The Challenges of Generating Digital Map Libraries for Historical Research

Alberto Fernández Wyttenbach
Willington Siabato
Javier Moya

Laboratory of Geographical Information Technologies
Technical University of Madrid (UPM)

September 25-26, 2008 - Madrid, Spain
Internet is and will be the powerful tool which gives way to different online communication options on geographical approaches.

Historians and documentary experts need to access remotely to every existing information, that can be compiled in a single place to facilitate the access and comparison.

They have established a number of well-defined international standards ISO 23950 (Z39.50) and OAI.
Nevertheless, not many cooperative projects have been set off so far by a group of map libraries to simultaneously and remotely access several historical cartographic funds:

- Tools allow remote access to a GI repository from a single Website
- Access to information and the comparison of some documents located in different servers
- Cataloguing and visualization Web tools

Digital Map Library (DML) supported by the Spatial Data Infrastructure (SDI) guidelines.
The Challenges of Generating Digital Map Libraries for Historical Research

THE SDI FRAMEWORK

- SDI combine distributed data and services by an interoperable way to be used in traditional GIS or in geoportals within various geoprocessing and utility stages.

- Geoportals provide tools to visualize, explore and download information, in addition to search.

- Geographical browsing functionalities are essential to “play with maps”.

- Based on data harmonization, compatibility and interoperability of the systems.

- Several players take part.
THE SDI FRAMEWORK

Open Geospatial Consortium (OGC) Services

- Commercial options and OpenSource for their implementation
- OGC specifications applied to the cartographic heritage field:
  - WMS – Web Map Service
  - WFS – Web Feature Service
  - CSW – Catalogue Service on the Web
- Geographic Metadata: make data identifiable, understandable and readily shared by users on the long term (ISO 19115, Dublin Core, Spanish Metadata Core Profile)
The Challenges of Generating Digital Map Libraries for Historical Research

THE SDI FRAMEWORK

Geographic Information Policies and Agreements

- To share information, and to coordinate and monitor the processes
- So far SDIGER. Now the INSPIRE Directive
- Paying attention to the necessary spatial information for environmental policies and in other sectors
- A national SDI covering the three levels (national, regional & local) is needed
Policies and Data Sharing Schema

- INSPIRE is a good case in point for high level community policies among environmental and GI authorities to follow and carry out cooperation agreements between libraries and archives.

- However, the cartographic heritage is not to be included within the thematic information layers defined in INSPIRE (Annex 3)… WHY???

- Because some special remarks make it difficult…
SPECIAL REQUIREMENTS OF DML

1. The policies operating in the environmental -GI scope among the various European and world agencies are clearly different from the ones operating in the cultural-heritage scope

   - the latter is more restrictive as property rights
   - people involved are quite different
The Challenges of Generating Digital Map Libraries for Historical Research

SPECIAL REQUIREMENTS OF DML

2. Different hierarchical levels of the traditional SDI umbrella, the impossibility of harmonization with the cartographic heritage appears evident

- map collections in a local library represent GI of any part of the world
- there will always be documents of a geographic region distributed throughout the map libraries of the world
- the entire information should be offered in spite of its repetition
- any local DML will offer its data through a world browser
- both local and global DMLs need to be supported by a world SDI giving them modern GI coverage
SPECIAL REQUIREMENTS OF DML

REAL WORLD SDI

GLOBAL SDI

REGIONAL SDI

NATIONAL SDI

LOCAL SDI

AGENCY SERVER

AGENCY SERVER

GI & ENVIRONMENT POLICIES
The Challenges of Generating Digital Map Libraries for Historical Research

SPECIAL REQUIREMENTS OF DML

REAL WORLD SDI

PAST WORLD SDI (DML)

GLOBAL SDI

GLOBAL DML

REGIONAL SDI

REGIONAL DML

NATIONAL SDI

NATIONAL DML

LOCAL SDI

LOCAL DML

AGENCY SERVER

LIBRARY SERVER

GI & ENVIRONMENT POLICIES

CULTURE & HERITAGE POLICIES
The Challenges of Generating Digital Map Libraries for Historical Research

SPECIAL REQUIREMENTS OF DML

- The strategy to follow consists of creating DMLs in a local environment.

- Interoperability provided by the standards and metadata should always be taken into account.

- From there, to work up links with other map libraries or to group all of them in a wider distributed information system.

- Local DMLs will nourish the higher levels until the last link of the pyramid is achieved – the world DML.

- The need for global GI to browser in all the existing funds of a particular geographic region.
CONSIDERATIONS IN DML

- Basic similarities between the global reality of a SDI as a distributed Geoportal and a DML: Standards and services.

- Specific technological and policy considerations:
  - generic bibliographic metadata schemas
  - georeference process: bounding box
  - Additional historical information

- Usability and users play an important role when dealing with DML interface design.
The Challenges of Generating Digital Map Libraries for Historical Research

ONLINE EXAMPLES

The DML Prototype

- The DML of the Canary Islands is a Internet portal with access to a Map Server and a Catalogue containing the historical maps and plans of the Canary Islands.

- DML services in a local SDI prototype. Visualization and query tools were used from standardized OGC Services.

- Methodology:
  - Digitization & Georeferencing,
  - Metadata creation & cataloguing,
  - Map Server & Web interface configuration
The Challenges of Generating Digital Map Libraries for Historical Research

ONLINE EXAMPLES

The DML Prototype

http://www.digitalmaplibrary.org
The Challenges of Generating Digital Map Libraries for Historical Research

THE DML PROTOTYPE

http://www.digitalmaplibrary.org

DIGMAP stands for “Discovering our Past World with Digitised Historical Maps”, but it could stand also for “digging on maps”!

Project co-funded by the EC eContentplus Programme. It started in October 2006 for being developed in 2 years. So… we are finishing. 😊

**Partners**

- Instituto Superior Técnico - IST (Portugal)
- Technical University of Madrid - UPM (Spain)
- National Library of Portugal BN (Portugal)
- Royal Library of Belgium KBR (Belgium)
- Biblioteca Nazionale Centrale di Firenze - BncF (Italy)
- National Library of Estonia - NLE (Estonia)
- Bulgarian Academy of Sciences - IMI (Bulgaria)
The challenges of generating Digital Map Libraries for historical research

THE DIGMAP PROJECT

• Partners
  – Technology
    • IST (Portugal)
  – Cartography
    • UPM (Spain)
  – Libraries
    • BN (Portugal)
    • KBR (Belgium)
    • BncF (Italy)
    • NLE (Estonia)
  – Dissemination
    • IMI (Bulgaria)

• Multilingualism
  – Partners languages
    • Bulgarian
    • Dutch
    • Estonian
    • French
    • Italian
    • Portuguese
    • Spanish
    – English
    – Other European languages to be also considered:
      • German, Russian, ...

The challenges of generating Digital Map Libraries for historical research

THE DIGMAP PROJECT

- DIGMAP explores environments for browsing and searching by human users, as well as services for interoperability with external information systems.

- Comprises techniques for the automatic extraction of metadata from images of digitized maps, digitized books and Websites, gathering of metadata from remote services, etc.

- The software solutions that have been produced are able to be reused in other digital libraries, for standalone services, or as components integrated with other libraries. (Integration – Complete integration through servers)

- The information architecture follows open data models, namely those already defined by the OGC.
The challenges of generating Digital Map Libraries for historical research

THE DIGMAP PROJECT

- The first year we produced a service prototype.

- Relevant standards and technology were used in the first DIGMAP Service Prototype and consecutives:
  - Descriptive metadata: mainly UNIMARC, MARC21 and Dublin Core
  - Geographical Information: ISO 19000 family of standards
  - Thesauri: ISO 5964 - Guidelines for Multilingual Thesauri
  - Core Technology: Web-Services, Ajax, RDF, XML Schemas, etc.

- DIGMAP towards the goal of becoming the main international information source and reference service for old maps and related bibliography.
DIGMAP has produced…


- Two new international professional services: “European Multilingual Geographic Thesaurus”; “International Authority Database of Maps Engravers, Editors and Printers”

- A new reusable open-source technology for digital libraries of digitised maps (catalogue management, thesauri management, features extraction from images, metadata transformation, search and retrieval, interoperability, etc.)
The challenges of generating Digital Map Libraries for historical research

DIGMAP will promote…

- The development of European collaborative networks for reference, description, cataloguing, indexing and classification of ancient maps.

- Innovative ways to integrate/interoperate with TEL – The European Library
The challenges of generating Digital Map Libraries for historical research

<table>
<thead>
<tr>
<th></th>
<th>Lite...</th>
<th>...Full</th>
<th>Super</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browsing Index</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>MIND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeline</td>
<td>(IST)</td>
<td>(x)</td>
<td>x</td>
</tr>
<tr>
<td>GeoBrowser</td>
<td>(IST)</td>
<td>(x)</td>
<td>x</td>
</tr>
<tr>
<td>Search Engine</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Forum</td>
<td></td>
<td>(x)</td>
<td>x</td>
</tr>
<tr>
<td>RED</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nail.map</td>
<td>(IST)</td>
<td>(x)</td>
<td>x</td>
</tr>
<tr>
<td>cat.on.map</td>
<td></td>
<td>(x)</td>
<td>x</td>
</tr>
<tr>
<td>GeoIndexer</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REPOX-Lite</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MapIndexer</td>
<td></td>
<td>(x)</td>
<td>x</td>
</tr>
<tr>
<td>GeoParser</td>
<td></td>
<td>(IST)</td>
<td>x</td>
</tr>
<tr>
<td>Gazetteer</td>
<td></td>
<td>(x)</td>
<td>x</td>
</tr>
</tbody>
</table>

User Interface:  
Catalogue:  
Indexer & Thesauri:  

The challenges of generating Digital Map Libraries for historical research

Independent
Standalone

Shared
Distributed
The challenges of generating Digital Map Libraries for historical research
The challenges of generating Digital Map Libraries for historical research
The challenges of generating Digital Map Libraries for historical research
The challenges of generating Digital Map Libraries for historical research
The challenges of generating Digital Map Libraries for historical research

<table>
<thead>
<tr>
<th>Pesquisa Avançada</th>
</tr>
</thead>
<tbody>
<tr>
<td>título</td>
</tr>
<tr>
<td>autor</td>
</tr>
<tr>
<td>colaborador</td>
</tr>
<tr>
<td>data</td>
</tr>
<tr>
<td>editor</td>
</tr>
<tr>
<td>assunto</td>
</tr>
<tr>
<td>descrição</td>
</tr>
<tr>
<td>texto livre</td>
</tr>
<tr>
<td>com todas as palavras</td>
</tr>
<tr>
<td>com frase exacta</td>
</tr>
<tr>
<td>com pelo menos uma das palavras</td>
</tr>
<tr>
<td>sem as palavras</td>
</tr>
<tr>
<td>site (ex: .pdf)</td>
</tr>
</tbody>
</table>

- Tudo (41703 ficheiros)
- Biblioteca Nacional de Portugal (BNP) (http://www.bn.pt - 6043 ficheiros)
- Biblioteca Nacional da Estônia (NLE) (http://www.nlb.ee - 2198 ficheiros)
- Biblioteca Nacional Central de Florença (BNCF) (http://www.bncf.firenze.sbn.it - 5808 ficheiros)
- Biblioteca Nacional da Bélgica (KBR) (http://www.kbr.be - 5345 ficheiros)
- Instituto Geográfico Nacional de Espanha (IGN) (http://www.ign.es - 10939 ficheiros)
- OAI-PMH (8364 ficheiros)
- Others (3006 ficheiros)
The challenges of generating Digital Map Libraries for historical research

Geoparser service

This service can parse textual documents and recognize named entities in the text. Geographical entities are disambiguated into the corresponding identifiers in the DIGMAP gazetteer. A set of supporting text mining services is also provided, such as language recognition.

This page provides a simple form for testing the service. Users can provide textual sentences, and the service will reply with an XML document containing the geoparsing results. Separate pages provide more advanced examples, showing how to use the geoparser as an XML Web service, or presenting a time-map exploration interface for geoparsed RSS feeds.

The next sentence is an example: Antonio Telo is one of the most active professional historians in Portugal, specializing in the history of the 20th century.
The challenges of generating Digital Map Libraries for historical research

GeoparseResult xsi:schemaLocation="http://www.opengis.net/gp ../gp/GetFeatureRequest.xsd http://www.opengis.net/wfs ../wfs/GetFeatureRequest.xsd">
  −
  <EntryCollection>
    +
    <Person entryID="0">
      <TermName>Antonio Telo</TermName>
    +
    <PlaceName entryID="1">
      <TermName>Portugal</TermName>
    +
    <DateTime entryID="2">
      <TermName>20th century</TermName>
    .
    .
    .
  </AnnotatedText>
</GeoparseResult>
The challenges of generating Digital Map Libraries for historical research
The challenges of generating Digital Map Libraries for historical research

Gazetteer service

DIGMAP is a service for resource discovery and access to old maps and related resources, with a focus on their geographic information...
The challenges of generating Digital Map Libraries for historical research

MapIndexer service

Indexed Maps

Map Identifier | Modified
--- | ---
http://www.oldmap.co.uk/f5L-EWIGHT-old-Map.jpg | 2008/08/08 19:15:36

DIGMAP Services: Geoparser | Gazetteer | Map Indexer | tail.map | caton.map | Map Services | Wiki

©2008 All Rights Reserved. Contact: DIGMAP@digmap.eu


Project co-funded by the Community programme: Leonardo da Vinci (contract: 1301-2008-1-ES01-KA2-053).
The algorithm started by detecting 87 segments, from which 23 were also automatically selected in a second step. Human selection will select the definitive relevant features...

http://www.helmink.com/Antique_Map_Plancius_World/Scans/Plancius%20World%202.jpg
The challenges of generating Digital Map Libraries for historical research

Thumbnail Service

DIGMAP

DIGMAP Thumbnail Service
This service can generate thumbnails for HTML pages, PDF documents or raster images. These thumbnails can either be PNG files, for usage in the DIGMAP user interface, or GeoTIFF files, for incorporation into a Web mapping interface.

Generate PNG thumbnail

<table>
<thead>
<tr>
<th>URL</th>
<th><a href="http://digmap1.ist.ul.pt:8080/nail.map/DIGMAP_logo.png">http://digmap1.ist.ul.pt:8080/nail.map/DIGMAP_logo.png</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>160</td>
</tr>
<tr>
<td>Height</td>
<td>100</td>
</tr>
<tr>
<td>Transparency</td>
<td>false</td>
</tr>
<tr>
<td>Rotation</td>
<td>0</td>
</tr>
</tbody>
</table>

Generate PNG thumbnail with a transparency window

<table>
<thead>
<tr>
<th>URL</th>
<th><a href="http://digmap1.ist.ul.pt:8080/nail.map/DIGMAP_logo.png">http://digmap1.ist.ul.pt:8080/nail.map/DIGMAP_logo.png</a></th>
</tr>
</thead>
</table>
The challenges of generating Digital Map Libraries for historical research

cat.on.map service
The challenges of generating Digital Map Libraries for historical research
The challenges of generating Digital Map Libraries for historical research
The challenges of generating Digital Map Libraries for historical research

Map Services

DIGMAP is a service for resource discovery and access to old maps and related resources, with a focus on their geographic information.

DIGMAP

Geolocator

URL: http://www.chinaight.com/image/map/ancient/ancient-map-taiwan_1896a.gif
Thumb URL: default
Interface: default
Submit Method: xml
Submit URL:
Resume Token:
Current NE Lat:
Current NE Lng:
Current SW Lat:
Current SW Lng:

GeoBrowser

Feed: /geobrowser/include/test-feed.xml
Mode: thumbs
Page Size: 25
Use Title: true

Exemplars:
Atlas by Fernao Vaz (National Library of Portugal)
Atlas by Fernao Vaz (National Library of Portugal) (using images stored on Wayback Machine)
Terms Example

GeoTimes

Feed: /xml/example-feed.xml
Worklist: /xml/example.xml
Page Size: 25
The challenges of generating Digital Map Libraries for historical research

Arizona Memory Project Sharlot Hall Museum
Biblioteca Dr. Jorge Villalobos Padilla, S.J.
Centre de recherche en histoire des sciences et des techniques
Centre for Newfoundland Studies
Demetries at The Australian National University
Digital Library of Wrocław University
Digital Library of Zielona Góra
División de Procesamiento de Imágenes (DPI)
FIDES Digital Library
Institut de recherche pour le développement (IRD)
Internet Archive
Kujawsko-Pomorska Digital Library
Library of Congress
Louisiana Digital Library (LDL)
Louisiana Digital Library (LDL)
Malopolska Digital Library
Mary B. Ansari Map Library
Memorial University of Newfoundland’s Digital Archive Initiative (DAI)
National Library of Australia
Oregon State University
Publication of Archival, Library & Museum Materials (PALMM)
Silesian Digital Library
Sistema Eléctronico de Editoração de Revistas
Technical Research Centre of Finland (VTT)
The Digital Research Library (DRL) of the University of Pittsburgh
The Digital Research Library (DRL) of the University of Pittsburgh
The University of Dublin – Trinity College
University of Illinois at Urbana-Champaign – University Library
University of Michigan Digital Library
University of Nevada, Las Vegas Libraries
University of Southern California Digital Archive
University of Southern California Digital Archive
University of Southern California Digital Archive
University of Wisconsin Milwaukee Libraries
Warsaw University of Technology Digital Library
Washington State University Libraries
Western Waters Digital Library (WWDL)
Western Waters Digital Library (WWDL)
Western Waters Digital Library (WWDL)

Map Collection
Maps
geologic or topographic maps
Centre for Newfoundland Studies - Digitized Maps
Map Indexes
Cartographic materials contain digital copies.
Cartographic Materials
Map Collection
Maps, atlases
Maps of Catalonia (s. XVII-XXI)
C. Harrison Mann, Jr. Digitized Map Collection
...Schwedischen Landesaufnahme von Vorpommern 1692 - 1709
Historische Karten allgemein
Historische Seekarten
Historische Katasterkarten
Internationale Weltkarten
Kartenwerk Deutscher Staatsebenen
Maps
Cartographic
Items with collection equal to maps_usgs
Maps
LC Maps
Louisiana State Museum Historical Map Collection
Maps of Louisiana
Northwest Louisiana Map Collection
Cartographic Materials
Maps (to 1939)
Historic Maps
Centre for Newfoundland Studies - Digitized Maps
Map Collection including map items from other collections
Scanned Maps
Florida Map Collection
Cartographic materials
Mapas Geográficos
Hydrographic survey and cartography
Dartington Digital Library Maps
Maps from the Report of the Flood Commission of Pittsburgh, 1912
Ordnance Survey Irish Historical Maps
Historical Maps Online
University of Michigan Nichols Arboretum Historical Maps and Plans
Las Vegas History in Maps
David Lee Collection
Shannon Boyd-Bailey McCune Collection
Sea of Korea Maps Collection
WPA Land use survey maps for the City of Los Angeles, 1933-1939
American Geographical Society Library Digital Map Collection
Collection of ... and cartographic documents
Early Washington Maps: A Digital Collection
Early Washington Maps
UNLV - Las Vegas History in Maps
Overland Trails Diaries and Maps

37 OAI-PMH servers (55 collections) identified worldwide (excluding TEL members)
The challenges of generating Digital Map Libraries for historical research

Alberto Fernández Wyttenbach
Willington Siabato
Javier Moya

Laboratory of Geographical Information Technologies
Technical University of Madrid (UPM)