

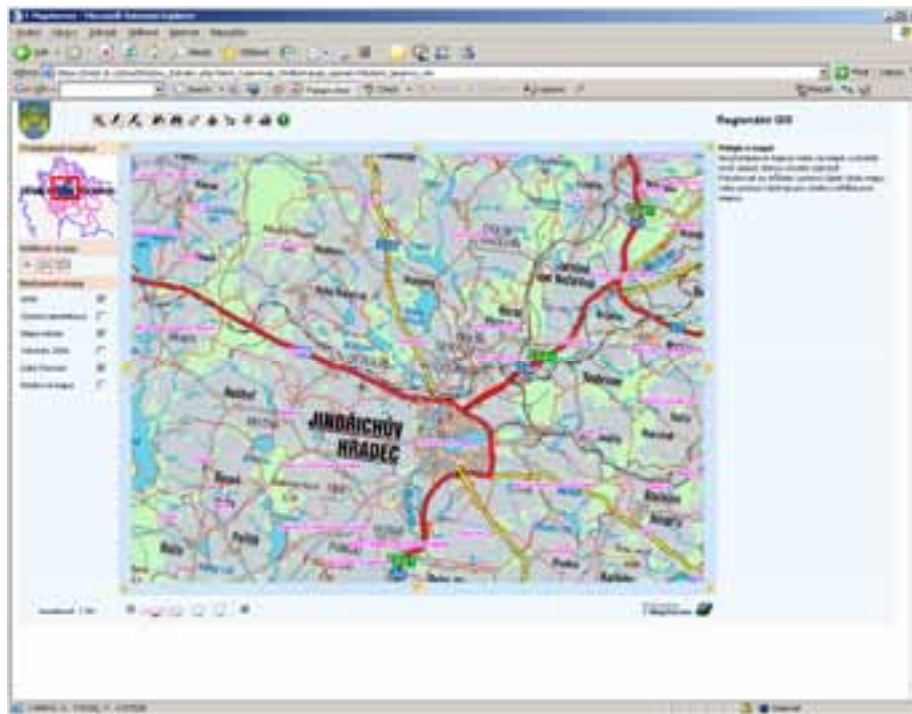
## GIS for the Region of Jindrichuv Hradec (Czech Republic)

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### Abstract

Geographic Information System for the Region of Jindrichuv Hradec was established as a common project of 26 small villages/towns and the city of Jindrichuv Hradec itself. The aim of the cooperation has been a creation of unified system (i.e. software and geographic database) for the entire region which is used by subjects of public sector (i.e. both autonomous (self-government) and state organisations). The system offers an access to basic GIS layers (cadastral map, maps of medium scales, orthophotomaps, address system, utilities etc.) and to many other thematic data (urban planning, environment, transport, municipal properties etc.). The GIS has also proved its usefulness in generally popular fields. It provides touristic and cycling tracks maps which are intensively used in this peaceful and picturesque region by general public. System is constantly being updated and amended with new spatial datasets. The whole project demonstrates that combination of good ideas, sufficient funds and proper software can bring a result - quality GIS.



Pict. 1 – Basic light client for public

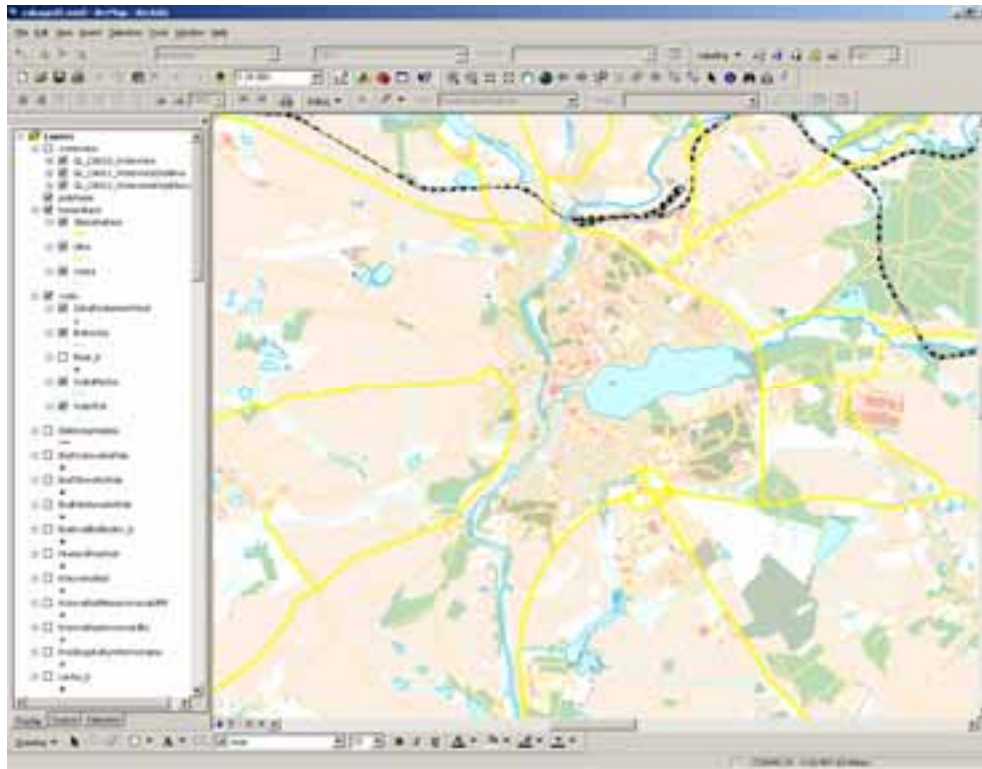
## Introduction

Solution for Regional GIS – realised by local authorities and T-MAPY company - introduces a complex system of applications which has the ambition to cover all GIS tasks identified in municipal and regional environment for all groups of users with different levels of requirements and knowledge of GIS technology. Being based on ESRI technology, the system is widely open, extendible and fully supports the integration with other parts of Municipal and Regional information systems as they have been formed in the Czech republic since 1990.

Classic desktop is extended by web solution with usual web browser (MSIE, Mozilla) as an user environment. Selected technology provides the integration of information system into a user's Intranet/Extranet, distant accesses from Internet and also a direct editing of selected information on external web pages of a user.

The system design and development is lead by the endeavour to solve – among others – these problems:

- a) quality data base for GIS
- b) system of GIS applications which support the widest area of tasks on multiple user levels
- c) integration of GIS with other applications of Regional and Municipal Information System



Pict. 2 – Overview of city of Jindřichův Hradec – basic project in ArcInfo environment

## Data

There has been a great interest dedicated to data creation, capturing, maintenance and administration by the authors of the system. For particular data subsystems we dispose of :

- methodologies
- data models
- SW tools for required geoprocessing (for necessary controls and conversions etc. )

All the data used in Regional GIS project are generally created by two basic methods:

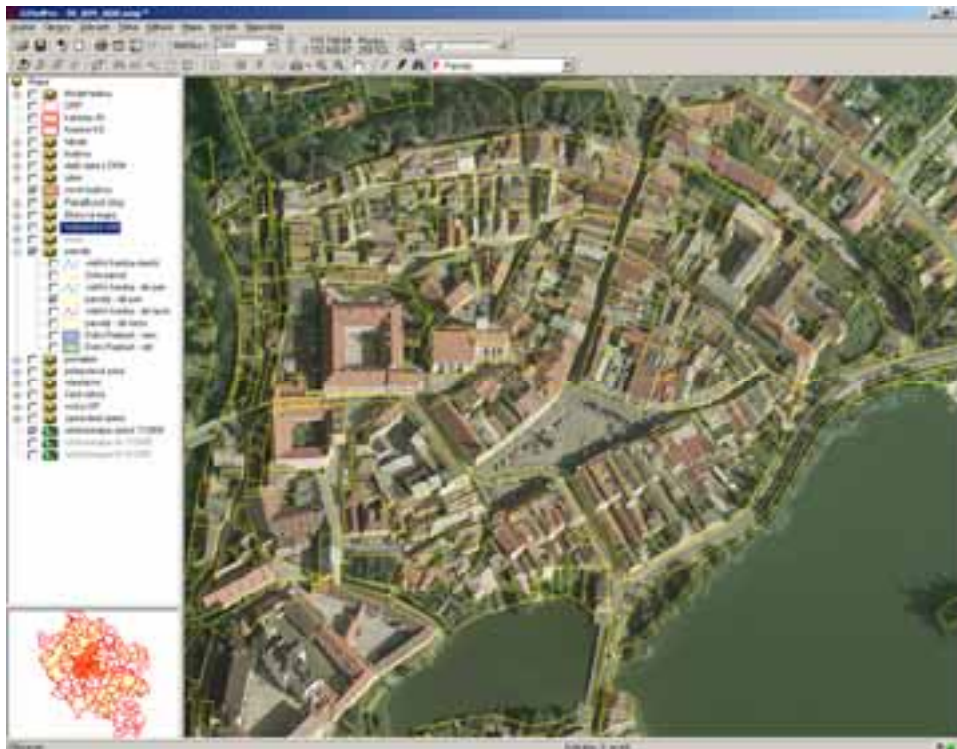
- internally (i.e. by internal capacities of the office or via delivery of external partner, but according to our methodology and into our data model)

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- externally (data are primarily created by the third side and therefore it is necessary to offer respective tools for data control and conversion before their implementation to Regional GIS)

It is necessary to mention that real beginning of GIS in Czech republic was bound with great changes in central and eastern Europe after 1989. It means that the end of 20th century was connected with establishing of all important geographical databases but unfortunately we cannot say that this process is finished, although for most important cases – for instance digital cadastral maps - it had been planned. One of the consequences of this situation (great data hunger) has been provisional data creation and capturing, i.e. many institutions and companies have not waited for “official” data (created and maintained typically by state authorities) and have started to create these data by their own way, large datasets have been captured without existing standards. Proper solution of these problems has required special attention to respective quality-control procedures and their results.

In this situation it is our greatest interest to harmonize our methodologies and data models for **internally** created data with existing or emergent rules, standards etc. We implement **external** data on the basis of successfully finished controls and conversions, i.e. procedures supported by the set of GIS tools. It is important to mention here that – of course – there is a clear trend to use all the modern trends (at first WMS/WFS/WCS, generally SOA etc.) in both positions (as a consumer and as a publisher), but we have been influenced by several laws and rules, which directly require to collect data at the level of some territorial units – regions and so called municipality with extended “sphere of authority”. Each unit of this kind is going to be responsible for so called “spatial analytical ((geo)data) basis” – i.e. quite massive geodatabases which are not able to be substituted by direct (for instance WMS/WFS) type of access. Regional offices will have (since 01/01/2007) the duty to collect and guarantee this data, use them for quite complicated analysis and then directly for spatial planning (what means also the ability to cut out data from selected subarea in any moment, print them at the highest level in large format etc. – and in all these tasks we – at this moment – do not want to rely on “remote access”).



*Pict. 3 – Ortophoto and digital cadastral map in GISel - MapObjects based desktop client*

We try to create, capture and maintain generally all the data which are identified as necessary for supporting our activities and at least defined in our conceptual data model which is then developed (in CASE) to detailed level and as a final product (data model) able to either be imported to ArcSDE

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geodatabase or to be used as a source for definition of file structure. What kind of data are we oriented at ?

- basic reference data
  - digital cadastral map (originally in scale 1:1 000, 1:2 880)
  - digital technical map (in accuracy corresponding to scale 1:500)
  - spatial identification (i.e. address points, map of house numbers etc.)
  - ZABAGED (digital equivalent of basic maps of Czech republic 1:10 000)
  - DMU 25 (originally digital equivalent of 1:25 000 maps of Czech Army)
  - orthophotomaps
  - other maps of so called medium and small scale (1:50 000 – 1:500 000)
  - digital terrain model, hypsography
- thematic data
  - living environment
  - transport
  - utilities
  - industry and agriculture
  - spatial planning
  - culture and tourism
  - emergency
  - etc



*Pict. 3 – So called generalized block map – fundament of great scales city plans*

## Software solution

Technological part of SW solution can be characterised by these items:

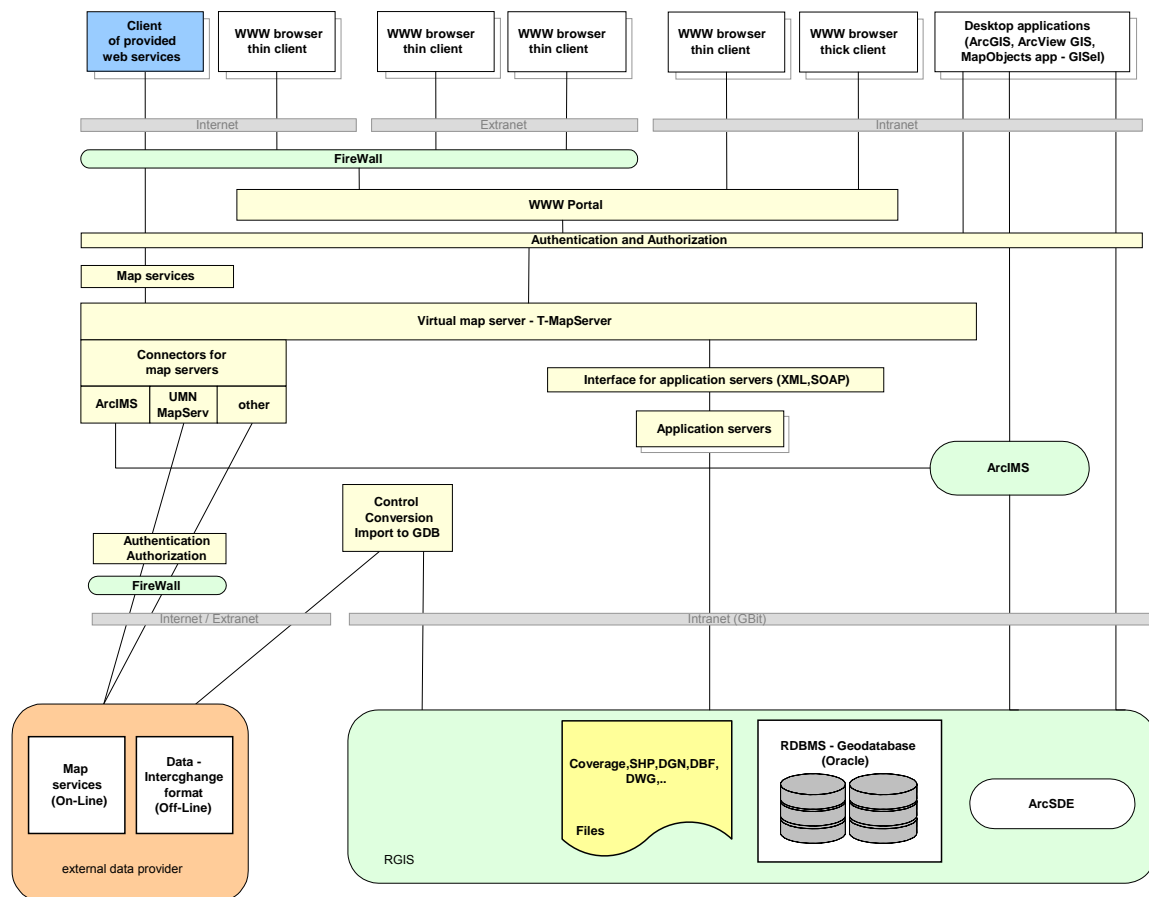
- a) Usage of ESRI technologies as a foundation of all the system
- b) Standards
  - data formats
  - communication methods and services
  - software standards (common, OpenGIS, ..., SOA, ...)
  - standards coming with European projects (GINIE, ESDI, ..., INSPIRE)

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- c) Open and scalable architecture, applications and technologies adjustable according to needs of users and different user levels
- d) Open and published interface for all applications
- e) Interoperability/ communication and integration with other part of Regional IS components

**Architecture of the system** is designed with respect (not only) to these conditions:

- a) usage of ESRI ArcGIS concept
- b) support of formats of larger number of “greater” producers (not only of ESRI, but also of Bentley (MicroStation dgn) etc.
- c) well-balanced support of two basic directions in applications development, i.e.
  - **desktop** – by quality desktop clients and extendible modules
  - **web (inter/intranet)** – by html/Java clients to respective MapServers and extendible application services



*Pict. 4 – Basic architecture of the system*

Basic structure of user applications is developed in a narrow connection with data subsystems which are described above:

- sophisticated support of work with digital cadastral map
- support of work with digital technical map
- spatial identification
- urban planning documentation
- etc. ...

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The **applications** have been developed for both desktop and web environment. It is obvious that current possibilities of desktop are still higher than those of web solution if we are speaking in terms of ArcIMS (and open source MapServer) versus (oldies but still goldies) MapObjects or ArcObjects (ArcGIS Engine) based applications, when number of users of higher ArcGIS clients (ArcView – ArcInfo) is naturally limited. According to our tendency to offer various subversions of one application the web version is - of course – used as a base for the widest part of users, rising needs are supported by (sub)versions developed on the desktop platform. We do not think in terms of the highest ESRI concepts (i.e. ArcGIS Server) now but we suppose that in next several years we will be able to reach this technology (which is not real now for several reasons including infrastructural).

**Integration** with other parts of Regional information system is one of the most important goals in our software development. It is especially important in case of integration with large SW packages, which are offered by many SW producers in the Czech Republic. The very basic applications of this type integrated with our GIS are:

- registry of parcels/ real estate
- registry of spatial identification (addresses, street names etc.)
- registry of inhabitants
- registry of economical subjects
- systems which directly supported internal agenda of municipal offices of our regions

### About JINDRICHUV HRADEC CITY

The city Jindrichuv Hradec is situated in the south of the Czech Republic, 60 kilometers from the county city České Budějovice and 20 kilometres from Austrian borders. Southeastern Bohemian has its specific charm. Intersected with creeks, rivers, and countless lakes over the entire region, the countryside rises from the flatlands in the west towards the wooded hills known as the Czech Canada, as if wishing to show off many beautiful phenomena of the nature on a tiny piece of land at once. Situated amidst all the natural beauty is a genuine gem:

- A town overlooks the Vajgar Lake, whose gorgeous panorama of a Gothic castle and Renaissance chateau are reflected in the water like in a mirror, as though a silent witness of the bygone glamour of its former aristocratic inhabitants.
- A town on the 15th meridian, with the Assumption of Virgin Mary Provost Church and a massive tower with a view of the entire region.
- A town which used to be one of the largest towns in the Kingdom of Bohemia until the middle of the 17th century.
- A town whose historic center has been declared a historical conservation area for its exquisite historical, architectural, and cultural virtues.
- A town sought out by countless tourists, both from home and abroad, for its unique points of interest and clean environment: a town of the " Golden Rose " : Jindrichuv Hradec.

It's total area is about 74 km<sup>2</sup>. It has over 23 000 inhabitants. The town was founded in 1293 and until today there have been built many sights and interesting buildings – particularly in the historic centre, among others the castle and the chateau. Jindrichuv Hradec has a large cultural tradition, which one nowadays continues with the opera ensemble. There is a sport tradition as well – for example rowers from Jindrichuv Hradec (Václav Chalupa and others) have achieved many successes in various competitions. As for industries - after the revolution in 1989 many companies started their business in building industries, business and services. There is the Faculty of management of the University of Economy in Jindrichuv Hradec.

One of the priorities of town Jindrichuv Hradec is using modern information technologies, which leads to the improvement of information services provided not only to the inhabitants and visitors of the town, but also to business subjects and other institutions. In the development of information

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technologies GIS is largely utilised. The official internet page of the town office currently provides map projects, the plan of the town, the territorial plan and the map of sights.

### About T-MAPY company

T-MAPY was established in 1992 and has been fully focused on comprehensive services provision in the sphere of information and geoinformation technologies. It has been a reliable partner for its customers who can expect comprehensive projects implementation from offer or project elaboration through data and software supply and "plug-and-go" assembly to a long-term service and consultation support. Final information systems solutions can help the end users to make their activities in their decision-making process easier and more effective and to orientate more easily in the existing information "chaos". You can find more information on the company's web pages - [www.tmapy.cz](http://www.tmapy.cz). Live presentations of implemented projects can be seen on [www.tmapserver.cz](http://www.tmapserver.cz).



*Castle in the City of Jindrichuv Hradec*

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