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Digital Map Collection Project at the National Széchényi Library

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Summary: The National Széchényi Library, like other repositories, has to face and cope with the challenges of our digital age. New solutions are necessary for maintaining the 212-year-old tradition of preserving intellectual heritage. This paradigm shift especially affects map libraries because of their specific problems. In addition, as a consequence of disharmony between modifications to legislation and provision of born digital maps on demand from databases, the National Széchényi Library is receiving radically fewer maps as legal deposit documents. A solution to these problems, together with long term preservation of digital maps, is sought in the scope of the so-called Digital Map Collection Project. Another aim of this project is to look for answers to the question of how to make the data content of traditional maps more informative with the aid of digital technology. In the end, it should expand the integrational role of spatial data to every collection in the library. It is emphasized that for retaining the character of a high level research centre through this digital shift, qualified and committed experts in the fields of bibliographic description and reader services are indispensable.

The National Széchényi Library was established in 1802 by Count Ferenc Széchényi with the goal of preserving the intellectual and spiritual heritage of the nation by collecting the entirety of “Hungarica”, i.e. Hungarian literature and literature relevant to Hungary. Some 20,000 printed books and more than 1,300 manuscript volumes were donated to the Hungarian nation, but engravings, maps, and coins were included as well.

The founder also wanted to prove and emphasize that the Hungarians were a permanent and organic part of the European intellectual community. Coexistence of nations determines their history and culture. Therefore, the collection of the Hungarian Széchényi National Library reflects not only Hungarian culture, but can also be considered a rich cultural heritage of the entire Europe. Maybe maps embody this thesis best. Moreover, valuable facts explaining European map making history can be found.

Since 1939 the Map Collection has been an independent department of the National Library. Currently it possesses approximately 300,000 items, out of which 3,400 map sheets belong to the initial Széchényi-collection. From this original map donation about one fourth covers the territory of historical Hungary and all other works are valuable cartographic documents of the whole world.

Although capturing copies of Hungarian cartographic documents was legally regulated from the beginning, continuous acquisition couldn't always be assured. To resolve this problem, a competition and exhibition was started in 1996 titled “Beautiful Hungarian Map”. This annual event has become the most important meeting of Hungarian cartographers and map lovers. Unfortunately, this exhibition has not been able to find broad acceptance among producers of digital maps.

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Basic problems in acquiring born digital maps as legal deposit copies

From the moment the majority of maps were first produced electronically, the library has been gradually receiving fewer legal deposit documents. Off-line digital maps published on CD or DVD are mostly captured, but the degree of born digital cartographic material in legal deposit in general is very small. Over the last decades the material received by the library has decreased by about 10% year by year.

These days, most digital maps are no longer considered publications, but are created on demand from databases. Therefore all these maps are excluded from the Legal Deposit regulations. The more current data is, the higher its value for data producers. Because of high archiving costs data producers have no interest in preserving data. Databases will rather be conventionally overwritten or superseded. Even if datasets are preserved by the producers, researching them is not automatically ensured, since mapping companies have no legal obligation to provide spatial data for research purposes. All these aspects contribute to the situation that the documentation of recent geographical and economic conditions for the future can't be guaranteed. Modifications to legislation lack regulation regarding born digital maps.

Digital Map Collection Project

Besides the technical development, serious financial problems and frequent changes in the management staff made the library lag behind other institutes around the world. In reaction to these circumstances the Digital Map Collection Project was launched in 2014.

A prerequisite to effectiveness is to adjust and to re-define functions, roles and responsibilities within the National Library and the Map Department, according to the new information environment and global digital age. In the area of acquisition and long-term preservation an enormous amount of geo-data has been generated. Consequently, evaluation and interpretative selection according to national importance pursue the superior target of preserving mostly essential national cartographic heritage at the expense of comprehensiveness.

The Map Department of today and tomorrow should operate much more like a national bibliographic geo-agency, geo-information and reference-centre or meta-data repository than as a mere geo-data archive. The main goal is to create and offer a high level researcher service and training centre to today's standards.

The project is still in the planning phase and only initial fragments have been completed. Once finished, the framework will encompass the elements of collection ► cataloguing ► curation ► digitization ► digital processing ► archiving ► provision of long term access to born digital and scanned maps. Collaboration with universities bridges financial gaps and at the same time serves practice-oriented project work in education.

Collecting digital maps

The prime question above all is: What should be collected? The Map Department decided to concentrate on maps in digital form, but not on geo-data. The latter should be preserved at mapping agencies, because of their superior technical and personnel capacities for this task.

To enable success the National Library and especially the Map Department first had to adjust the Legal Deposit regulations. In the development of drafting, implementing and enacting legislation the focus was put on striking a balance between maintaining cartographic heritage for future gen-

erations and enabling reasonable access to spatial data on the one hand and the rights of creators, i.e. copyright on spatial data, on the other. It was decided to establish customized agreements with mapping agencies and other spatial data providers and institutions. Simultaneously, this achieved the first step in the process of interpretative selection of information. Choosing certain mapping agencies means also selecting certain digital cartographic works.

Archiving digital maps

After solving acquisition issues the next two big challenges are sustaining national cartographic heritage, including its future-proof preservation, and the question of how to serve contemporary and prospective researchers and the education sector.

The goal of long term archiving is to eliminate, or at least to minimize, the risk of data loss or corruption. Long term preservation of electronic cartographic works is still mostly a question of storing cultural heritage, but it is an economic issue and a technical challenge as well. Because the process of digital preservation is one of the most meaningful elements of the paradigm shift for libraries, several international approaches with different emphases were studied from literature for elaborating an archiving policy for the Map Department.

The following institutes/ groups are engaged in long-term data preservation (this list is only partially complete):

- INSPIRE – Infrastructure for Spatial Information in the European Community – aims at a unified and accessible European SDI¹, but hasn't directly involved the matter of archiving.
- European Experts of different cartographic or archiving organizations or partnerships, like
 - The Commission on Digital Technologies in Cartographic Heritage of the International Cartographic Association (ICA)
 - The Association of European Research Libraries, Map Experts Group
 - IFLA Section of Geography and Map Libraries
 - The Joint Information Systems Committee (Jisk)
 - The Digital Curation Centre (DCC)
 - The International Council on Archives (ICA)
 - The Digital Preservation Coalition (DPC)
 - The Preservation Partnership (GeoMAPP)
 - The Geospatial Multistate Archive
 - The Committee on Data for Science and Technology (CODATA)
 - The EuroSDR Data Preservation Working Group, where SDR means Spatial Data Research
 - The OGC² Data Preservation Working Group
 - The German competence network for digital preservation (nestor)

The EuroSDR archiving working group drew up the most important principles for preserving geo-data under the title “GI+100: Long term preservation of digital Geographic Information — 16 fundamental principles” currently published in its 3rd edition. This document was approved by both EuroGeographics and the European Board of National Archives. These essential rules form the basis for the Map Department's archiving strategy plan.

¹ Spatial Data Infrastructur

² Open Geospatial Consortium

In preceding decades the archiving process of geographic information started at the moment of geo-data transmission from the active system into long term storage, i.e. when cartographic documents on paper were captured after their publication. Contemporarily and in the future the archiving process starts at the time of geo-data creation. Well-coordinated cooperation between geo-data producers and archivists is needed because the retention process should respect the requirements of both disciplines. One of the most difficult parts in this planning phase is estimating the needs of future readers.

Provision and services

For today's researchers only collected material that was catalogued digitally and displayed on the internet is visible. Approximately 98% of all items present in the Map Department have received digital bibliographic descriptions. Through these, they can easily be found by search machines in the library or on the web.

Cartographic products published on the internet haven't got the necessary attention so far. In the future bibliographic records will be created, enabling researchers to find them by structured search instead of the trial and error search practiced today.

The cartographic material has been partly digitized giving priority to the most important works: the entire cartographic material about the Kingdom of Hungary and the original Széchényi-donation have been already digitized. This means approximately 12,000 map sheets.

Web-presentation of maps is a common and rightful request. The National Széchényi Library has presented approximately 3,000 of its preserved cartographic works on the Hungarian Digital Image Library together with other images (<http://www.kepkonyvtar.hu/>). Separate and safe visualization is desired. The Department of Informatics at the library has developed a robust image viewer that is resistant against illegal hacker attacks which try to get maps from the website.

The application developed in-house is capable of displaying high resolution images, with smooth zooming and dynamic watermarking. Dynamic in the application means both dynamic visibility and dynamic size. The major advantage of the application, compared to the well-known Zoomify, is the capability to use strong standard AES encryption of images between the server and the client. SSL is not needed to cover the connection. This application also solves the weakness of Zoomify, which is that the Zoomify image slices are stored in a public directory structure, and whoever is familiar with Zoomify can easily harvest the complete structure and place the image slices next to each other to recover the original high resolution image. During development focus was laid on client resources, by managing bandwidth, memory and CPU consumption. It goes without saying that the research and academic institutes in Hungary are not equipped with the highest available technology and computing power.



Figure 1. One of the published maps; Nicolas de Fer: *Ethnic map of Transylvania* (1705).

The map collection of the Founder Count Ferenc Széchenyi is being published grouped into several topics with this self-created tool. (Fig. 1, <http://szechenyiterkepek.oszk.hu>) These maps will be available for online ordering and download, including an online payment function implemented in ELDORADO, a new Electronic Document Sending System under development. This system aims to provide a fully electronic workflow of the library network in Hungary, from application through digitization to provision of the required documents. Maps are important documents for the system because they are used as test files of images of huge size. ELDORADO even supplies items protected by copyright for electronic download after the payment of royalties. It coordinates and harmonizes digitizing processes among the different research libraries of Hungary, depending on their capacities.



Figure 2. The website of the Virtual Globes Museum.

Digitization of maps offers an opportunity for further digital processing with the aim of increasing the service content for researchers and for non-experts. Currently, the keyword and the first main step is georeference. It allows comparison, analysis or connection with other types of geocoded documents.

Thanks to the long years of collaboration with the Department of Cartography and Geoinformatics at the Eötvös Loránd University, several globes of the National Library have been digitized and georeferenced in the past few years. Using the Virtual Globes Museum (Fig. 2, <http://terkeptar.elte.hu/vgm/>), globes are accessible and researchable. This project is still not complete. The entire globe collection will be photographed and digitally processed for this intelligent, rotatable presentation.

There are other platforms providing information about famous pieces of the Map Department. The first printed map of Hungary, *Tabula Hungariae*, is available for online study (<http://lazarterkep.oszk.hu/>). As Gábor Timár, Gábor Molnár and Balázs Székely reviewed and published this in 2009, this map has been georeferenced by them as well. (Fig. 3)



Figure 3. Orientation of the map of Lazarus (1528).

In the winter semester of the academic year 2014-15 a mass-georeferencing activity began with the help of the Department for Physical Geography and Geoinformatics at the University of Debrecen, and the Department of Geoinformatics and Cartography at Eötvös Loránd University. Searching for geographical terms is a valid expectation of map readers. Geographical names play a critical role in the understanding of maps. Toponyms on maps are especially important, because pure geometry doesn't always help in identifying special objects.

Geographical terms are stored in the Geotaurus, a semantic thesaurus used by the entire Hungarian librarianship. It contains contemporary geographical terms, terms recorded since 1913 and the ones from the GeoNames geographical database with coordinates.

The names of geographical places change over time and reflect historical events and the linguistic peculiarities of different nations. These historical toponyms can be understood as the footsteps of history and become part of cultural heritage. They should be recorded in Geotaurus, which would take an unacceptably long time because the National Széchényi Library doesn't have enough personnel to do this. Involving students from the Institute of Geoinformatics at the University of Óbuda, Alba Regia Faculty (formerly Faculty of Geoinformatics at the University of West Hungary) seems to solve this problem. Cooperation has shown its first positive result. A more accurate search can be offered by firstly georeferencing the maps and then collecting the toponyms with coordinates of the related area.

In recent years, OPACs with territory-based search possibilities mostly for cartographic products have become more and more in use. The first milestone in Hungary was passed in 2012 by Zsuzsanna Ungvári from the Department of Geoinformatics and Cartography at the Eötvös Loránd University, in the form of a diploma thesis. She worked out a map-based search tool custom-made for the needs of the National Széchényi Library. The website constructed by her combines the usual bibliographical information like title, author, publisher, scale, projection, place and time of publication with a geographical search tool. This latter tool is at the moment an instrument for coordinate-based search. If the map contains the selected point or address, it will be shown in

the result (Fig. 4). According to our plans, this tool will be extended. If the user marks an irregular polygon area on the webmap, the program will examine any overlap with the map sheets in the database. The incorporation of a multilingual tool for search by theme and date is intended as well. The search results can be retrieved in tabular format, but also frames of the covered territories can be visualized on a global webmap based on the georeferenced maps.

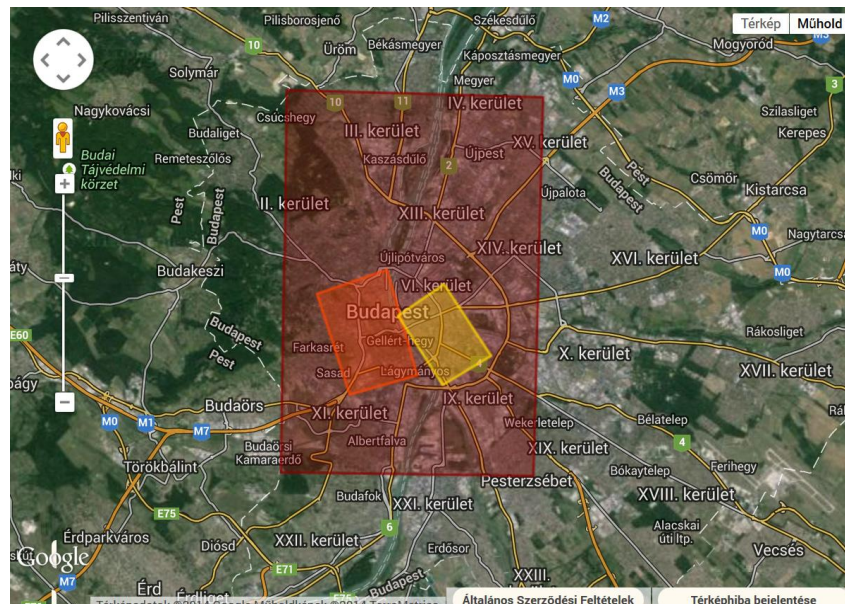


Figure 4. The covered area of old maps.

Bibliographic records and a short description of the chosen mapsheets can be opened from the database. The chosen maps can be studied as a layer on Google Earth and several other global webmaps (Fig. 5). Certain points of information on frames of historical maps are cut off by displaying them together with the current topography. However, this informative data is not lost to online-researchers, since the original maps can be presented too (Fig. 6).

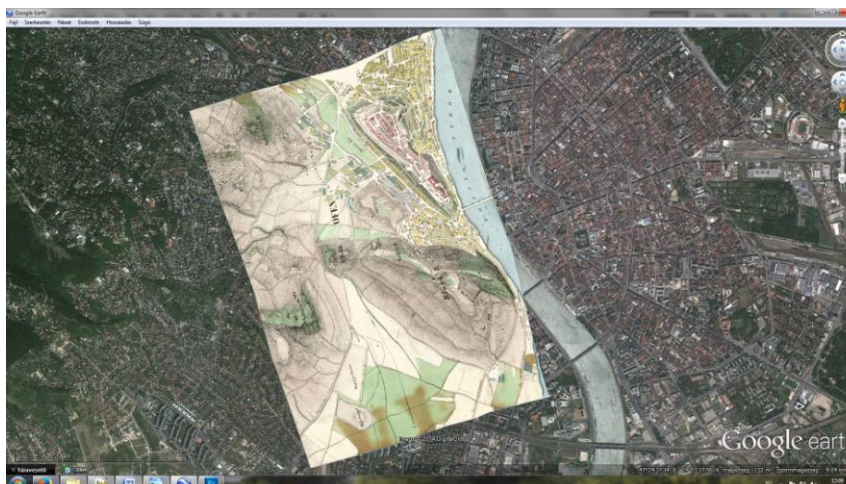


Figure 5. Carlo Pinto Vasquez: *Landscape descriptions of the royal free cities of Buda and Pest* [1837] visualized in Google Earth.



Figure 6. Vasquez: Same map as in Fig 5 with information elements shown within the frame

Taking into account that Geotaurus contains coordinates, a map-based search could expand the entire collection of the library. Geolocated geographical keywords enable matching different types of documents with the reference map. Adequately complex search terms allow a restriction on the number of hits.

Map Department as a Research Centre

The paradigm shift will mostly result in a change to the approach of awarding the main task of the library. The main target is the same, but more dynamic than before: all of these efforts serve the purpose of providing high level support for researchers. The necessary efforts and technical developments are well known and ordinary in librarianship all around the world, but they are lacking in the National Széchényi Library, despite being an essential request from readers. Scanned georeferenced historical maps with territory-based search tools provide the basis. These search tools can be used on desktop PCs in the reading room and online on the internet. The possibility of laying maps from different historical ages on top of each other, studying and analysing them by direct comparison, will bring a new dimension to the research of historical maps at the National Széchényi Library. Remote access and other electronic services as well as traditional reader services must enhance and supplement each other. Studying historical maps in original form is crucial in making the work in the reading room essential. Mentoring, that is the reading service of librarians with experience of several decades, and the cartographic publications stored in the Map Department complete the offer. Both the reading room service and the remote access of information accessible online should serve educational purposes, too.

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URL-s

Homepage of Tabula Hungariae: <http://lazarterkep.oszk.hu/>

Virtual Exhibition of the Széchényi Map Collection: <http://szechenyiterkepek.oszk.hu>

Virtual Globes Museum: <http://terkeptar.elte.hu/vgm/>