences and infrastructures existing at institutions participating in SIS implementation.

It is assumed that financial sources for foundation of SIS in Poland shall be received from own resources of institution participating in implementation as well as from central funds (budget subsidies) or regional funds. Commercialisation of SIS running should be anticipated for increasing its implementation with special regard to outsourcing.

SIS implementation should be carried out in close cooperation between the National Council for Spatial Information and the Group for Elaboration and Coordination of the Government Programme of the Cadastral System Development attached to the Prime Minister.

It is advisable establishing of national, inter-ministerial council for SIS and undertaking by competent scientific unit, for example Institute of Geodesy and Cartography (IGiK), implementation consultancy and coordination of research and development works on SIS domain.

The following stages of SIS implementation in the next 5 years(to 2006) are being proposed:

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| 1. Elaboration of the project for information system of national data base of general-geographic data along with subsystem of feeding and up-dating of data base and access to data | 2001 |
| 2. Publishing of manual on SIS building, implementation and running | 2002 |
| 3. Preparation of legal acts indispensable for starting with SIS building | 2002 |
| 4. Elaboration of the project of SIS implementation on national, regional and local levels (including selection of pilot centres). | 2002 |
| 5. Creating of national general-geographic data bases and metadata bases. | 2002 |
| 6. SIS implementation on the national level. | since 2003 |
| 7. SIS implementation on regional levels at pilot centres. | since 2003 |
| Correction of implementation project (including working out of model | |

- solutions for regional level).
8. Implementation of model solutions on regional level. since 2005
SIS implementation on local level at pilot centres.
Correction of implementation project including working out of model solutions for local level.
 9. Model solutions implementation becomes widespread. since 2006

6. Summary

The basic aim of Spatial Information System in Poland is the improvement of public administration on different levels through implementation of multi-branches, thematically and territorially wide system comprising of all spatial data, as well as securing of information essential for building, maintenance and strengthening of spatial and ecologic orders which constitute real condition for permanent and balanced development of the country. SIS building in Poland will make up a significant contribution into building of information society, as an indispensable condition for achieving in the future status of society and country, which is based on knowledge management.

Results of works executed in the frame of project are foreseen to be implemented by Ministry of the Interior and Administration, which ordered the project. Local government organs may use them also on local and regional levels. Of special significance is undertaking activities heading towards determination of organizational and legal frames of the future SIS, proposed in the concept of spatial information system in Poland including: establishing the National Council for Spatial Information, introducing legal regulations for the system- of internal and external character, adopting rules for SIS financing.

Implementation of project results shall contribute to accelerating of the processes: collection, processing and distribution of spatial information data, thus to rationalization of users supplying with spatial data, quality improvement and securing of spatial data to be updated, decreasing of the whole costs connected with collection and processing of spatial information. It will effected also in unification of existing and new founded spatial information systems which allow to rationalize the processes of modern state management. Results of the work shall be publicized in the form of handbook, which shall assist: building, implementation and running of SIS. Results shall be put into special publication too.

Solutions proposed in the concept are in accordance with strategy of informatisation development, including tele-informatics, at government administration and are justified by resolution of Polish Parliament (Sejm) , dated 14 July 2000 I the matter of building basis for information society as well as in Council of Ministries document, dated 28 November 2000: "Aims and directions of information society development in Poland".

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