Usage of Geoinformation Technology by the Police of the Czech Republic

David Janiurek
Ph.D. student at institute of geoinformatics, VSB-TU of Ostrava

Abstract. Usage of Geoinformation Technologies at the Police of the Czech Republic.
One of the ambitions of ongoing reform of the Police of the Czech Republic is the reduction of Information systems (IS).
It assumes only a few complex IS that will be able to ensure all necessary information to perform services on the principle of „one insert - one question“ and offer an appropriate user comfort at once. At the same time it is necessary to further work with such obtained information, carry out data analyses and display it in geographical context (e.g. digital map) including interactive visualization.
One of other ambitions of the reform is to use computer techniques during the service in the field. This implies particularly the need for unification of geographic products and uniform user environment for working with data.
Another necessary condition for modern police force activities is the high level of analytical support of performed tasks and activities that requires products and tools enabling provision of such support.
Equally important is also the visualization and sharing of certain data or analysis results with local authorities or directly with citizens. The purpose of such sharing is the effort to have a public-service-oriented police work i.e. community policing and provision of visualized data - map layers (e.g. on web pages) of consequences caused by crime, resulting damage and potential threats.
IS provide the police with an exact overview of the security situation and public order in the community. This summary should include documentation (e.g. map outputs indicating problematic or dangerous places, places where there is a repeated crime) to provide representatives of government with an effective tool for ensuring public order in the community, including cooperation between the state and municipal police.
The fundamental prerequisite for the provision of these tasks is the design and subsequent implementation of a single IS which meets above-stated functional requirements. Such designed concept must fulfil not only the needs of standard police activity resulting from individual levels of Police CR management, but also it has to be incorporated into activities resulting from the Integrated Rescue System of the Czech Republic.

Keywords: police, information system, GIS.

1 Introduction

Within the issue of geographic information systems, the Police of the Czech Republic has created a working group for the coordination of geographic products usable in crisis management and for the operation of the Police CR. The working group performs activities such as unification of geodetic reference systems and national mapping works mandatory in the territory of the Czech Republic at the Police CR or formulation of geographic products utilization for the performance of police duties in the matter of internal order and security (especially to develop crisis plans and documentation of Integrated Rescue System including their utilization and to meet requirements for securing the defence of Czech Republic against outer attacks and during the state of war).

One of the ambitions of ongoing reform of the Police of the Czech Republic is the reduction of Information systems (IS).It assumes only a few complex IS that will be able to ensure all necessary information to perform services on the principle of „one insert - one question“ and offer an appropriate user comfort at once. At the same time it is necessary to further work with such obtained information, carry out data analyses and display it in geographical context (e.g. digital map) including interactive visualization.

2 Preparation of GIS at the Police CR

One of other ambitions of the reform is to use computer techniques during the service in the field. This implies particularly the need for unification of geographic products and uniform user environment for working with data.

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The fundamental prerequisite for the provision of these tasks is the design and subsequent implementation of a single IS which meets above-stated functional requirements. However, to share data within the system, including data exchange with other public administration authorities, it is necessary to ensure quality interconnection of all components.

IS should contain these fundamental parts:

- Applications focused on evidence task whose target is to offer tools for the most effective collection of information on relevant activities or events. Examples of usage are implementation plans of safety precautions, evacuation plans or information on available or total forces and resources of individual police departments.
- Applications disposing a simple, well-arranged and easily controllable user interface and definitely heading towards thin web clients, eventually light desktop clients. Such solution must have short-time responses to user requirements. Primarily it must enable localizing the event location in the area on the basis of input information on location. Such information can be a coordinate, address, communication kilometrage, closeness of orientation points etc. The application should provide general information on the state of event solution, including dynamic visualization of location of forces and resources in the area along with basic information on them. The navigation of forces and resources should give support by dynamic suggestion of optimal route to the event location and especially information for the support of decision-making (managerial outputs incl. statistical evaluation).
- Applications of a more sophisticated nature, with “strong” functions of geographic information system (GIS), heading towards heavy clients, eventually to desktop clients. In this case the response time is no longer a crucial factor. Above all, it is a possibility to implement overlay operations (e.g. a polygon depicting the area of hazardous material spread, layer of buildings), network analysis (plans of reinforcement of forces and resources), 3D modelling (e.g. floods, hazardous material spread, visibility analyses), statistical functions. Another necessary part is represented by editing functions and tools for data warehouse administration. Also it considerably substantiates the issue of analytical criminality mapping phenomenon [3], which has been lately represented by the analytical research in the area of crime repression using the GIS. This process uses the combination of common analytical and criminology methods together with spatial context of criminality occurrence.

These introduced parameters and their high level represent the objective of the design and implementation of GIS within the Police of the Czech Republic.

The presumption is that following the analyses of information needs of individual services and possible connection to existing IS of Police CR and public administration it would be possible to create such IS which will efficiently retrieve, save, analyse, update, transfer and view all types of geography-related information. Such usable data and related analytical or operative services will support the activity of individual executive units, operational and crisis management, planning and evidence.

Position of GIS at the Police CR should be also perceived in a wider context. That includes especially the compliance with the European INSPIRE Directive [4] which establishes standards for geoinformation technologies within the European context. It is necessary to mention the currently running European project called “Emergency support system“(ESS) [5,6] which represents the cooperation of foremost world leaders in the security field regarding the scientific research and development and specialized companies in the field of IT and project management. The objective of the ESS project is to conduct a research and create a transnational application which will be capable of real-time monitoring of relevant data flows necessary to support decision-making during emergency events.

3 The Role of GIS at the Police CR within IRS

The basis for the design of the GIS concept at Police CR should take into account its role within the Integrated Rescue System (IRS). IRS composes of three base parts (Police CR /PČR/, Fire Brigade Rescue Corps /HZS/ and Medical Rescue Service /ZZS/) whose trouble-free communication and data compatibility are crucial for successful solution of common and crisis incidents in the field of security and civil protection with usage of geoinformation support. [7]

The general concept should assume the creation of common data base (F.E. Data Portal of Security Forces – DPSF) which would represent the source of reference geographic data for all above-mentioned forces. These forces will also participate in maintaining the up-to-date state of geodata, eventually in creating new layers whose availability could be utilized by other forces when solving problems.

This data base would represent a base for hierarchic structure of Geinformation Support of Police CR activities (GIS PČR). The structure of GIS PČR design fully reflects the hierarchic division of the organization into central (national) and regional units and further to other sub-units within Territorial Departments and District Departments

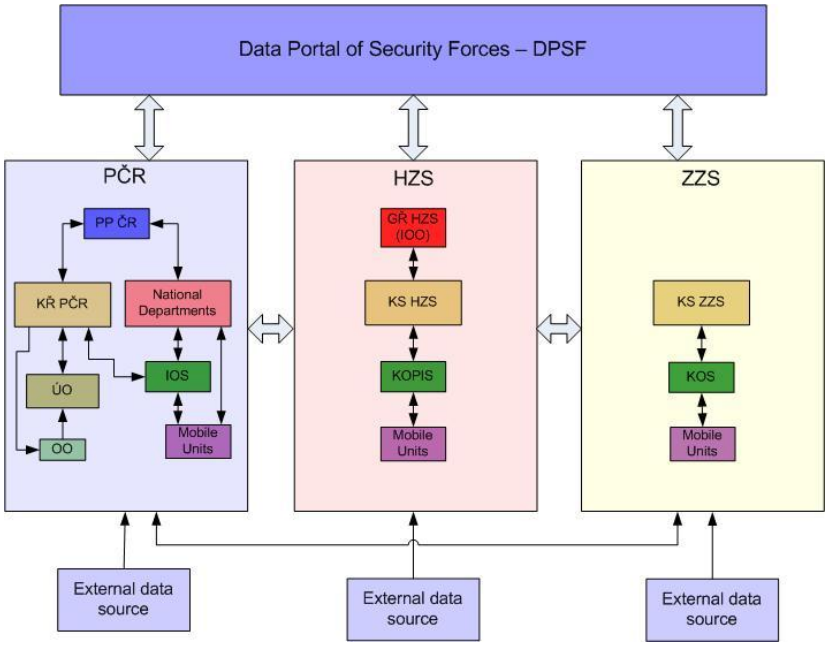

Fig. 1. General concept of the data flow design within base parts of the IRS (abbreviations in the text).

4 Design of GIS concept at Police CR

In compliance with the contemporary reform, a few internal seminars and workshops were held at the Police of CR, also, interviews took place across all services at the Police CR and their purpose was to map and analyse internally all demands [16] on the geographic information system which would meet the requirements across the Police CR including eventual integration to existing IS. Especially the interviews proved their benefits compared to other types of observations, namely in the well-arranged assembly of relevant data from many different sources.

On the basis of users' requirements it is suitable to consider the Central data warehouse PCR to be the heart of designed system and it should represent the highest architecture level. This data warehouse is suggested to be physically placed in the building of Police Presidium in Prague and redundant mirror copies of databases should be further distributed to designated special workplaces in one or two selected Regional Directories. This will ensure high resilience and availability of data warehouse in case of emergency situations. If some of its part stops working for any reason the operation will be continuously taken over by other parts. It is suitable to create an administrative station (GIS administrator) consisting of IS specialists and GIS analysts to maintain the central data warehouse.

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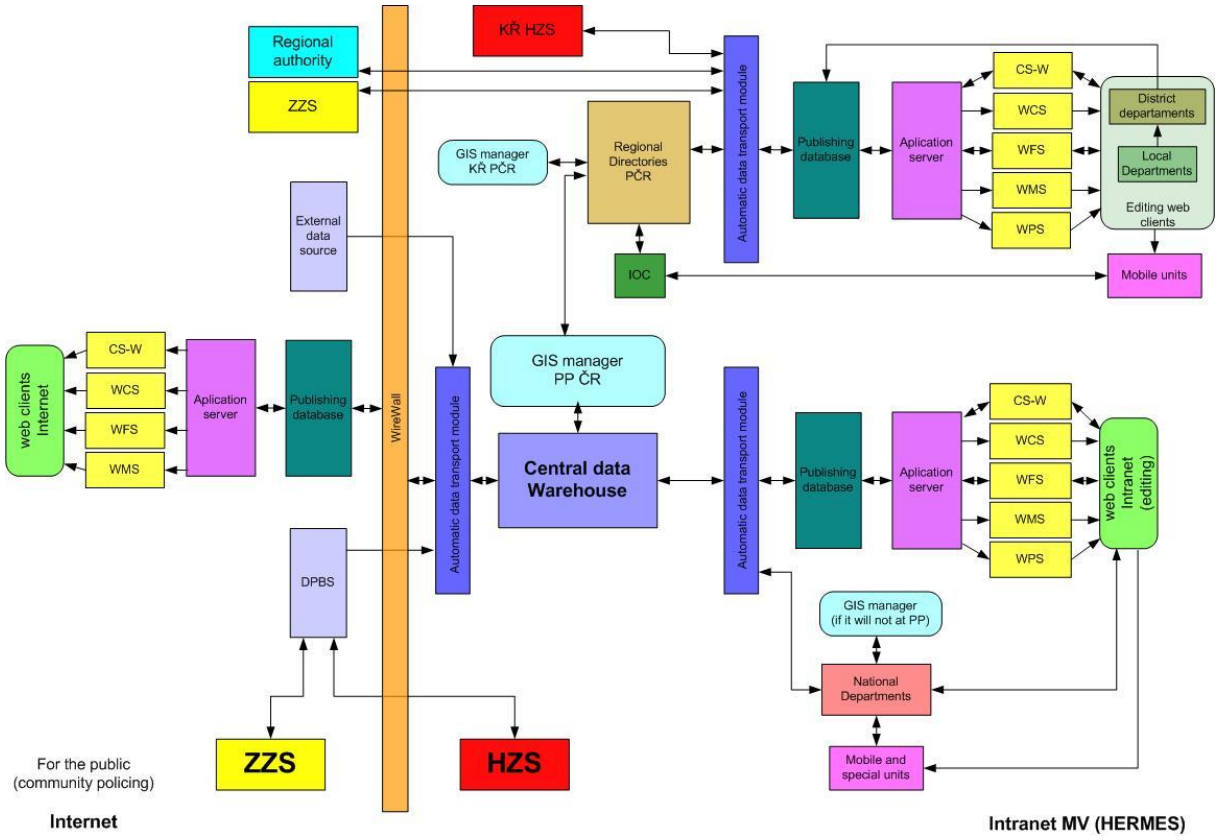

Fig. 2. Design of GIS data flows in and outside Police CR (abbreviations in the text).

4.1 Central data warehouse of Police CR

Central data warehouse is designed to provide following services:

- Map service of Police CR for the public (in the form of WMS, WFS, WCS, CS-W), in the form of public map portal. The service will enable publishing data on police activities for general public and organizations (f.e. cartographic statistic information on criminality in regions etc.)
- Map service of data warehouse of PCR for internal use of PCR departments (in the form of WMS, WFS, CSW, WPS, CS-W). This service will provide geographic information by

authorization and user rights of individual departments, persons or mobile units accessing from internal network of the Ministry of Interior. It may include e.g. display of the set of descriptive information (SDI) and set of geodetic information (SGI) of the Real Estate Cadastre with the option of combination with other map data.
- Direct access and automatic data synchronization with local databases and central database for Regional directories and Departments with national sphere of action.
- Geographic support of Crisis staffs.
- Metadata catalogue services with hierarchic links to internal and external data sources.

Automatic transfer and harmonization of data must enable regular uploading, transformation and saving of data so that data distribution within organization is not interrupted. According to INSPIRE requirements it must meet the condition that a software error or data update must not cause a portal failure for a period longer than 2% of total operation time. Access to current data and databases incl. administration and maintenance will not be limited. Upload of data will be possible from one (e.g. Integrated Information System) or more sources. Upload, data optimization for publication or release and saving of processed data into target structures will be possible to configure in administration.

4.2 Regional Directories and National Departments

Departments with national sphere of action and Regional Directories of PČR (KŘ PČR) are suggested to be linked to the Central data warehouse.
The task of Regional Directories will be provision of following services:
- Map service for District Departments and Local Departments in respective region (in the form of WMS, WFS, CSW, WPS, CS-W). This service will provide geographic information by authorization and user rights of individual District Departments and Local Departments, persons or selected mobile units (f.e. map support of service cars) accessing from internal network of the Ministry of Interior (MV).
- Automatic data synchronisation between local databases of TD and database of Regional directory
- AVL service – displays the location of all monitored service cars in the region (according to authorisation)
- Geographic support of integrated operation centres (IOC) which will directly affect the support of mobile units and other possible patrols in the field. They will provide data support incl. navigation services.

The task of Regional Directories will be to ensure following services:
- Prepare data and supervise the synchronisation with Central Data Warehouse
- Automatic data synchronisation with databases of Territorial Departments

Departments with national sphere of action will ensure data synchronization between their databases and Central Data Warehouse of PCR. For their internal use they will provide geographic and localization support for selected mobile and special units.

4.3 District Departments

District departments (ÚO) should be equipped with editing clients or higher analytical tools to support data processing. In case of alphanumeric data in a direct way or in case of spatial data with WFS service, data will be migrated to databases of relevant Regional Directories. Metadata record will be possible to use or provide with CS-W service. Geographic support on this level will be ensured with WMS, WFS, WCS and WPS services.

4.4 Local Departments

Local departments (OO) should be connected to their relevant District Departments only in the form of distant access to Local Department databases by help of light web and editing client for

entering new information heading to databases of relevant Regional directory. Web clients (www browser) will also ensure geographic support for district departments. Such support will be ensured with WMS, WFS, WCS, WPS and CSW services for metadata display (same as for District departments).

The task of Local Departments will be to enter new geographic information retrieved in the field or to edit existing geographic information when changed.

4.5 Mobile units

Mobile units represent a special group of users, especially due to the need of their integration into data flow structure with respect to utilizing the mobile character of data communication from and to the field. Geographic support of mobile units in the field is provided by mapping services of Regional administration or Department with national sphere of action (its own mobile units) with assumption of cooperation with data set saved in the memory of a mobile unit.
Data transferred from mobile units (location, status, text records) should be primarily stored at the Regional Directory or Department with national sphere of action while the data and communication model will enable promotion of this data to District and Local departments in real time.

5 Conclusion

The design of suitable GIS architecture within Police CR is therefore a fundamental step which will reflect not only in modernization (possibility of quality graphic sharing of information which Police CR disposes and which are – from the security and public order point of view – relevant to local government organs and especially to citizens) but also in future reduction of economic costs directly related to performance of essential duties of the Police of the Czech Republic.

Among several fundamental goals that could be seen in the implementation of GIS at the Police CR it is the access to relevant data and metadata through mapping services for different user groups, effectiveness of existing work flows by means of inserted graphic component, centralization of spatial data (unification of usage of both internal and external data sources) and, above all, the transparent background for decision-making and command.

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