INTERNET GIS and INTERNET MAPPING

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ABSTRACT

The terms Internet GIS and Internet Mapping are defined after the definition of the base terms as Information Technologies, Geographic Information Technologies, Information Systems, GIS, and Internet Maps. A parallel between GIS and Internet GIS is done and the differences are indicated.
The Internet Maps are investigated. They are classified at two levels: the first level consists of static and dynamic maps and the second level contains non-interactive maps and interactive maps.

Definition and technical realization

To give a definition and description of the terms *Internet GIS* and *Internet Mapping* it is necessary to define some related basic terms as *Information Technologies, Geographic Information Technologies, Information Systems, GIS, Internet Maps*.
The term ***Information Technologies*** is a sum of terms itself. The information technologies are "technologies for collating, saving, processing, transferring and presenting of information in different forms". What concrete belongs to the term Information Technologies modifies in time as new necessities and requirements appear which leads to development of new products and services.
Geographic Information Technologies (GIT) is part of information technologies that treats space related information. *Geomatic* and *Geoinformatic* are applied with such meaning as *Geographic Information Technologies*. Many classic geographic related sciences and technologies have connection with GIT, for example:

- Surveying
- Cartography
- Photogrammetry
- Remote Sensing
- Geographic Information Systems
- Geostatistic
- etc.

The term ***Information System*** can be defined as a system of humans, machinery and methods which target is to collate, proceed, analyze and spread information. The information system consists of date, hardware, software and users.
Geographic Information Systems (GIS): Geographic Information Systems are automated systems that support, collate, manage, analyze modulate and visualize space related data for the solution of different problems.
The conclusion, after thus defined basic terms, is that Internet GIS can be examined as an addition to ordinary GIS that uses Internet for providing access to GIS.
Internet Maps: Essentially each map which is accessible via Internet can be named *Internet map* including from ordinary scanned maps to such that offer different GIS functions.

Therefore:
Internet GIS: are Internet based systems and services which have the task of saving, analyzing and visualizing space related data. It has functions of ordinary GIS but the access to it is via internet.
Internet Mapping: Creation, dissemination and use of maps via Internet is named *Internet mapping*.

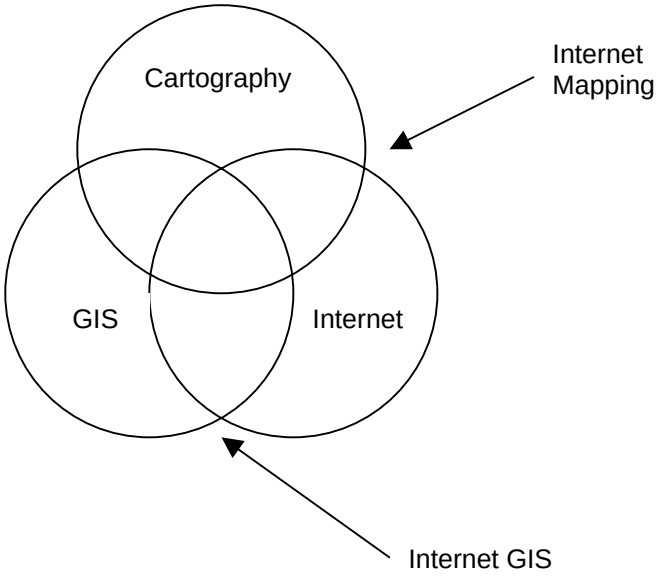

Figure 1: Cartography, GIS, Internet

The main differences between desktop GIS and Internet GIS are explained in the model of realization. GIS are usually monolith structures, which integrate all necessary functions, opposite to Internet GIS, where different elements – the interface, the application for processing and the data base are shared between several machines, the so called - *client-server structure*.

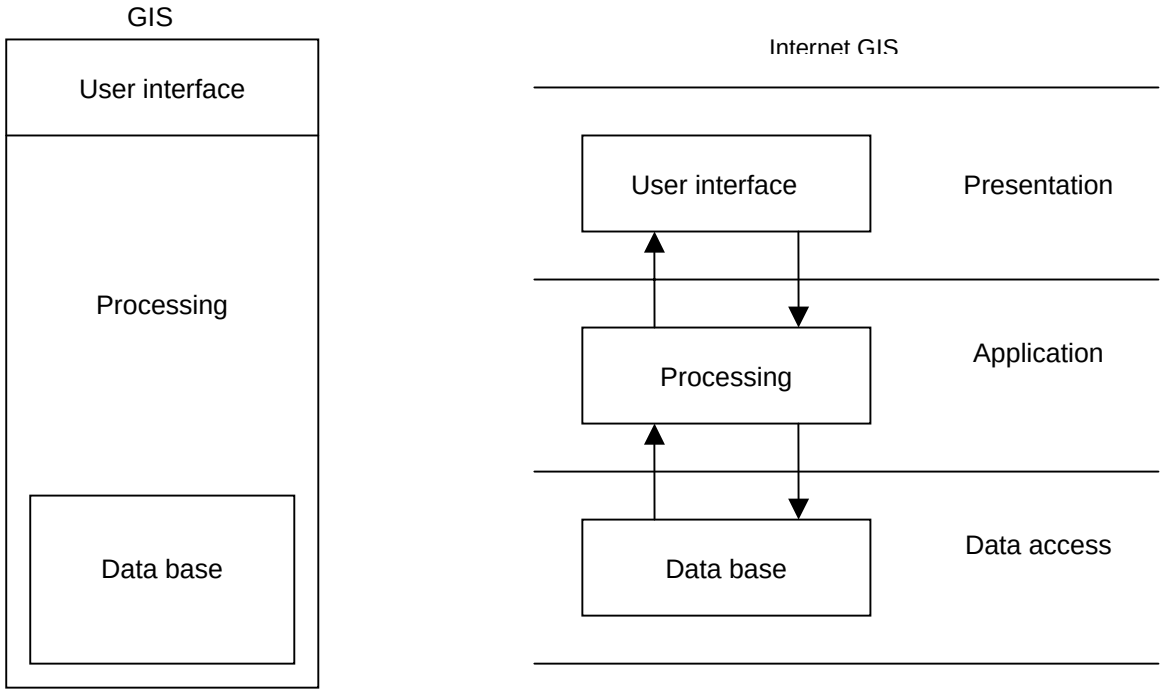

Figure 2: Comparison between GIS and Internet GIS

The concept of *client-server* structure includes a division of the given application into tasks dispensed between the client and the server. An application based on this idea consists usually of three main parts – a client, a server and a network for communication. Each one of these elements consists of certain software and hardware.

In most cases Internet GIS have client-server structure in which standard GIS software is installed on the server and in addition user client interface and communication protocol. In general currency architecture of Internet GIS includes also a separate *map server*. The map server is every server with installed software for processing of queries for maps. For example an architecture of Internet GIS is presented on **Figure 3**.

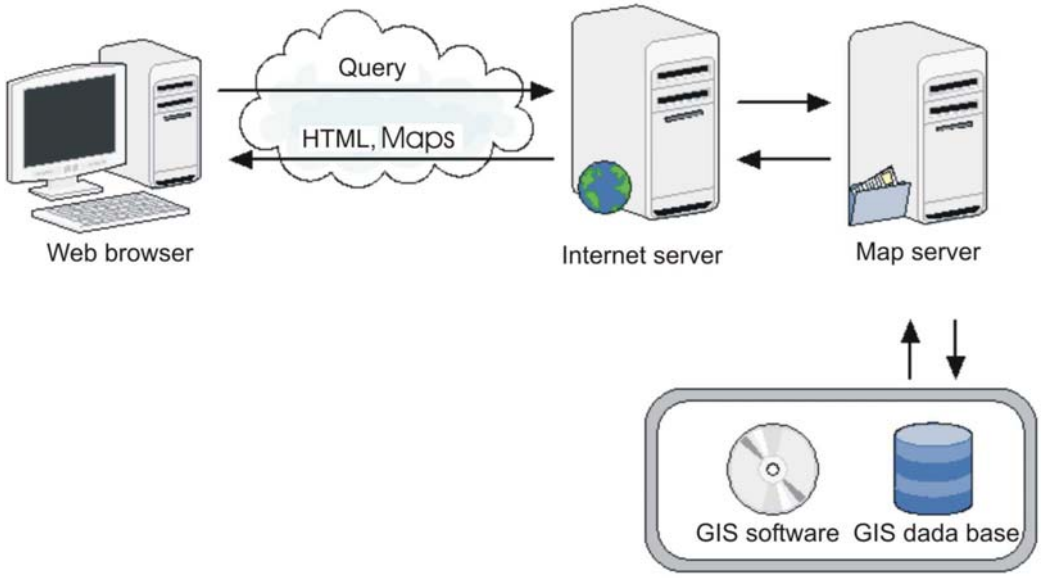

Figure 3: Traditional structure of Internet GIS

Static and dynamic maps in Internet

Opposite to the conventional maps, the digital maps can be changed dynamically as an answer to different interactive operations. Using appropriate design of such operations the expressiveness of maps can be raised vastly. The possibilities for interaction with maps or with its elements are from simple graphic transformation to date base access or use of different tools for analysis.
The first level of classification splits Internet maps in *static* and *dynamic*, the second level – each of these kinds is divided into *maps for examination only* and *interactive maps*. The maps for examination can't be changed, whereas the interactive ones offer some opportunities for interaction and changes of the map.

Static maps – only for examination

The static maps are functionally and conceptually similar to the paper maps. In most cases they are regular maps, scanned in GIF or JPEG format saved as static raster images, but they can be also vector images. Usually they do not offer any interactivity but are very suitable for preservation and offering some rare historical maps to the general public, for example. There are possibilities for giving some function of this kind of static maps, for example zoom function, but for this purpose we need a number of static images of the maps in different scales. The scaling (Zoom) and moving (Pan) however are not considered as interactive functions because a similar action can be done with the regular maps. For example a map can be examined at hand or from distance. This type of maps is easy for realization and this is the reason for its participation from the beginning of Internet.

Static interactive maps

They are similar to the static maps but offer some kind of interactive level. The most widespread types of static interactive maps are images with defined different active areas that are connected to related information given in different formats.

Dynamic maps for examination only

The dynamic maps are created individually for each map request and they differ form one another. They are created on the *map server* that processes the request and makes the needed map.

The map is generated in raster image format (for example GIF or JPEG format) and is sent to the user. There are two main advantages. From one side the user can always receive actual maps and from the other side he cannot consider explicit software for its examination. The disadvantages are that the interactivity in the dynamic maps for examination is missing and every time when the view is changed (zoom or pan) it is necessary lots of information to be transferred in Internet. In other words, the user has to connect the map server every time for the generation of a new map.

Dynamic interactive maps

The dynamic interactive maps are generated in a similar way as described above but here it is possible to change the content of already generated map. They offer high level of GIS functionality especially concerning management and analysis of information – they give an opportunity for using, analyzing and exploring of any kind of space information and support the user in determination of the content and design of the map elements.