

# International Preservation News

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on Preservation and Conservation



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## Preservation and Digitization of Rare Maps, Globes and Special Collections



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is a publication of the International Federation of Library Associations and Institutions (IFLA) Core Activity on Preservation and Conservation (PAC) that reports on the preservation activities and events that support efforts to preserve materials in the world's libraries and archives.

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In 2012, we witnessed a general explosion of the accesses to library collections, one of the last significant ones being the BnF “Gallica App”<sup>1</sup> for the iPad. The images illustrating our editorial are emblematic examples of these new ways of reading newspapers and books, admiring special collections stored in our libraries, museums and archives and looking at TV-shows and movies. Travelling on plane, train or buses you might observe a lot of “new explorers” with tablets as wonderful cultural heritage arms.

The robot “Curiosity” exploring Mars is representative of this access explosion: very remote targets, no human contacts and, at the end, not only a digital photography of the planet but also a scientific analysis of what is scanned. All the technologies used to improve the access rely on digital: digital camera, screen and computer. Sometimes, like with Curiosity, we have the impression of loosing any contact with the original. The virtual and permanent access to an immense quantity of objects and documents leaves us with a feeling of wealth and power as well as a sort of frustration in front of digital surrogates.

In our libraries, since the beginning of digitization, many publications have kept on feeding the Preservation versus Digitization debate. However, we do know that digitization couldn't replace a good preservation of the originals. If we still want to propose beautiful exhibitions we need to keep our treasures in good shape, allowing digitization as a plus for the future.

We chose to illustrate this topic with the preservation and digitization of maps, globes and special collections. Fenella France from the Library of Congress shows how her institution is actively involved in the preservation of rare cartographic objects, her paper focusing on preventive conservation and use of advanced digitization to optimize and monitor display parameters for rare maps such as the Waldseemüller 1507 World Map.

Christopher Fleet, Head of maps department at the National Library of Scotland, presents recent developments in access methods, in maps visualization and in the use of open source technologies: whilst the NLS has large sheet mapping collections, numbering some two million maps of all parts of the world, it has considered promoting web-based access as a priority for nearly two decades. Linked to the web-based topic, the Preservation Working Group of the International Internet Preservation Consortium (IIPC) presents the challenges to ensure long-term preservation of the memory of the Web.

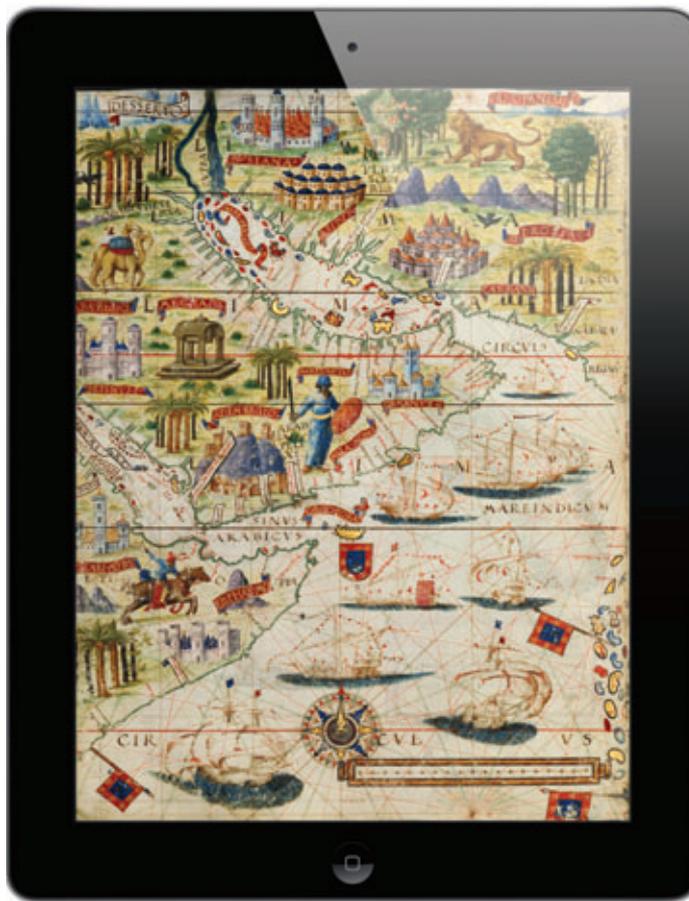
Bernard Dulac and Philippe Vallas from the National Library of France Preservation Department present the specific problems linked to the digitization of large formats (mainly maps) in the Sablé BnF workshop.

Prof. Francesco Guerra from the University IUAV of Venice describes a successful digitization in 3D of two Coronelli globes. 3D is a new challenge for our institutions which more than often preserve globes and objects.

Finally, as a central theme of this special issue, you will find a paper about the role of risk assessment in digitizing special collections.

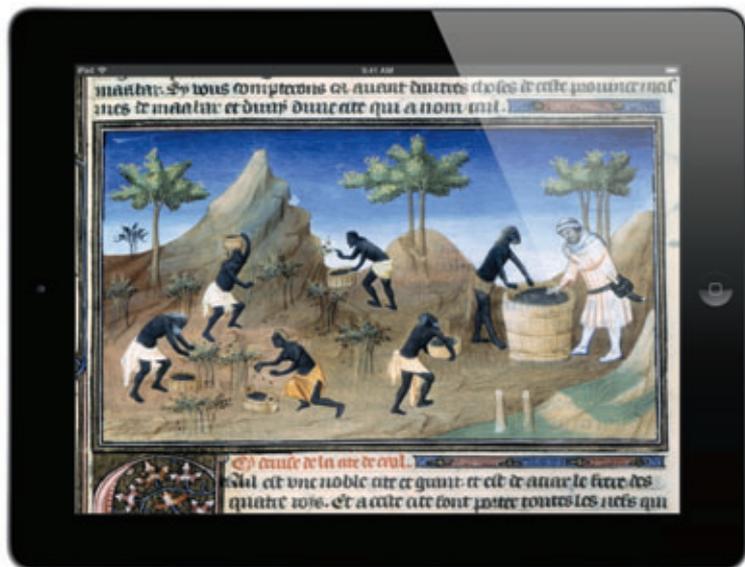
Have a nice reading and, as it is the season, I wish you a very happy new year!

**Christiane Baryla**  
*IFLA-PAC Director*



Lopo Homem, [Pedro et Jorge Reinel, António de Holanda], [Portugal], 1519, *Atlas Miller*: océan Indien, Arabie et Inde. BnF, département des Cartes et Plans, CPL GE D-26179 (RES), f. 3.  
Gallica App for iPad © Apple Inc.

<sup>1</sup> The two editorial images are issued from the BnF application Gallica for iPad and Android tablets. The application is available, free of charge, on the App Store and Google Play; it gives access to a rich corpus of more than 2 million documents: books, newspapers, images, maps, manuscripts...



Marco Polo (1254-1324), *Le Devisement du monde* ou *Livre des Merveilles* :  
La récolte du poivre à Coilun [Quilon]. BnF, département des Manuscrits,  
Français 2810, f. 84. Application Gallica pour iPad © Apple Inc.

En 2012, nous avons assisté à une démultiplication des accès aux collections de bibliothèques, dont l'application « Gallica » pour iPad, proposée par la Bibliothèque nationale de France, est un exemple significatif. Les images qui illustrent cet éditorial sont emblématiques des nouvelles pratiques de lecture de la presse et des livres, des nouveaux outils de découverte du patrimoine culturel et des nouveaux modes de réception des chaînes de télévision. En avion, dans les trains et dans les bus, on observe chaque jour davantage de nouveaux « explorateurs » armés de tablettes.

Le robot « Curiosity » qui explore la planète Mars est représentatif de cette explosion des accès : Mars, une cible très éloignée, aucun contact humain direct avec la planète et, au bout du compte, non seulement une photographie numérique mais aussi une analyse scientifique du matériel scanné.

Toutes les technologies utilisées pour améliorer l'accès reposent sur le numérique : caméra, écrans,

ordinateurs. Parfois, comme c'est le cas avec Curiosity, nous avons le sentiment de perdre tout contact avec l'original. L'accès permanent virtuel à une immense quantité d'objets et de documents nous procure un sentiment de richesse et de pouvoir aussi bien qu'une certaine frustration devant les substituts numériques.

Dans nos bibliothèques, depuis l'arrivée de la numérisation, de nombreux débats ont entretenu l'opposition Conservation/Numérisation. Nous savons tous maintenant que la numérisation ne remplacera jamais une bonne conservation des originaux. Si nous voulons encore proposer ne serait-ce que de belles expositions, il est nécessaire de garder nos trésors en excellent état.

Le thème retenu pour ce dossier, celui de la préservation et de la numérisation des cartes, des globes et des collections spécialisées, illustre particulièrement ces défis.

Tout d'abord, Fenella France montre comment la Bibliothèque du Congrès est activement engagée dans la conservation d'objets cartographiques rares. Son article met l'accent sur le préventif et sur l'utilisation d'une numérisation de pointe pour optimiser les conditions d'exposition d'une carte très rare comme le Planisphère de Waldseemüller.

Christopher Fleet, expert dans le domaine des cartes et plans à la Bibliothèque nationale d'Ecosse, décrit les derniers développements concernant les méthodes d'accès, la visualisation des cartes et l'utilisation des technologies open source au sein de sa bibliothèque : alors que la NLS a une très grande collection de cartes, la promotion d'un accès via le Web demeure sa priorité depuis plus de vingt ans. Lié à cette problématique, un article du Groupe de travail sur la Conservation issu du consortium IIPC nous explique tous les enjeux d'une conservation à long terme de la mémoire du Web.

Philippe Vallas, directeur adjoint du département de la conservation à la BnF, et Bernard Dulac, chef de service du Centre technique de Sablé sur Sarthe (BnF), présentent les problèmes spécifiques à la numérisation des grands formats dont les cartes font partie.

Enfin le Professeur Francesco Guerra, de l'université IUAV de Venise, décrit la numérisation en 3D, réussie, de deux globes de Coronelli conservés en Italie. La numérisation en 3 dimensions est un des défis majeurs pour toutes les institutions qui gardent des objets.

En marge de ce dossier, Roswitha Ketzer, de la British Library, propose un article sur l'importance de l'évaluation des risques à numériser des collections spécialisées.

Nous vous souhaitons une très bonne lecture, et bien sûr, une excellente année 2013 !

**Christiane Baryla**  
Directeur d'IFLA-PAC

# Cartographic Preservation and Digitization of Rare Maps and Globes at the Library of Congress

by **Fenella G. France**<sup>1</sup>, Chief, Preservation Research and Testing Division, Library of Congress, **James Thurn** and **Jamie Schmeits**, Conservation Division, Library of Congress, USA

## Abstract

The Preservation Directorate at the Library of Congress is actively involved in the preservation of rare cartographic objects. Preservation activities focus on preventive conservation and use of advanced digitization to optimize and monitor display parameters for rare maps such as the Waldseemüller 1507 World Map. Since the purchase agreement required permanent exhibit for the only extant copy of this first map to use the term "America", a specialized anoxic encasement was created to enable visual storage and long-term controlled exhibition for at least 30 years. To enable continued access to the map for researchers and future preservation studies, hyperspectral imaging of the 12 map sheets was undertaken prior to the display of the map starting in December 2007. The Library of Congress Geography and Map Division has also advanced preservation storage and display for one of the largest collections of globes in the world. The construction of custom encasements for rare globes and a new temperature and humidity controlled storage facility in Fort Meade, Maryland, provide the opportunity to house many of these globes in ideal conditions.

## The Waldseemüller 1507 World Map

The Waldseemüller 1507 World Map was the first map, (printed or manuscript) to refer to America, and is sometimes referred to as "America's birth certificate". The copy at the Library of Congress is the only known survivor of the 1,000 copies of the map believed to have been printed. Therefore due to the rarity of this item, preservation was a high priority. Martin Waldseemüller's world map grew out of a project in St. Dié, France, to document and update new geographic knowledge derived from previous discoveries. This included data gathered during Amerigo Vespucci's voyages to the New World. The Waldseemüller map was the first map to clearly depict a separate Western Hemisphere, with the Pacific as a separate ocean, and represented a huge leap forward in knowledge (Hessler, 2008). Waldseemüller carved 12 woodblocks that were used to print the twelve separate sheets of the map. Each of the sheets of laid paper measure approximately 61x46 cm, and since the map was designed to be assembled as a wall-map, the finished map measures approximately 2.4 metres wide by 1.4 metres high. The exchange between the German Government and the Library of Congress requires that the map always be on exhibit for anyone to view. The large anoxic display encasement was designed to maintain a 20-30 year hermetic seal, so prior to encasement the decision was made to use hyperspectral imaging to capture extensive historical information for researchers and scholars.

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1. The Waldseemüller 1507 World Map.

## Constructing an Anoxic Encasement for the Waldseemüller 1507 World Map

The design and construction of controlled environments to regulate the environment has been important for rare and significant collection items, and has also posed challenges for cultural heritage institutions (France, 2009). Since the mid-twentieth century, institutions have used cases with controlled microclimates to retard the deterioration of artefacts. Significant developments in the design and construction of anoxic and hermetically sealed cases over the past 50 years have supported the preservation of rare cultural heritage materials (Maekawa, 1998). Anoxic storage is important for long-term display of some artefacts, depending on the component materials, with one of the critical components being a hermetic seal to achieve true anoxic conditions. For written and printed works, oxygen will chemically react and degrade the paper and ink. Historically there have been various attempts to create microclimates to protect maps and other treasures. Papyrus documents were wrapped in a protective layer of blank papyrus, while heavy bindings on manuscripts and books reduced the impact of fluctuations in environmental conditions. Russell and Abney in the late 1880s noted that the fading of watercolour was reduced in vacuo. Early encasements used bellows, and since there was no real-time monitoring of conditions, cases often were not retaining anoxic environments. For the purposes of this discussion the term hypoxic refers to low oxygen, anoxic describes an environment without oxygen, and the ability of an encasement to maintain an environment less than 0.5% oxygen for an extended period of time.

Throughout the years materials and construction techniques have advanced and changed, enabling more sophisticated environmental controls. The Library of Congress has researched, designed, and used anoxic encasements for rare maps and manuscripts since the 1970's. In the 1990s, the Preservation Director-



2. Left: the anoxic encasement; Right: the final exhibit case containing the encasement.

ate created anoxic cases for five Library treasures, including two drafts of the Gettysburg Address, the rough draft of the Declaration of Independence, the Virginia Declaration of Rights, and the L'Enfant Plan of Washington D.C., the map of the US capital city created in 1791, after L'Enfant returned from a visit to Paris. Different gases have been used to replace the oxygen and create an anoxic environment, including helium, nitrogen and argon. Case materials have changed, enabling a greater capacity to maintain a controlled environment. Many cases originally used Plexiglas a poly (methyl methacrylate) transparent thermoplastic, often used as a lightweight or shatter-resistant alternative to glass. Diffusion of gases through Plexiglas, including oxygen and inert gases, is much greater than glass; hence the use of Plexiglas reduces the effectiveness of the encasement to maintain a hermetic seal. Case construction and materials have also changed over the past decades, from stainless steel to aluminium, with welding of earlier stainless steel encasements creating points of weakness for maintaining a seal.

The goal for the preservation of the Waldseemüller map was the successful design, fabrication, testing, and installation of an argon encasement for the Waldseemüller 1507 World Map. This anoxic encasement is the largest visual storage encasement manufactured to date. The requirements for the encasement were: 1) to create a sealed environment and passively maintain inert gas levels for 25-30 years, 2) be able to accommodate changes in differential pressure caused by changes in external barometric pressure, 3) provide the capacity to monitor the map by measuring environmental changes in order to meet preservation needs, and 4) the ability to integrate with the Library's electronic and security infrastructure while addressing size and weight limitations within a historic building. The encasement frame was specially designed and engineered from a single 10cm block of aluminium and fitted with high-grade o-rings to create a hermetic seal and reduce oxygen infiltration. Testing and monitoring since 2007 has confirmed minimal infiltration

of oxygen into the encasement and the capability to maintain a hermetic seal. Constant monitoring of the encasement has confirmed that it maintains a stable passive environment with sensors and real-time monitoring of the differential pressure, oxygen level, temperature, and relative humidity in the encasement. The encasement system receives scheduled calibration and testing of sensors. The Library has monitored a range of environmental parameters in this encasement in real-time for four years, allowing calculation of the effective leakage rate. Collected data demonstrates the hermetic seal has a potential lifespan of 150 years. This means that at current levels the anoxic environment will be stable, since it will take that length of time to reach 0.5% oxygen.

The frame and base of the new encasement were machined from two solid pieces of aluminium donated by the Alcoa Company. The case was sealed with a double sheet of thick, non-reflective laminated glass. The case includes valves for flushing out oxygen and replacing it with inert argon gas. It also includes sensitive monitoring devices to constantly measure internal environmental conditions. During the manufacturing process, specialists from the National Institute of Standards and Technology (NIST) checked the strength of the glass to ensure it would not break during barometric or temperature changes, and leak-tested the encasement to certify it would keep oxygen out for at least 20 years. NIST engineers also designed devices for raising and lowering the encasement for maintenance and display. Final dimensions of the anoxic encasement housing created are a total size of 2.75 x 1.5 metres, weighing 1000 kilograms, constructed from a flexible aluminium shell with hurricane proof glass for viewing. Two "in series" vitono-ring seals maintain a hermetic seal on the 400 litre volume of Argon, and the encasement is constantly monitored for changes in oxygen, relative humidity, temperature, and pressure. The anoxic encasement has allowed for the constant visual display of this unique, rare and significant world map at the Library of Congress.

## Hyperspectral Imaging of the Waldseemüller 1507 World Map

To make the map accessible to researchers while it is on semi-permanent exhibit in its sealed case, hyperspectral imaging was undertaken to create high-resolution images with information captured both in the visible and invisible regions of the spectrum. The application and development of hyperspectral imaging for the preservation of cultural heritage materials and analysis of historic documents provides a powerful technique for assessing collection objects (Fisher and Kakoulli, 2006). The imaging system developed at the Library of Congress captures the spectral response of materials from the ultraviolet, visible and near infrared regions of the spectrum (UV, VIS and NIR) and also reveals obscured or non-visible information. The system comprises a MegaVision 39 Megapixel monochrome camera (7216 x 5412) E6 back, and APO-Digitar5, 6/120 lens, integrated through customized software with light emitting diode (LED) illumination panels that span the spectral range of 365nm to 1000nm for reflected, transmitted and raking (low oblique side-lighting) imaging modes. Non-destructive spectral imaging can be used to characterize historic documents by capturing the unique chemical spectral response of composite materials (Goltz et al., 2010). The Library system includes assessment of both substrates (paper, parchment, photographic materials) and media (inks, pigments, colorants). Capturing UV, VIS and NIR spectral data in various illumination orientations minimizes handling of fragile and rare cartographic and other items, and allows new opportunities for object analysis and post-acquisition processing to uncover hidden and obscured text and information (France, 2010). All images in the stack are accurately registered in a data cube, enabling almost unlimited combinations of spectral wavebands for further processing. This advanced imaging of heritage documents allows greater access to the object and enhances non-visible obscured information in registered, high-resolution digital images. In addition to spectral identification of materials, this non-contact tool can be used to monitor storage and exhibition changes or deterioration in parchment, paper and other materials due to environmental conditions, and assess treatments of historic documents. Critical advances in the Library imaging program include development of a spectral reference database, integration of data from other non-invasive analytical techniques, and a full analytical mapping of objects for non-destructive analyses of collection materials. The resulting cube of acquired spectral data creates a new "digital cultural object" that is related to, but distinct from the original. Coordinating the relationship between these two entities enables greater access to scholarly information, since identification of materials enables provenance, geographical (spatial) and temporal information to extend knowledge about the historic document, without the requirement for samples to be taken. The range of data this digital object contains enhances interactions across a range of professions, allowing multidisciplinary collaboration for integration of preservation, sociological and cultural information. The digital representation of the original analog map balances preservation and access to the original object, requiring a rigorous process of standardized processing, extensive archival metadata and data management. Advances in lens properties, sensor and illumination technology have significantly advanced spectral imaging with improvements in customized image cap-



3. PCA enhancement of faded map grid lines.

ture software, as well as standardized image capture and image signal processing techniques (Easton, 2010). With its ability to spectrally classify materials and spectrally "map" their distribution over the surface of cartographic materials, hyperspectral imaging is now being used as a first point of examination for many Library cartographic collections.

The application of this technology to the Waldseemüller world map provided a number of insights for cartographic researchers. Over time, inscribed red gridlines on sheets six and seven had faded significantly and become virtually imperceptible. These gridlines represented important added features in the cartographic history of this map, so it was important for curatorial collaborators to find away to retrieve this lost information. Johannes Schöner (1477-1547), a German astronomer and cartographer and pupil of Waldseemüller, was noted to have drawn red lines over the Middle East north to the Black Sea, an area that must have been of interest (Hessler, 2008). With the spectral imaging, these lines could be separated and distinguished through their unique spectral response. Image processing of the spectral information enabled the recreation of the grid lines by using the specific spectral response of the red colorant and creating a pseudocolor image. This reconstruction allowed researchers to assess overlapping of the lines, including which lines were laid down first, where lines began and ended, and began to broaden the interpretation and understanding of Schöner's thought processes from the early 1500s. As shown in Figure 3, principle component analysis (PCA) from a 12-band image cube and pseudocolor combination of Bands 1, 2 and 3 enabled further enhancement of the lines to more accurately assess overlays, and interactions with other components of the map.

While the Waldseemüller 1507 world map is famous for the first reference to 'America', it remains a source of intrigue since the cartographer is known, but not the precise time or location of printing (Harris, 1985). It is suggested that the Waldseemüller 1507 map was bound to a large extent by Ptolemaic tradition.

The map was discovered in 1901 by Joseph Fisher, a Jesuit historian conducting research in the library collection of Wolfegg Castle, Wurttemberg, Germany. He was convinced that the World Map sheets were printers' proof sheets, so the ability to gain greater understanding about how the woodcut was produced was of great interest to scholars, cartographers and historians. Specialized processing, utilizing images taken with the raking side-lighting panels in the VIS (blue) and NIR regions (470nm and 910nm respectively), created a virtual 3-dimensional rendering of the map, giving a visual perspective of what the original woodcut from which the sheets were printed may have looked like (Figure 4). Since the original woodcut no longer exists, the processed images allow an analysis of possible techniques used in the early 1500s to inform scholars about creation techniques and gain a better understanding of the materials used in the process.



4. Depiction of rendering of the original woodcut features.

Other processing included a PCA spectral separation of an iron gall ink inscription, most likely added by Schöner, as shown in Figure 5. The image processing clearly illustrates the iron gall ink writing on top of the printing ink.

Additional image acquisition and processing was undertaken to capture the selection of watermarks on the map sheets. The detection of watermarks has long been undertaken by a variety of methods, the most preferred being beta radiograph plates



5. PCA of printing and iron gall ink inscription (Sheet 10).



6. Left: beta radiograph; Right: unprocessed transmitted light watermark imaging.

(Ash, 1982). Due to health concerns by the Safety Division, the Library sought a new method that would continue to provide the same quality as that of the beta radiograph plates. Ongoing studies utilizing a combination of reflected and transmitted techniques have enabled the capture of heavily obscured watermarks, while retaining the requisite chain and laid line dimensionality. Image processing has enabled the suppression of the overlaying text, facilitating the enhancement of the watermark features, including chain and laid lines. This watermark on the Waldseemüller 1507 map has been traced to paper made in Nancy and Strasburg regions of France.

### Housing of Globes

Preservation storage and display in the Library does not just apply to two-dimensional maps, but also extends to three-dimensional globes in the cartographic collection. The Library of Congress Geography and Map Division holds one of the largest collections of globes in the world. The construction of a new temperature and humidity controlled storage facility in Fort Meade, Maryland, one of the Library's off-site cool storage modules, provided the opportunity to house many of these globes in ideal conditions. Conservator Jim Thurn and a team of conservation technicians took on the task of creating a uniform housing method for over three hundred diverse globes. The housing method would need to protect the globes in transit between the Fort Meade facility and the Geography and Maps reading room, in addition to allowing easy access and identification for researchers and staff members.

Conservation staff created custom boxes for the smaller globes on the Library of Congress's automated box maker. For larger globes, staff ordered special boxes constructed of 60-point board in three sizes from an outside vendor. The globe housings range in height from about 17.75 cm to 109 cm. All the boxes were created with a drop-front and a removable inner tray, to allow the globes to be removed with minimal risk of damage. Conservation staff also added double flaps behind the drop front, and added binder board supports to reinforce the inner tray for heavier globes.



7. Left: a custom box with drop front and double flap; Right: a removable tray.

Conservation staff wanted to solve some specific problems for these rare collection items with this project. The critical challenge staff wanted to address was determining how to hold the globes securely in place within the boxes, especially during transit, without adding unnecessary weight or potentially causing damage. While testing out various solutions, staff discovered that non-cross-linked, closed-cell polyethylene foam

planks trimmed to size and adhered with hot-melt glue on the sides of the box and in the tray, provided enough support for most globes. A thin layer of cross-linked, closed-cell polyethylene foam on the front of the supports provided a softer, less abrasive surface to minimize risk of damage to the globes. For larger and heavier globes, staff reinforced the foam planks of the construction with flute board for additional rigidity.



With the foam supports in place, staff affixed labels inside the box to help ensure the globe was returned to its customized box. Staff found the labels necessary, as placement of a globe in an incorrect box might cause damage. These labels indicated the front of the tray and the direction in which the meridian or axis should point, so that the globe was correctly positioned in respect to the foam supports. Conservation staff also encapsulated a colour digital image and bibliographic information and attached it to the front of the box.

8. Left: foam supports in a custom box; Right: foam supports reinforced with flute-board.





9. Left: content information; Right: the wide range of housing sizes of the globes.

The globe housing project provides a model for practical problem solving in a low technology environment, using simple and inexpensive tools to ensure the safe transit and long-term standardized storage of valuable and unique globe collections.

Following the housing of globes now stored at the Ft. Meade facility, the Conservation Division constructed protective housings for eight rare globes in the cartographic collection. The eight globes were housed in customized boxes to remain on Capitol Hill, along with the world's largest collection of antique globes, in the Geography & Map Division secure storage vault. Since these globes are shown during periodic tours, protective housings suitable for displaying the globes were desired. The housings, which range in height from 45.7cm to 61cm, were constructed of archival-quality binder board and covered with fabric. Double-wall, stepped-joint construction was used for increased strength, while removable, clear acrylic, front panels allow viewing of the globes and minimize handling. The acrylic panels could be slid upward through a slot in the top of the housing to gain access to the globes. Because the globes were of varying designs and in different states of condition, the housing interiors were designed to the specific requirements of each globe to ensure adequate protection. Foam padding and/or linen ties were incorporated to keep globes secure within the housings. After the housings were constructed, heavyweight felt covers were created to prevent light from damaging the globes. This allowed for long-term safe storage and viewing of these rare cartographic collection items.

## Summary

The preservation and digitization of rare maps and globes in the Preservation Directorate shows a focus on the combination of new technologies, while actively pursuing standardized but customized options for a range of rare maps and globes at the Library of Congress. Activities focus on the importance of preventive conservation in preserving our rare, fragile and precious collection items, optimizing display and storage parameters for rare maps such as the Waldseemüller 1507 World Map and unique globes. The agreement with the German Government to retain the map on exhibit required long-term control of all environmental parameters, and the construction of a specialized anoxic encasement for visual storage of this rare map, enabled long-term controlled exhibition for at least 30 years. Hyperspectral imaging of the twelve map sheets ensured access to obscured, faded and hidden components of the map for any researchers requiring content information. These initiatives show the integrated approach at the Library between caring for collection materials in the optimal manner, assuring uninterrupted access to these in either their original or a digitized format, formats that allow large amounts of data to be captured for later processing and analysis to address preservation, scientific analysis and scholarly interests.



10. New housings. Left: 19<sup>th</sup> century globe; Center: hand-painted globe; Right: felt cover.

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## Préservation et numérisation des cartes et globes rares à la Bibliothèque du Congrès

La Direction de la Conservation de la Bibliothèque du Congrès s'applique à conserver les objets cartographiques rares de ses collections. Ses activités se concentrent sur la conservation préventive et l'utilisation de la numérisation de pointe afin d'optimiser et de contrôler les conditions d'exposition et de stockage de cartes rares comme le Planisphère de Waldseemüller de 1507. Il s'agit de la première carte à faire référence à l'Amérique : elle doit, en tant que seule copie existante, être exposée de manière permanente. Un conditionnement anoxique spécial a donc été créé pour permettre un stockage visuel et l'exposition contrôlée à long terme pendant au moins 30 ans. Pour que le planisphère reste malgré tout accessible aux chercheurs et puisse faire l'objet de futures études de conservation, la Bibliothèque du Congrès a eu recours à l'imagerie hyperspectrale pour numériser les 12 feuillets de la carte avant que celle-ci ne soit exposée à partir de décembre 2007.

Cette technique permet de minimiser la manipulation des objets, cartographiques ou autres, rares et fragiles, et ouvre de nouveaux horizons à leur analyse en révélant du texte et des informations cachés et obscurcis. Il peut être également utilisé pour suivre les changements au niveau du stockage et de l'exposition ou la détérioration du parchemin, du papier et d'autres matériaux causée par les conditions environnementales, ainsi que pour évaluer des traitements de documents historiques. L'imagerie hyperspectrale est maintenant employée comme premier mode d'examen pour de nombreuses collections de cartes de la Bibliothèque.

Par ailleurs, la division Geography and Map de la bibliothèque a mis en œuvre des méthodes de stockage et d'exposition de pointe pour l'une des plus grandes collections de globes au monde. La construction de caissons sur mesure pour les globes rares et une nouvelle installation de stockage à température et humidité contrôlées à Fort Meade, dans le Maryland, offrent la possibilité de préserver un grand nombre de ces globes dans des conditions idéales.

Ces initiatives montrent l'approche intégrée de la Bibliothèque : prendre soin de manière optimale des objets de la collection et y assurer un accès ininterrompu dans leur forme originelle ou dans un format numérisé, format qui permet à de grandes quantités de données d'être capturées pour traitement et analyse ultérieurs afin de satisfaire aux besoins de la conservation, de l'analyse scientifique et de la recherche.

## Preservación cartográfica y digitalización de mapas y globos raros en la Biblioteca del Congreso

La preservación y la digitalización de mapas y globos raros en la Dirección de Preservación de la Biblioteca del Congreso se concentran en la combinación de nuevas tecnologías, mientras buscan activamente las opciones normalizadas, pero individualizadas, para una variedad de mapas y globos raros de la Biblioteca del Congreso. Las actividades están focalizadas en la importancia de la conservación preventiva para preservar las preciosas y frágiles piezas de colección, optimizando los parámetros de exhibición y almacenamiento para los mapas raros como el Mapamundi Waldseemüller de 1507 y los globos únicos.

Debido a que el contrato de compra del Mapamundi Waldseemüller de 1507 exigía su exhibición permanente, se creó una vitrina anóxica que permitiera el almacenamiento y exhibición visual controlados a largo plazo durante por lo menos 30 años. A fin de permitir el acceso continuo al mapa por parte de los investigadores y futuros estudios de preservación, se llevó a cabo la captura hiperespectral de imágenes de las 12 láminas de mapas antes de la exhibición en diciembre de 2007, asegurando el acceso a los componentes oscurecidos, desvanecidos u ocultos del mapa.

La Biblioteca del Congreso Division de Geografía y Mapas también ha avanzado en el almacenamiento para preservación y exhibición de una de las mayores colecciones de globos del mundo. La construcción de vitrinas a la medida para los globos raros y de un nuevo depósito con temperatura y humedad controladas en Fort Mead, Maryland, brindan la oportunidad de almacenar muchos de estos globos en condiciones ideales.

Estas iniciativas muestran un enfoque integral de la Biblioteca hacia el cuidado de los materiales de las colecciones de una manera óptima, asegurando el acceso ininterrompido a los mismos, bien sea al original o a un formato digitalizado, formatos que permiten capturar grandes cantidades de datos para el procesamiento y análisis posteriores a fin de atender la preservación, el análisis científico y los intereses académicos.

# New Developments in Accessing and Viewing Online Maps at the National Library of Scotland

by Christopher Fleet, Senior Map Curator, National Library of Scotland

Note: The URLs of all websites referred to are listed at the end of the article.

This short article presents recent developments in access methods, in visualising maps, and the use of open source technologies at the National Library of Scotland. Whilst the NLS has large sheet mapping collections, numbering some two million maps of all parts of the world, promoting web-based access has been a priority for nearly two decades. The NLS *Map Images* website (<http://maps.nls.uk>) now has 48,000 high-resolution zoomable images of maps available, mostly relating to Scotland in the last four centuries. The website includes Ordnance Survey maps, county maps, town plans, military maps, and estate maps, used for a wide variety of purposes: particularly family history, local history, archaeology, environmental risk review, and land ownership. Every day, the website has about 1,300 visits and 10,000 page views, and whilst free access as a service is the main priority, a related e-commerce module allows printouts, images and photocopies to be ordered. This, of course, has an important preservation advantage, in displaying images instead of original maps, and using images to generate copies.

For convenience, the main recent developments have been grouped into three main categories below:

1. improving access to maps through bounding boxes;
2. improving the visualisation of maps through georeferencing;
3. using open source technologies to reduce costs and promote collaboration.

## 1. Improving access to maps through bounding boxes

We have only recently exploited the full potential of georeferencing as a better means of discovering early maps through improved search and retrieval. Once georeferenced, numerical geospatial metadata can allow better searching of historical maps, using the MARC21 034 field, the Dublin Core DCMI Box, or related geo-enabled search methods, as well as their greater visibility to global geographic search and retrieval services (Oerhli et al., 2011).

### Find By Place viewer

This can be well illustrated through the NLS *Find by Place* viewer (Fig. 1).

Most users are interested in which online maps there are covering a particular place they are interested in, and the *Find by Place* viewer provides a way of accessing all 48,000 online maps by their location. It allows the user to select a particular category of maps from a left hand panel and their geographic extents

are then displayed in the main map window. By clicking on the location of interest in the main map window, all the maps that cover that location are highlighted and thumbnail images of them appear in a right-hand column (Fig. 2). A Google gazetteer allows place names, street names and postcodes to be used to zoom the map to a particular location, and the user can dynamically change the map backdrop to a Google map or satellite view, to *OpenStreetMap* or an historical map layer from the 1920s.

The main metadata content of the application is bounding boxes of geographic extents, held as shapefiles. Shapefiles are the most popular geospatial vector data format and although developed by ESRI, are an open specification for describing geometries of features by points, lines and polygons. A growing number of shapefiles are freely available for many features (through, for example, the EDINA ShareGeo repository), including historical jurisdictions as counties and parishes. We were also able to obtain shapefiles for Ordnance Survey map sheets from the Charles Close Society, who created them for their *Sheetfinder* application. It was also quite quick and easy to trace shapefile boundaries and boxes from graphic indexes of maps to create them for the remaining number.

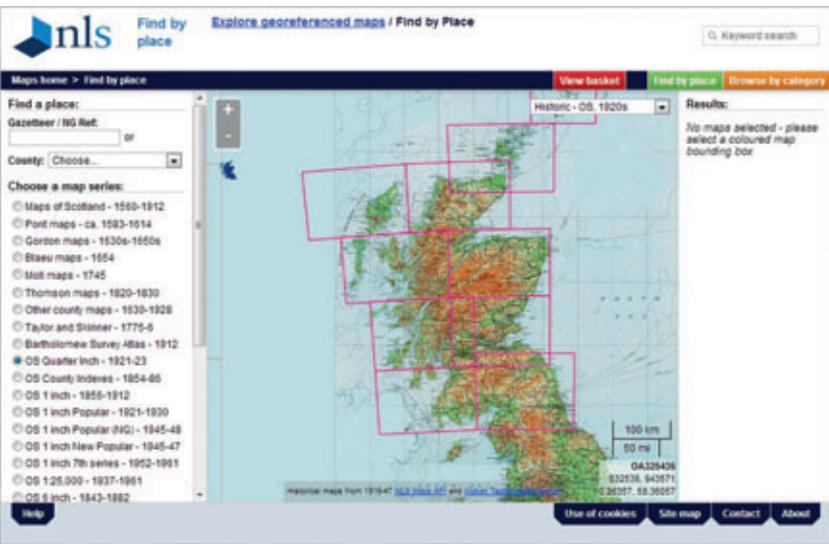
### ScotlandsPlaces

*ScotlandsPlaces* is a collaborative web portal, initially launched in October 2009, allowing the public to search data seamlessly from three of Scotland largest national institutions with geographic collections: the Royal Commission on the Ancient and Historical Monuments of Scotland, the National Library of Scotland, and the National Records of Scotland. The main search interfaces allow geographic access by a map-based viewer, by a two-level county and parish hierarchy, and by a gazetteer of place names (Fig. 3).

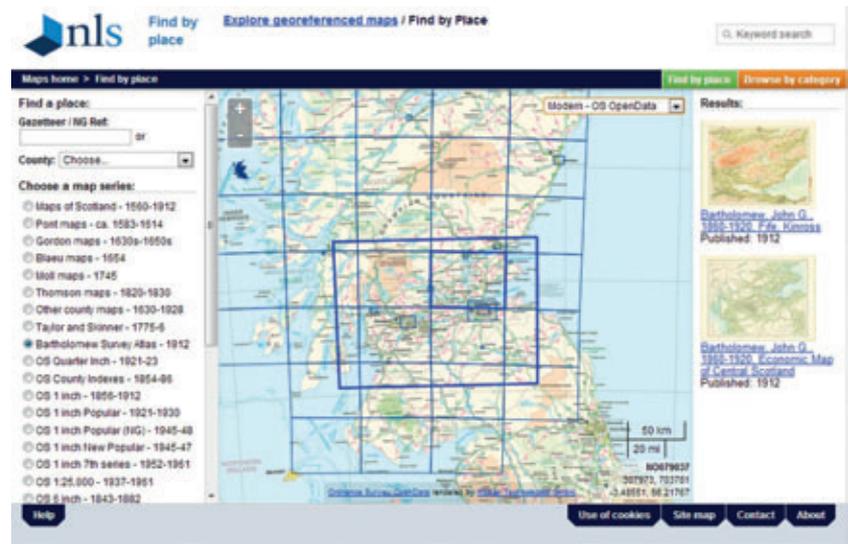
By holding bounding box extents of the NLS map metadata, it was easy to integrate the NLS maps into *ScotlandsPlaces*. It was also possible to index the NLS map records by county and parish on the basis of a spatial query using county/parish shapefiles and the map records shapefile, and assigning these controlled vocabulary terms to the records for improved retrieval. Through shared geographic metadata, the portal allows dispersed content to be brought together into one interface for easier searching, whilst the institutional images remain on institutional servers (Fleet, 2011).

### OldMapsOnline

*OldMapsOnline* has in 2012 become the world's largest portal to online images of historical maps (Southall & Pridal, 2012). It shares a similar approach to *ScotlandsPlaces*, integrating geographic metadata into one searchable interface, whilst for viewing and further consultation, the user is taken to the individual



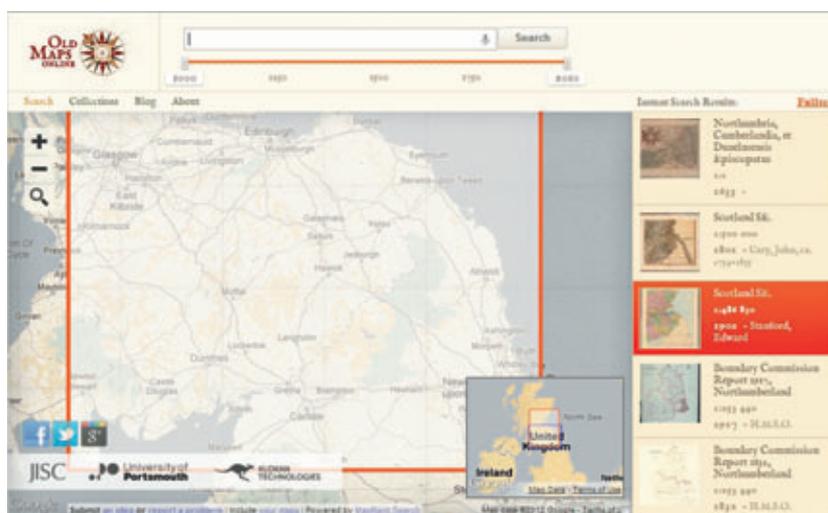
1. The NLS Find by Place viewer, providing geographical access to maps - <http://maps.nls.uk/geo/find/>.



2. The NLS Find by Place viewer, with selected results appearing in the right-hand column.



3. ScotlandsPlaces - county based map search interface - <http://www.scotlandspplaces.gov.uk>.



4. OldMapsOnline portal to historical map images - <http://www.oldmapsonline.org/>.

map on the host institution's website. The Google-maps style interface presents a dynamic selection of the most appropriate maps that cover the user's geographic area of interest, based upon bounding boxes and the scale of the original map (Fig. 4). Through sharing the shapefile bounding box metadata that NLS developed for the *Find by Place* viewer, *OldMapsOnline* provides an alternative and very powerful way of promoting new geographic access methods.

## 2. Georeferencing historical maps to present them as overlays and web map services

Georeferencing of historical maps offers a number of important advantages for libraries: improved retrieval and user interfaces as illustrated above, but also better understanding of maps by analysing their geometrical properties, and the ability to compare and overlay with other maps and spatial data. Georeferencing of historical map images involves assigning spatial information so that they align with real world geography. The process typically consists of adding control points that have a real-world location to an historic map; once there are sufficient control points, the historic map can be transformed so that it correctly aligns with geographic reality.

The NLS has been involved in a number of projects using georeferenced mapping:

- Preparing georeferenced overlays or mosaics of historical maps
- Web Map Services
- Historical Maps API
- Georeferencer

### **Preparing georeferenced overlays or mosaics of historical maps**

Through a number of collaborative projects, NLS has actively prepared georeferenced mosaics of historic maps for web delivery in the last few years. We now have over 160 georeferenced mosaics taking up about 2.5 Tb of disk space, focusing on Scotland, but also covering Ireland, Great Britain, and Belgium. The mosaics can all be viewed in the *Explore Georeferenced Maps* viewer (Fig. 5).

The *Explore Georeferenced Maps* viewer allows similar search and browse methods to the *Find by Place* viewer, with searching possible by gazetteer, county/parish drop-down lists, and by zooming on the map. A transparency slider then allows the historic map to be gradually faded on-screen, and compared to a number of modern map layers that the user can select. As well as being fun, the viewer allows easy historical comparison of one map to another on screen, and a direct comparison of past landscapes with the present day.

### **Web Map Services**

It is also possible to allow historical maps to be delivered into other websites through using open standards, such as the OGC's Web Map Service (WMS) protocol, or Web Tile Map Service (WMTS) protocol. The Open Geospatial Consortium is an international consortium of companies, public-sector agencies and universities who collaborate to develop these publicly available interface specifications, allowing easy standards-based sharing of historical georeferenced maps.

A growing number of external websites now use NLS Web Map Service overlay layers described above, including the *Gazetteer for Scotland*, the *OpenStreetMap* Community. The *Gazetteer for Scotland* provides a Google-maps interface to over 20,000 descriptive records relating to places in Scotland, and the user can select an historic map layer from NLS as a backdrop (Fig. 6). The *OpenStreetMap* Community use historical out-of-copyright maps of Great Britain from NLS as a backdrop within their main maps editor, JOSM. This allows confirmation of the position of historical features for tracing in this collaborative, wiki-style map project.

Web Map Services promote collaborative projects which use geography / location to integrate resources. For example, NLS has collaborated with the University of Edinburgh in the *Visualising Urban Geographies* in 2010. VUG created mapping tools for historians, using digitized and geo-referenced maps in conjunction with historical information based on either addresses or districts. This spatial dimension enriches historical understanding and analysis, and can also be applied to other subject areas. VUG focused on Edinburgh to explore the potential of the mapping tools where there is available data and a wide range of suitable maps, but the tools can be applied to anywhere. It also provided a range of guides to georeferencing, to preparing maps and other historical information for online delivery, and using free and open-source geospatial software (Rodger et al, 2010).

Another collaborative project has been *AddressingHistory* with EDINA, which brought together georeferenced Post Office directory information with historical maps. Whilst the initial pilot focused on Edinburgh, Glasgow and Aberdeen, we hope to extend this to the whole of Scotland using directories that have now been digitised. Through parsing to split their content into people, places and occupations, and georeferencing, the directory information can then be visualised spatially with an historic map backdrop (Fig. 7).

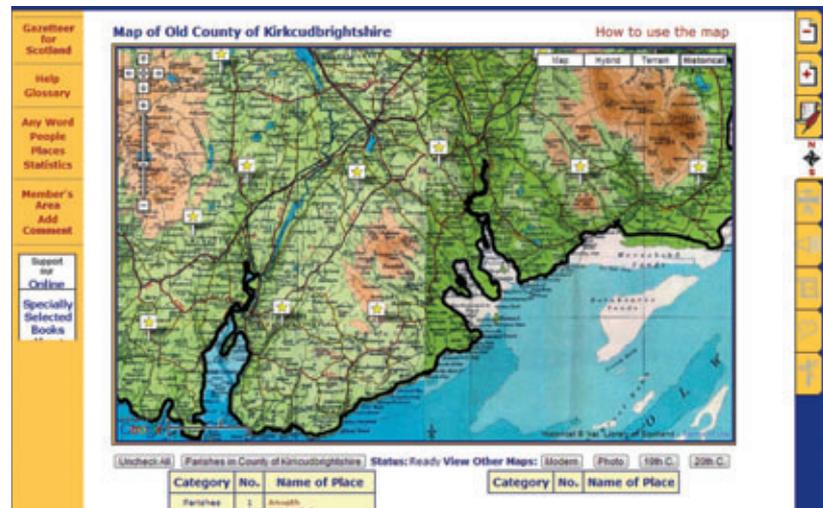
### **Historical Maps API**

The main aim behind this particular project was to explore the potential for making available historical georeferenced maps as a web service for embedding in other websites (Fleet & Pridal, 2012b). Whereas Google, Bing and Yahoo map APIs focus on present day mapping, this project specifically promoted the use of *historical* maps in online mashups. We prepared a set of georeferenced historical maps of Great Britain from 1:1 million to 1:63,360 scales, we tiled and compressed them, and then distributed the tilesets across four web servers for more rapid and stable web delivery. A specially-written Javascript API (<http://nls.tileservers.uk/api.js>) returns a URL for the tile images, delivering these from the most appropriate server. The Historical Maps API was launched in May 2010 at the Project Page: <http://maps.nls.uk/projects/api>, and in the following 20 months to March 2012, it recorded 841,000 visits and 1,462,000 page views (Fig. 8).

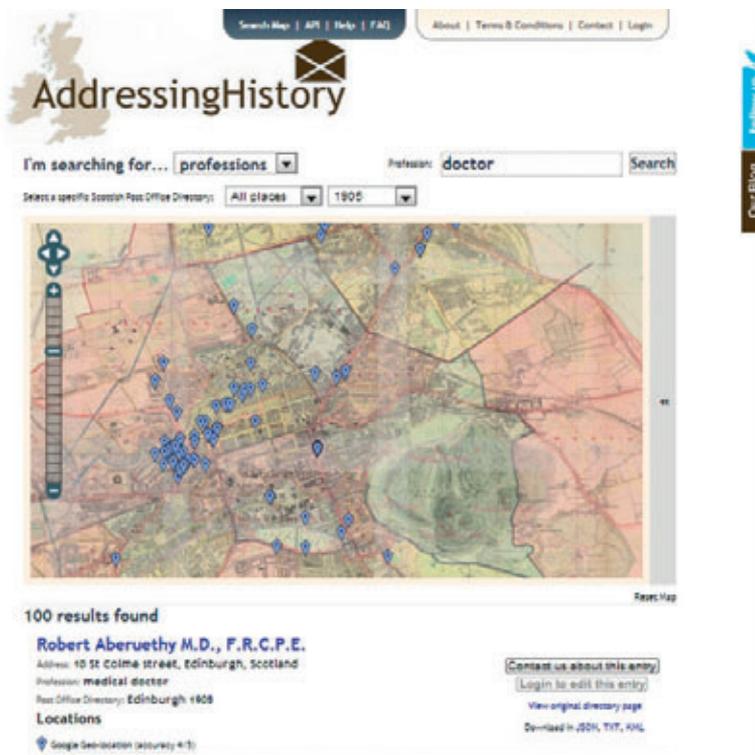
As described by Pridal & Zabicka (2008), the Historical Maps API takes advantage of the fact that Google Maps, Microsoft Bing, and other geo-data APIs use the same projection and tiling profile. The extents of all tiles as well as the zoom levels are predefined for the whole Earth on the Spherical Mercator



5. Explore Georeferenced Maps viewer - <http://maps.nls.uk/geo/explore/>.



6. Gazetteer for Scotland - with historical map backdrop from NLS - <http://www.scottish-places.info/counties/countymaps33.html>.



7. AddressingHistory, displaying locations of doctors in 1905 in Edinburgh.



8. NLS Historical Maps API in use in right-hand screen in the Where's the Path website - <http://wtp2.appspot.com/wheresthepath.htm>.

projection, and therefore georeferenced maps can be specially prepared for rapid delivery by following this standard protocol.

The main user communities of the API can be broadly defined as those devoted to outdoor leisure and recreation, archaeology, family history, local history, a number of other specialist history websites, photography, teaching, and archives. This community is certainly broader and different from the mainstream user community of the main NLS maps website, with more special interest groups, and more serious dedicated users from archaeological and historical subject areas. This highlights one of the main advantages in exposing library content through web services such as the Historical Maps API, that a far greater range of uses and applications can be built than if the library attempted to create these themselves.

### **Georeferencer**

Until recently, georeferencing has involved relatively time-consuming and in-house processes using conventional geographic information system software, and has been infrequently employed by map libraries. The *Georeferencer* application addresses this problem by allowing free, crowdsourced collaborative online georeferencing of map images from a number of libraries. *Georeferencer* is an international collaborative online project, currently with over five library applications across Europe, developed by Petr Pridal as part of the *OldMapsOnline* project. *Georeferencer* allows a cheaper, public, collaborative way of georeferencing maps, sharing several of the advantages of *MapWarper* and the New York Public Library's *Map Rectifier*. However, unlike *MapWarper*, it does not rely upon images being uploaded to an external website, making use of zoomable images on existing library web servers (Fleet et al., 2012).

The main georeferencing window presents the historic map to be georeferenced in the left-hand window and out-of-copy-right georeferenced maps in the right-hand window (Fig 9). The default right-hand window mapping is *OpenStreetMap* but other layers can be selected, including Ordnance Survey OpenData and the NLS Historical Maps API mapping for the United Kingdom, as well as Google maps, satellite and terrain layers. The user simply zooms in and adds control point by clicking on the same area in the historic and modern map windows. Once georeferenced, the maps can be visualised using the Google Earth browser plugin as a georeferenced overlay with a transparency slider.

NLS made available 1,000 maps in *Georeferencer* in November 2010 and about half of the maps were georeferenced in the first 16 months, with some categories of maps, such as town plans, completely georeferenced during that time. With an upgraded version of *Georeferencer* at NLS in May 2012, there was more popularity and within four months a further 200 maps had been georeferenced. Through more active promotion, the British Library was much more successful, with 750 maps georeferenced in less than one week February 2012, and in a second project in October 2012, 700 maps were georeferenced in six days (Kowal & Pridal, 2012).

## **3. Using open source technologies to reduce costs and promote collaboration**

In the last five years, the opportunities for using open-source mapping technologies have steadily grown, along with the power and functionality of these technologies. Open source technologies often allow libraries to reduce licensing costs of proprietary software - NLS used to pay annual fees of £5,000 per annum for ESRI's ArcIMS software, for example, for delivering map images online, and now pays nothing through the use of GeoServer and OpenLayers. Open source technologies often provide better use of open standards, not just through web service such as WMS and WMTS as described earlier, but through better support for non-proprietary file formats and scripts. Thirdly, open source technologies often allow easier international collaboration on a long-term basis with a broader shared community than with a proprietary application. Although often maintaining and developing the software can involve more time and expertise (sometimes requiring developer support), in recent years NLS has found open-source technologies to be cheaper and more powerful for delivering maps online (Fleet & Pridal, 2012a).

### **OpenLayers MrSID Viewer**

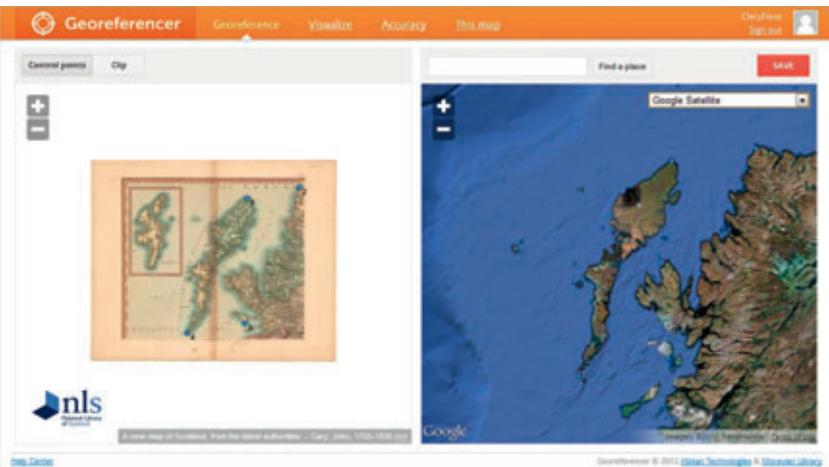
Historically NLS used the MrSID proprietary compression format for delivering ungeoreferenced images online, and used the LizardTech Express Server viewer until 2009. However, there were a number of problems of this viewer: its fixed image extents on screen, a whole-image refresh on each click, a limited ability to present map image within a header and footer wrapper, printing and downloading images were only possible with downloadable browser plugin, and there was no Permalink feature.

During the summer of 2009, Klokan Technologies developed a new web client viewer for NLS still using the LizardTech Express Server, but using OpenLayers as a client. OpenLayers is a Javascript library, originally developed by MetaCarta in 2005, and provides an API for building a wide range of flexible and powerful web-based geographic applications (Hazzard, 2011). The new OpenLayers viewer addresses all the limitations of the previous LizardTech viewer, and also shares similar style sheets and code with the *Find by Place / Explore Georeferenced Maps* viewers (Fig 10).

### **GeoServer and OpenLayers Find by Place / Explore Georeferenced Maps viewers**

The *Find by Place* and *Explore Georeferenced Maps* viewers have been built completely from open-source software, particularly OpenLayers for the main map functionality, and GeoServer for the bounding boxes and spatial selection. GeoServer is open source server software, written in Java that allows users to share and edit geospatial data, developed over the last decade by The Open Planning Project (TOPP). It also works very well with OpenLayers, automatically preparing an OpenLayers-based presentation of geodata such as shapefiles with GeoServer, and through the related GeoWebCache module, allows much faster delivery of geodata through pre-prepared caches (in our case, of shapefiles).

In most institutional environments, there is a need to use both open-source and proprietary software, and different balances



9. Georeferencer - with the historic map on the left, and the modern map on the right, control points in blue - <http://maps.nls.uk/projects/georeferencer/>.



10. The OpenLayers MrSID Viewer, displaying a zoomable map, zoom buttons, an overview window, and standard header and footer wrapper - <http://maps.nls.uk/atlas/thomson/view/?sid=74400134>.

and combinations of them both often work well. There is also plenty of scope to alter the mix over time, especially as the availability and performance of open-source applications continues to grow. Map libraries often need to be flexible within institutional contexts that may only allow limited usage of open-source tools, and have longer-term strategies relating to catalogues, digitisation, and preservation, for example, that any technologies need to support.

### Conclusion

There is a great potential for other institutions or libraries to make available their maps and related geographical resources using these technologies. Georeferencing allows very powerful and successful access methods, and georeferenced metadata can be easily exploited by a growing number of portals. In addition, through georeferencing maps and sets of maps, they can be used and viewed in a number of new ways, especially through collaborative web services. They also can be integrated and displayed with (or as a backdrop to) other georeferenced data, and this has an even bigger potential. Many library collections are inherently geographical, in relating to particular places, and these collections can be geocoded in ever more successful, automated ways, to present them online with historical and modern maps. Hopefully this short paper has illustrated some of these initial possibilities, and encouraged others to explore the great opportunities that these technologies are allowing.

### Acknowledgements

I would like to thank Petr Pridal of Klokan Technologies, who has developed many of the open-source map technologies at NLS described in this article.

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- Georeferencer <http://www.georeferencer.org>
- GeoServer <http://geoserver.org/display/GEOS/Welcome>
- MapWarper <http://warper.geothings.net/>
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- NLS Find by Place viewer <http://maps.nls.uk/geo/find/>
- NLS Georeferencer <http://maps.nls.uk/projects/georeferencer/>
- NLS Historical Maps API <http://maps.nls.uk/projects/api/>
- NLS Map images website <http://maps.nls.uk>
- OldMapsOnline - search portal <http://www.oldmapsonline.org/>
- OpenStreetMap - NLS wiki page [http://wiki.openstreetmap.org/wiki/National\\_Library\\_of\\_Scotland](http://wiki.openstreetmap.org/wiki/National_Library_of_Scotland)
- OpenLayers <http://openlayers.org/>
- OS Opendata <http://www.ordnancesurvey.co.uk/oswebsite/products/os-opendata.html>
- ScotlandsPlaces <http://www.scotlandsplaces.gov.uk>
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## Nuevos avances en acceso y visualización en línea de mapas en la Biblioteca Nacional de Escocia

Este breve artículo presenta los últimos avances en los métodos de acceso para la visualización de mapas, y el uso de tecnologías de fuente libre en la Biblioteca Nacional de Escocia. Aunque la Biblioteca Nacional de Escocia posee una amplia colección de mapas de gran formato, que ascienden a unos dos millones de mapas de todas partes del mundo, la promoción del acceso con base en la web ha sido una prioridad durante casi dos décadas. El sitio web de la Biblioteca Nacional de Escocia *Map Images* (<http://maps.nls.uk>) cuenta ahora con 48.000 imágenes ampliables de alta resolución de mapas, la mayor parte de ellos relacionados con Escocia en los últimos cuatro siglos. El sitio web incluye mapas de la Ordnance Survey (agencia cartográfica británica), mapas de condados, planos de ciudades, mapas militares y mapas de terrenos, los cuales se utilizan para diversos propósitos, particularmente para historias familiares, historia local, arqueología, revisión de riesgos ambientales y propiedad de la tierra. Cada día, el sitio web recibe cerca de 1.300 visitas y la visualización de 10.000 páginas, y aunque el acceso gratuito como servicio es la principal prioridad, existe un módulo de comercio electrónico relacionado que permite hacer impresiones y solicitar imágenes y fotocopias. Esto, por supuesto, reviste una ventaja importante para la preservación, al mostrar las imágenes en lugar de los mapas originales, y usar dichas imágenes para generar copias.

Por razones prácticas, los principales avances recientes se han agrupado en las tres categorías siguientes:

1. mejora del acceso a mapas a través de recuadros de selección;
2. mejora de la visualización de mapas a través de la georreferenciación;
3. uso de tecnologías de fuente libre para reducir los costos y promover la colaboración.

Existe un gran potencial para otras instituciones o bibliotecas para permitir el acceso a sus mapas y los recursos geográficos relacionados usando dichas tecnologías. La *georreferenciación* permite métodos de acceso muy potentes y exitosos, y los metadatos *georreferenciados* pueden ser explotados fácilmente por un número creciente de portales. Además, a través de la georreferenciación de mapas y conjuntos de mapas, los mismos pueden usarse y visualizarse de diversas y nuevas maneras, especialmente a través de servicios web de colaboración. También se pueden integrar para mostrar con (o como telón de fondo de) otros datos georreferenciados, al relacionarse con lugares específicos, y estas colecciones pueden geocodificarse en formas automatizadas cada vez con más éxitos, para presentarlas en línea con mapas históricos y modernos. Esperamos que este documento ilustre algunas de las posibilidades iniciales y anime a otros a explorar las grandes oportunidades que permiten estas tecnologías.

# Coronelli's Virtual Globe

by **Andrea Adami**<sup>1</sup>, Phd candidate, Politecnico of Milan, and **Francesco Guerra**<sup>2</sup>, Associate Professor of Topography and Cartography, University IUAV of Venice, Italy

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*Nowadays globes are an important subject to study both for their history, their cartographic content and their artistic aspects. Moreover some softwares, such as Google Earth, Virtual Globe and many others, are very widespread because of their usability and, above all, because they represent a complex object, the Earth, in a intelligible way. This works deals with the possibility of applying digital technologies to the cartographic globes, especially Coronelli's one, to obtain a virtual copy to navigate and to query.*

Cartographic spheres, terrestrial and celestial, have aroused a big interest both for their artistic features and for different application and function they were planned. Anyway the first and the most important interest about these objects is concerning their application as a cartographic tool for navigation, for astronomy and, above all, for geography and geodesy studying. Moreover the possibility of representing the earth in a 3d view makes these objects almost unique: in fact they give an intuitive and immediate understanding of an "object" (the sphere) that cannot be represented in many other ways.

One of the most representative globemakers of the 17<sup>th</sup> century is the monk Vincenzo Maria Coronelli. He is well-known for the production of many maps and for a big project of an encyclopedia but, above all, he produced spheres with different sizes. On the cartographic surface he related not only geographic information, but also different themes such as exploration courses, journeys, news from far places and other information not strictly geographical. Among his works the most well-known cartographic spheres are the ones with a diameter of 382 cm realized for Louis XIV which is the stencil for the following small globes.

The exhibition at the Museo Correr in Venice "Sfere del cielo, sfere della terra. Globi celesti e terrestri dal XVI al XX secolo" proves a renewed attention due to the new possibilities of digital approach. Computer technologies allow new developments in the fields of the circulation and the study of historical cartography concerning more immediate and intuitive interfaces but also new instruments for the analysis.

It is important not to consider the globes only a cartographic instrument, but to give them an artistic and historical value. In this way it is necessary to face specific problems connected with their conservation, their restoration and, if possible, their use: the hard rotation of the wooden sphere around the main axes, the deformation of the surface and as result the deformation of

the map, the hard readability of the map because of the decay of the ink pigment and the continuous exposure to the light. In this context, Circe, University IUAV of Venice, started a research focused on the historical globes, in particular Coronelli's sphere, in cooperation with the Museo Correr and the Biblioteca Nazionale Marciana. The aim of this research is to apply new computer technologies and new survey instruments to preserve and to study the globes, in their different aspect of historical wooden sphere, cartographic instrument and also artistic object.

The first approach to the globes concerns their cartographic value. For the above-stated reasons now it is almost impossible to use the sphere and so the realization of a virtual globe has been the first step of the research in order to look at the map and to give the studios a new admittance to its historical, social and geographical content.

The study has been focused on an historical globe, kept in the Museo Correr, of the Venetian monk. In particular the globe belongs to the set with a diameter of about 108 cm and it is a terrestrial sphere so it represents all the known lands above the sea level with a rich geographic and social description. This sphere belongs to the group called "printed globe" because the map is not designed directly on the spherical surface, but it is made of printed paper gores which are applied on the wood using some sticks. In this way it was possible to increase the production of the spheres (the globes were very diffused also like a piece of furniture in the most important houses) by the use of printing. Moreover using a book with the printed globes, it was possible to send all the necessary for the globe in every place without the difficulties of moving a wood sphere.



1. Virtual globe.

1. [aadami@iuav.it](mailto:aadami@iuav.it)  
2. [guerra2@iuav.it](mailto:guerra2@iuav.it)



2. Original image of one sheet with the colorimetric scale.

This characteristic has been crucial in the solving of the virtual globe. In fact starting from a book of gores it has been possible to build a virtual copy of the sphere. The work has been divided into several steps concerning:

- digitalization of printed gores;
- analysis of projective content;
- reconstruction of the virtual sphere;
- exploration and visualization of the globe.

The digitalization of printed gores has been realized starting from a copy of the book of gores, called *Libro dei Globi*, in the Venetian edition of 1705 of the Biblioteca Nazionale Marciana.

The first aspect of the study was the analysis of the book. Before the whole acquisition of all sheets, it has been necessary to check the way of digitalization. The first experiment was made with the handyscan, a range camera which works by the principle of triangulation, in order to acquire the real, deformed, surface of the sheet. Using the 3d model of the paper and the pictures acquired by a high resolution camera it has been realized an orthophoto which has been compared to a simple picture to check the amount of the errors. This test showed the errors were quite small. For this reasons, in order to acquire all the 50 sheets of the terrestrial globe, the photographic method was preferred considering also the restricted times of acquisition. The images have been acquired by a high resolution camera, Nikon D2X, 12 Mpixel, with a calibrated optics and then every picture has been undistorted. In such a way the final images have a high resolution and a pixel size of 0,1 mm. In each shot there is also a Kodak colorimetric scale in order to check not only the thematic content of the gore, but also the radiometric aspect.

After this first step, the focus was the analysis of projective content of gores to discover how Coronelli built his gore. The search for a known cartographic projection, as considered nowadays, did not give any result. Instead in his writings<sup>3</sup> the mapmaker declares of using a modified geometric construction expounded by Glareanus in 1527 in the XIX chapter entitled "De inducenda papiro in globo" of his *D. Enrici Glareani poetae laureati de Geo-*

3. Vincenzo Coronelli. 1963. *Epitome Cosmografica*. Venezia. In particular "la seconda parte del Libro Terzo che contiene la pratica".



3. Left: original sheet from *Libro dei Globi*; right: transformed gore.

*graphia liber unus*. Particularly the method consists in drawing a line with the dimension of 2,5 the terrestrial equator, dividing the line in 25 parts and using 12 parts to build the gores. In such a way the drawn gores cannot cover exactly the sphere so it was necessary to dampen and stretch the paper during the application on the sphere, causing some deformations in the cartographic content as observed by Fiorini in 1893<sup>4</sup>.

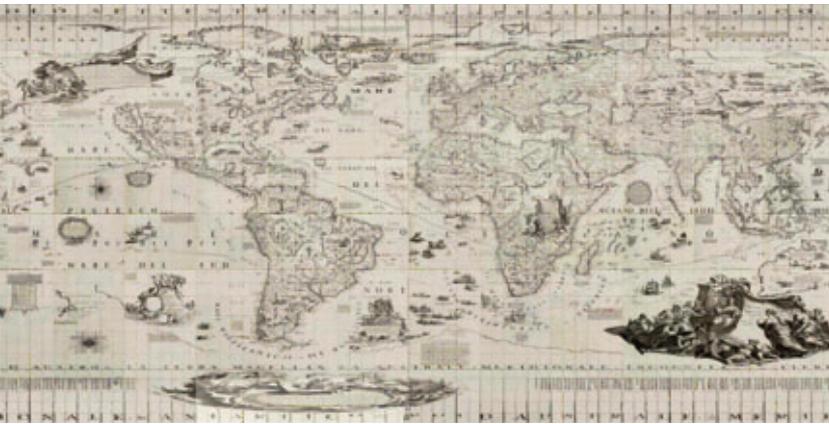
The absence of a known cartographic projection involves that it is not possible to use an exact transformation for the reconstruction of the virtual sphere. So the only chance to take all the gores in a clearly defined projection has been the use of local transformation defined by the correspondence of the drawn cartographic reticulate with the ideal one of a equirectangular projection (or Plate Carree) through an algorithm of triangulation<sup>5</sup>. This kind of projection has been chosen because most of commercial softwares use the equirectangular for the mapping of spherical surfaces. In this way all the gores (12 gores, each one divided into 4 sheets) and the Polar icecap (north and south icecap) have been transformed in a known projection, keeping the metrical control of the cartographic content and setting the pixel size to 0,1 mm.

Then it was necessary to map the images on a spherical surface. For the first application the software used was NASA WORLD WIND<sup>6</sup>. It is a freeware software, realized by Nasa, which allows to view the whole Earth mapped by satellite images or thematic maps. It works like the most famous Google Earth and it implements the possibility of adding new maps, to overlay the surface with the latitude and longitude lines and to zoom to read the details of maps. All imaged have been georeferenced and applied on the spherical surface using a file with the specification of latitude and longitude for each corner of the picture. In order to obtain the best performance from the software and the hardware, the image has been recorded in a PNG format and with different dimension of pixel connecting with the power of the pc.

4. Matteo Fiorini. "Sfere Terrestri e Celesti di autore italiano o conservato in Italia". In *Bollettino della Società Geografica Italiana*, 1893-94.

5. Realized by the software Ermapper.

6. [www.worldwind.arc.nasa.gov](http://www.worldwind.arc.nasa.gov)



4. Equirectangular representation of the map of the globe.

In such a way the exploration and visualization of the globe becomes really immediate and intuitive thanks to very simple interface of the software. Moreover the high resolution of the images allows to read each note written by Coronelli, to follow the exploration courses and to look at the features of each country.

This instrument, the digital-virtual copy of the globe, is an important instrument for geographers that can study the sphere without the difficulties of managing a fragile object. It is also a way to widespread the knowledge of the cartographic spheres between non-specialized people.

Furthermore the software allows particular analysis to underline some aspect of Coronelli's world. Overlaying the actual images of the Earth, like a satellite image, on the historical map it is possible to notice some details. First of all, it is evident that Coronelli, following the instructions of Louis XIII of France, fixed the main meridian (longitude zero) in the "Isola del Ferro" in the Canaries instead of Greenwich and so there is a translation of about 20 degrees towards the west. By the operation of transparency between overlaid maps, it is interesting to compare the coastline of the European countries. As regards Italy, for example, the orientation and the shape of the country are different. But focusing on the whole world, it is evident that there are many errors in the description of countries concerning not their position in latitude (which is quite exact), but in longitude (because of the difficulty of counting the distance along the parallels).

6. Overlay of satellite image and Coronelli's Map.

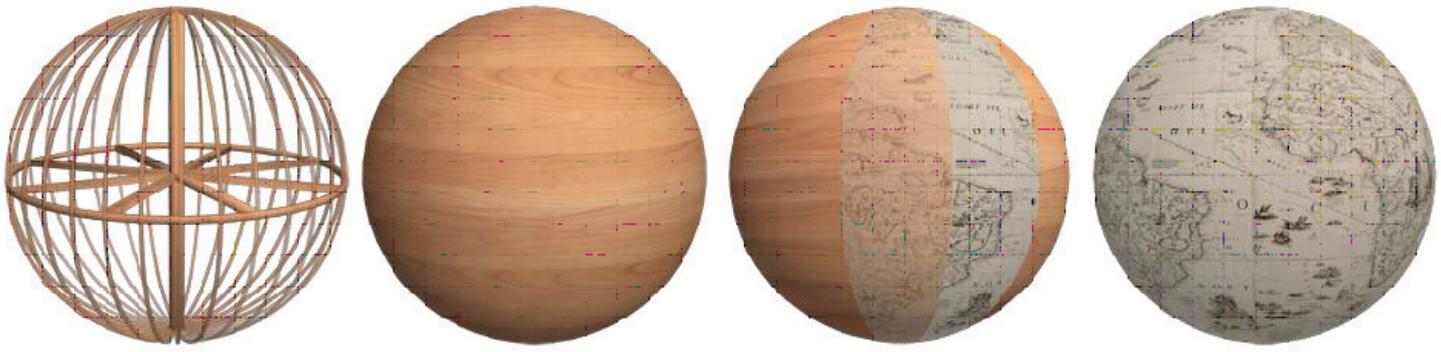


5. Screenshot from World Wind, with the mapped globe.

The second application, which is still in progress, will be exhibit at the 3<sup>rd</sup> International Workshop on "Digital Approach to Cartographic Heritage". It's an interactive software, realized in Delphi, with the aim of enable an immediate and customized navigation around the globe. It offers many possibilities such as the texturing of different historical maps on the spherical surface, the zoom for reading the smallest notes, the rotation and moving of the whole sphere. Moreover it is possible to change the visualization of the sphere from a spherical view to a cartographic-plane view. Finally this new software allows to overlay not only raster maps (like historical, satellite...) but also vector themes such as shape file to represent important cities, river and lakes and features in order to deepen the analysis.

Considering a widespread knowledge on historical cartography a virtual animation introduces to the main cartographic problem of transforming a sphere on a plane<sup>7</sup>. The storyboard of the animation shows an introduction to the main problem with a little note written by Coronelli himself and then some images of the book of Globes. Successively there is a representation of Glareanus geometrical construction and a scheme concerning Coronelli's Globe. At the end the texturing of a wooden sphere with the map and the visualization of the virtual globe reconstructed.

7. The animation can be found at the following link: [www.iuav.circe.it](http://www.iuav.circe.it).



7. Different steps of the animation: from the 3d virtual model of the globe to the final result.

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### El globo virtual de Coronelli

En la actualidad los globos terráqueos son un objeto importante de estudio, tanto por su historia como por el contenido cartográfico y los aspectos artísticos. Por otra parte, algunos programas de computación, tales como Google Earth. Virtual Globe y muchos otros, están muy extendidos debido a su facilidad de uso y, sobre todo, porque representan de una manera inteligible un objeto complejo, la Tierra. En este contexto, Circe, Universidad IUAV de Venecia, comenzó una investigación centrada en los globos históricos, en particular la esfera de Coronelli, en cooperación con el Museo Correr y la Biblioteca Nazionale Marciana. El objetivo de esta investigación es aplicar nuevas tecnologías informáticas y nuevos instrumentos de estudio, tales como la realización de un globo virtual, para preservar y estudiar los globos, en sus diferentes aspectos como esfera histórica de madera, instrumento cartográfico y también como objeto artístico.

# La reproduction des documents de grand format au Centre de Sablé-sur-Sarthe de la Bibliothèque nationale de France

by **Philippe Vallas**, Adjoint au Directeur du Département de la conservation, et **Bernard Dulac**, Chef de service du Centre technique de Sablé sur Sarthe, Bibliothèque nationale de France

Les ateliers du centre Joël-Le-Theule de Sablé-sur-Sarthe (département de la conservation) comptent parmi leurs atouts d'offrir un panel d'activités très diversifié, en raison des compétences existant sur place (catalogage, reliure et restauration, numérisation, station de désacidification unique en France).

Le traitement des documents de grand format est depuis longtemps une de leurs spécialités.

Les ateliers du centre Joël-Le-Theule ont commencé en 1984 la reproduction de cartes de grand format provenant du département des cartes et plans (fonds D'Anville et du service hydrographique de la Marine) ; ces documents bénéficiaient d'abord d'une maintenance physique. Le support de reproduction utilisé fut d'abord la microfiche monovue couleur (procédé Cibachrome), mise en œuvre à l'aide d'une caméra microfiche A0 fabriquée spécialement par le constructeur français Vanier-Photélec. Ce procédé photographique couleur était considéré comme le plus pérenne, à l'époque. Mais il était très coûteux en consommables et en matériel, et ces microfiches nécessitaient un appareil de lecture très volumineux, fabriqué à l'unité ; aussi ce procédé a-t-il été arrêté en 2004 au profit de la numérisation, après reproduction de plusieurs milliers de cartes. Les microformes ont été numérisées pour une part au début des années 2000.

Les documents, transportés à plat dans de grands portefeuilles, arrivent à Sablé de façon hebdomadaire par une navette interne. Les documents sont réceptionnés, inventoriés et transmis aux ateliers.

Certains d'entre eux sont directement envoyés en numérisation, après que les identifiants numériques ont été vérifiés, ou créés à l'issue du catalogage des documents.

D'autres entrent dans une « filière combinée » : catalogage et numérisation, nettoyage/ petites réparations et numérisation, ou numérisation et restauration.

Sur les 10 premiers mois de l'année 2012, 765 cartes ont été inventoriées avant catalogage, 382 ont été cataloguées avant numérisation (catalogage initial), 733 après numérisation (catalogage complémentaire).

3 380 documents sont passés dans les ateliers pour maintenance (dépoussiérage – gommage)/ petites réparation au papier japonais, 1 947 cartes du Ministère de la reconstruction ont été doublées, 354 cartes IGN ont été entoilées. Il est à noter aussi la restauration « lourde » (restauration, remise au ton ...) de 67 plans d'architecte (fonds Labrouste) et 99 cartes du Service Hydrographique de la Marine (SHOM).

Les ateliers ont commencé à numériser ce type de documents dès 2005, à l'aide d'une caméra numérique française i2S Supra-scan A0 (toujours actuellement utilisée), puis sur une caméra numérique de format A0 fabriquée en Italie (METIS DRSAO). Cette caméra est équipée d'un capteur tri- CCD 3x 12 bits.



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Ce matériel a été retenu, lors de l'appel d'offres, pour la qualité colorimétrique et la finesse de l'image (définition, qualité de la restitution dans les angles en particulier) par les experts du département de la conservation, afin de pouvoir enregistrer des graphismes très fins sur la totalité du document.

Cette caméra numérique permet l'enregistrement des documents jusqu'au format A0 (80 x 120 cm) à 400 dpi. L'acquisition des images se fait par balayage (prévisualisation, acquisition et enregistrement) à l'aide d'une source d'éclairage puissante à LED ventilées (18 ventilateurs alternent l'arrivée et l'extraction de la chaleur) afin d'obtenir la meilleure qualité d'éclairage possible, tout en évitant une température élevée préjudiciable au document ; le puissant faisceau lumineux n'éclaire le document que pendant quelques secondes, lors de son déplacement.

Les images sont enregistrées dans le profil colorimétrique universel Adobe 98.



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Dans le cas de formats supérieurs à A0, les documents sont « découpés » en plusieurs fichiers avec un recouvrement de 10 à 20%

Ensuite les images sont assemblées à l'aide d'un logiciel de couture, PanaView Image Assembler, afin de pouvoir obtenir une image complète du document.

Cette image est unique, ou, si le poids de l'image est supérieur à 1 Go, l'image est livrée en 100 dpi accompagnée des fichiers « découpés » qui, eux, sont visibles en 400 dpi. Un autre logiciel est aussi utilisé, Photomerge d'Adobe Photoshop. On utilise l'un ou l'autre en fonction des résultats obtenus.

Les images sont ensuite post-produites : rattachement dans un fichier XML des métadonnées du document (notice bibliographique, pagination, taille, résolution, format ...) et de l'image.

Le document numérique ainsi réalisé est livré, via une liaison informatique dédiée, au service numérisation où les images sont analysées pour un contrôle qualité (données images, cohérence des données du fichier XML...) et transmises au département de collection pour validation (contrôle de cohérence). A l'issue de ces étapes, les documents numérisés sont envoyés sur « SPAR » (Système de Préservation et d'Archivage Réparti), le système d'archivage pérenne des données numériques de la BnF.

Enfin les images sont mises en ligne sur Gallica, pour le grand bonheur de tous les chercheurs.

Une fois tous les contrôles passés, les documents originaux sont retournés, toujours conditionnés à plat, vers les départements de collection.

Dans les 10 premiers mois de l'année 2012, les ateliers de Sablé ont ainsi numérisé 4361 documents de grand format du département des cartes et plans, représentant 8072 images numériques, participant notamment au programme de numérisation des portulans (6 documents/ 113 images).

Les ateliers ont également travaillé pour le département des estampes et de la photographie, à hauteur de 1471 documents de grand format (1704 images), et ce pour des originaux de format proche du A0, et allant parfois jusqu'au double A0, voire plus.

### Exemple de document accessible dans Gallica :



### Détail après l'application du zoom dans Gallica :



### Notice complète visible dans Gallica :

**Titre :** L'Amérique divisée en ses principaux états, assujettie aux observations astronomiques / par le Sr. Janvier

**Auteur :** Janvier, Jean (17...-17...? ; éditeur). Cartographe

**Auteur :** Choffard, Pierre-Philippe (1731-1809). Dessinateur

**Éditeur :** chés Latré graveur (A Paris)

**Date d'édition :** 1760

**Sujet :** Cartouches (ornement)

**Sujet :** Arbres

**Sujet :** Végétation

**Sujet :** Divisions politiques et administratives

**Sujet :** Amérique -- Divisions politiques et administratives

**Type :** document cartographique, carte, image fixe

**Langue :** Français

**Format :** 1 carte : ill., contours col. ; 66 x 47,5 cm

**Format :** image/jpeg

**Droits :** domaine public

**Identifiant :** [ark:/12148/btv1b67000041](http://ark:/12148/btv1b67000041)

**Source :** Bibliothèque nationale de France, département Cartes et plans, CPL GE DD-2987 (8510 B)

**Relation :** Notice de recueil : <http://catalogue.bnf.fr/ark:/12148/cb40577015h>

**Relation :** Appartient à : Collection d'Anville ; 08510 B

**Relation :** <http://catalogue.bnf.fr/ark:/12148/cb40595487d>

**Couverture :** Amérique

**Description :** Échelle(s) : [ca 1:31 000 000 à l'Equateur]

**Provenance :** bnf.fr

**Date de mise en ligne dans Gallica :** 03/02/2012

A ce jour, près de 11 000 documents libres de droits du fonds J. B. d'Anville sont consultables en ligne sur Gallica.

# The Role of Risk Assessment in Digitising Special Collections

by **Roswitha Ketzer**, Collections Conservation Quality Manager, **Flavio Marzo**, Gulf History Arabic Science Project Conservator, and **Jane Pimlott**, Preventive Conservator, The British Library, UK

## 1. Introduction

As part of a long-term digitisation strategy [1], the British Library initiated a digitisation pilot project for early Greek manuscripts funded by the Stavros Niarchos Foundation. Within this project 284 early Greek manuscripts were digitised to facilitate wider access to readers nationally and internationally.

From the Collection Care point of view the project had several components:

- As little physical impact as possible on the manuscripts
- A detailed risk assessment
- Condition assessment before and after digitisation
- Remedial conservation work on selected manuscripts
- Training for the photographers and cataloguing staff in handling, monitoring, advising and building of cradles

In order to assess potential damage during digitisation, a risk assessment was carried out. The condition of the manuscripts chosen for this project ranged from fair to good. Those in poor condition had already been excluded following a condition assessment.

This paper assesses and evaluates the potential risks associated with the handling of manuscript material for a special collections digitisation project. It aims to provide a systematic examination of various risk related aspects of the project, and looks at ways in which these risks can be reduced.

## 2. Risk management in cultural heritage

Insurance companies, other businesses, and governments have been using the idea of risk management for many years, but its application to the preservation of collections of cultural heritage is relatively recent. The first publication on risk assessment in preventive conservation appeared in the late 1980s [2,3].



1. Greek manuscript documented during condition assessment. ADD 15 276 Heron Byzantium, De strategematibus, f.1v and f.2r, 16<sup>th</sup> century.

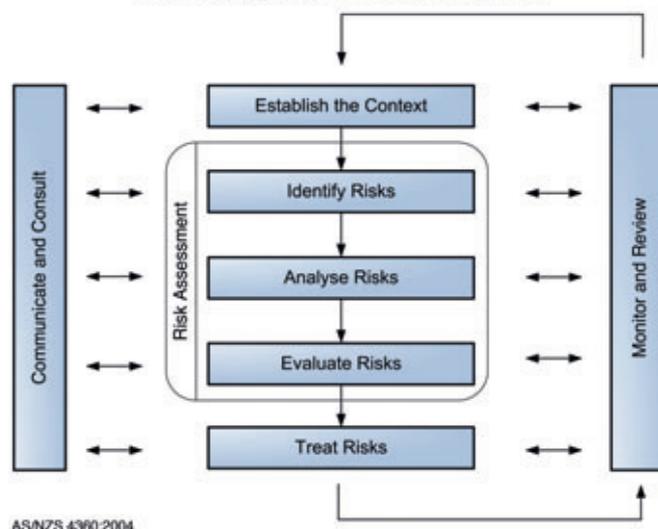
A risk assessment is carried out to facilitate the identification of potential damage to objects and the mitigation of risks. A risk assessment is defined by R. Robert Waller [4] as “the formal, structured identification of generic and specific hazards and determination of the magnitudes of generic and specific risks to a cultural property”.

The first step in a risk assessment is the identification of a hazard, which is “an agent with potential of causing an adverse effect” [4], which means harm or “a source of danger” [5]. An example for the identification of potential hazards and their risks is a slippery road (the hazard) that would make a car swerve and hurt a person (the risk). An example related to the project is an access route between storage and treatment area, which is narrow and bumpy (the hazard) and the books could be damaged during transport (the risk). All potential hazards must be identified, addressed, reduced and/or removed.

At the same time risk has to be identified, which may be rare, sporadic, regular or irregular. Identification of the risks can be done by looking at the object for evidence of past damage; water damage, pest damage or physical damage. Risks to items can also be identified by looking at past events in the immediate or wider environment; seasonal events, fire incidents, theft incidents; and frequency of past events. It has been found [6] that there is a relationship between risk and frequency, severity and predictability, which indicates that catastrophic and highly unpredictable events are very rare, while trivial and highly predictable events are very common. So events can be rare but catastrophic in outcome, or very common or frequent but mild in their outcome.

The risk assessment is part of the overall risk management process. First the context has to be established so that the risks can be identified, analysed, evaluated and treated.

### Risk Management Process Overview



2. Risk Management Process Overview according to AS/NZS 4360:2004 [7].

### 3. The set up

The risk assessment for this project is based on the standard 'Risk Management AS/NZS 4360:2004' and work done by the Canadian Conservation Institute (CCI) and Robert Waller at the Canadian Museum of Nature [7,8,9].

This risk assessment was set up in four steps:

1. Workflow strands of the project
2. Context
3. Risk agents
4. Risk levels

#### 3.1. Workflow strands of the project

This risk assessment covered most aspects of the digitisation project, and therefore seven workflow strands were identified which needed to be addressed:

- Cataloguing
- Condition assessment before digitisation
- Transportation to and from conservation studios
- Digitisation
- Digitisation in studio 2 with "Mayer cradle"[10]
- Condition assessment after digitisation
- Consultation by readers

Conservation work was carried out when necessary prior to digitisation following standard procedures within the conservation department. Therefore conservation was not addressed again for this project as a separate workflow strand.

#### 3.2. Context

The context had to be established because it defines the parameters and sets the scope within which the risk is being assessed. It is essential that risks are presented within a meaningful and unambiguous scenario. The following contexts had been ascertained:

- *Book removal*  
Removing books from shelf.
- *Transporting multiple books*  
More than one book is transported by hand and on trolleys.
- *Consultation of manuscript*  
Opening books, turning pages, taking measurements during cataloguing, use by readers, during digitisation and condition assessment.
- *Use of tools*  
Use of inappropriate tools during consultations like sharp items, pens, inappropriate supports or weights to keep books open or in place.
- *Loss/damage due to fire*  
For example, arson or faulty wiring.
- *Loss/damage due to water*  
For example, flood, rain or leaks.
- *Light damage*  
Natural light from windows without UV filters.

- *Uncontrolled environment for more than 24 hours*  
Storage within safe area but without environmental control according to PD 5454:2012 [12].
- *Transfer between areas with different climate*
- *Misplacement*  
Misplacement of manuscript when moved from shelf through unclear and irregular tracking, incomplete foliation and possible loss through theft or vandalism.

#### 3.3. Risk agents

Risk agents were identified from a standard list by Waller [9].

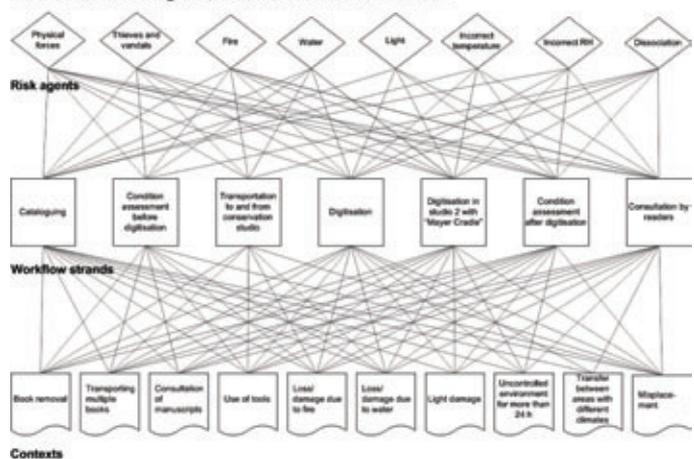
- Physical forces
- Thieves
- Fire
- Water
- Light
- Incorrect temperature
- Incorrect RH
- Dissociation

Pests, contaminants and radiation were excluded from this risk assessment, because there were considered as unlikely risks within this pilot project.

#### 3.4. Risk levels

The evaluation of risk levels was done according to the "ABC risk assessment scales for museum collections" [11], which determine the frequency of the perceived risk (A), the value lost in each affected object (B) and the proportion of the collection that is affected (C). These factors are each measured on a scale of 0 - 5 to calculate the Magnitude of Risk. This is a combination of  $A + B + C$  with a maximum score of 15 possible on a logarithmic scale. The result was presented according to a scale showing "Implications of different Magnitudes of Risks:  $A+B+C$ " [11]. A scale of 1 to 15 indicates different levels of magnitude of risk from tiny or minuscule damage (1) to catastrophic loss (15). So 7 and below in bluish colour indicates a tiny loss of value to a tiny fraction of the collection, and scores up to  $13\frac{1}{2}$  to 15 in red colour indicate a catastrophic loss with all or most of the collection value lost in a few years or less.

Links between risk agents, workflow strands and contexts



3. Links between risk agents, workflow strands and contexts.

# ABC risk assessment scales for museum collections

Assessing risks to collections. Sibiu Romania. 2007 ICCROM-CCI-ICN  
Final course version. If you have comments, please contact stefan\_michalski@pch.gc.ca



**A** For events, how often does the risk occur?  
For continual processes, how soon does the risk occur?

For events that occur more often than once per year, consider them as continual risks. For continual risks, select a degree of damage that is relevant to your context, and assess the time required to accumulate this damage. This can be maximum possible damage by that risk, or just noticeable damage, or a point between.

Score	Events: Mean time between events. Continual: Time to accumulate damage assessed in B.	Probability in 1 year	Probability in 100years	Events per 10 years per 1000 museums
5	~ 1 year			10 000
4 ½	~ 3 years	0,3		3 000
4	~ 10 years	0,1		1 000
3 ½	~ 30 years	0,03		300
3	~ 100 years	0,01		100
2 ½	~ 300 years	0,003	0,3	30
2	~ 1 000 years	0,001	0,1	10
1 ½	~ 3 000 years	0,000 3	0,03	3
1	~ 10 000 years	0,000 1	0,01	1
½	~ 30 000 years	0,000 03	0,003	



**B** How much value is lost in each affected object?

Use the average loss across all objects affected.

For continual risks, be sure to assess the damage and moment in time that has been selected for scoring A.

Score	Word definition	%	Number of affected objects equivalent to total loss of one object
5	Total, or almost total, loss of value in each affected object	100%	1
4 ½		30%	3
4	Significant loss of value in each affected object	10%	10
3 ½		3%	30
3	Small loss of value to each affected object	1%	100
2 ½		0,3%	300
2	Tiny loss of value to each affected object	0,1%	1 000
1 ½		0,03%	3 000
1	Miniscule loss of value to each affected object	0,01%	10 000
½		0,003%	30 000



**C** How much of the collection is affected?

This quantity is measured in terms of the "collection value pie"

In large collections of equal value objects, this can be measured by counting objects, folders, shelving length, etc.

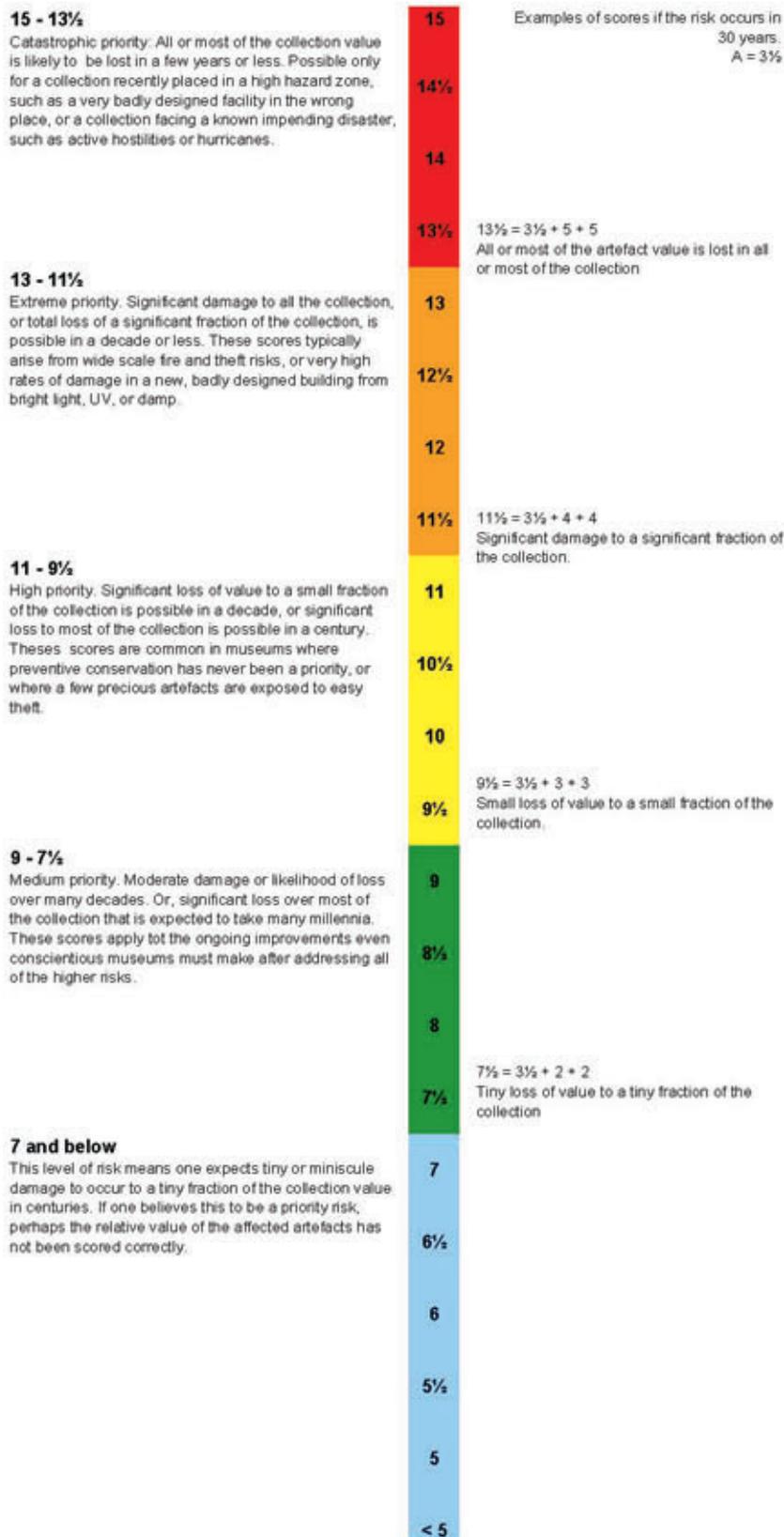
Score	Word definition	Fraction	%	Decimal
5	All or most of the collection value	1	100%	1,00
4 ½		1/3	30%	0,3
4	A significant fraction of the collection value	0/10	10%	0,1
3 ½		1/30	3%	0,03
3	A small fraction of the collection value	1/100	1%	0,01
2 ½		1/300	0,3%	0,003
2	A tiny fraction of the collection value	1/1 000	0,1%	0,001
1 ½		1/3 000	0,03%	0,000 3
1	A miniscule fraction of the collection value	1/10 000	0,01%	0,000 1
½		1/30 000	0,003%	0,000 03

**A + B + C = Magnitude of Risk (MR)**

## Implications of different Magnitudes of Risk: A+B+C

Assessing risks to collections. Sibiu Romania. 2007 ICCROM-CC-ICN

Final course version. If you have comments, please contact stefan-michalski@pdc.gc.ca



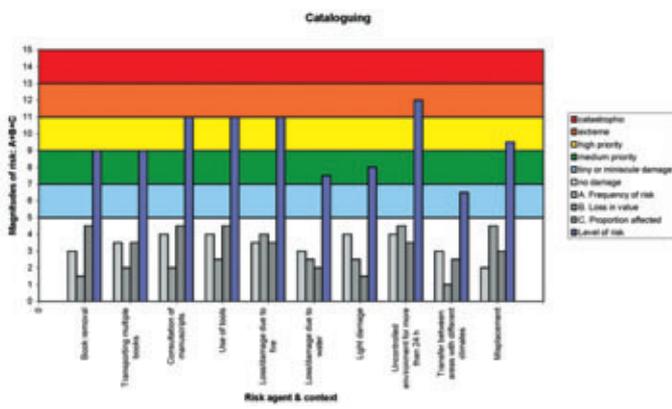
### 3.5. Risk evaluation

Through the complexity of this risk assessment several hundred evaluations were needed, caused by the relationship or interdependency between seven workflow strands, eight risk agents and ten different contexts. Not all contexts or risk agents had been applied to all workflow strands.

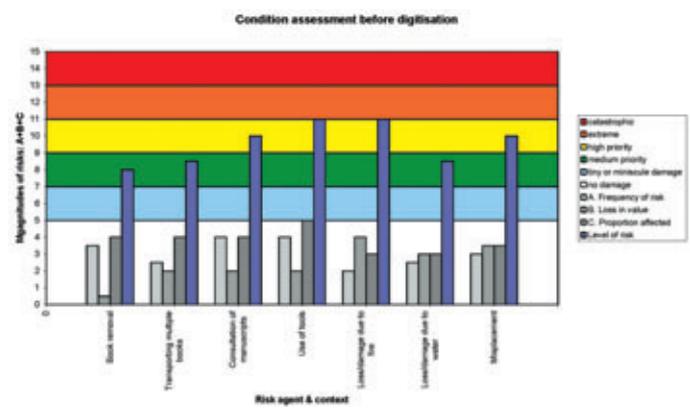
A peer meeting with seven colleagues from Collection Care was organised to reduce the subjectivity of the risk assessment. The context, risk agents and workflow strands were considered and the evaluations were recorded. The final results are the average of all combined assessments. The data created is collated in Excel spread sheets.

### 4. Results

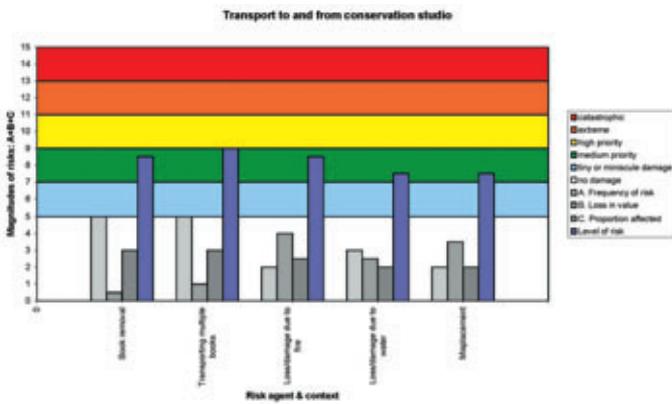
The results revealed that similar activities have different risk ratings according to their context.



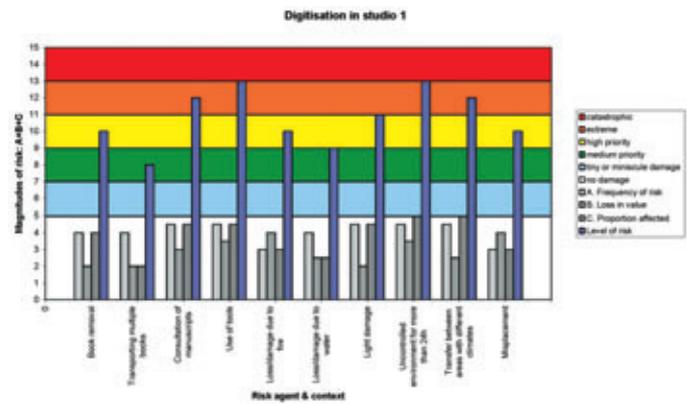
6. Results of risk assessment for Cataloguing.



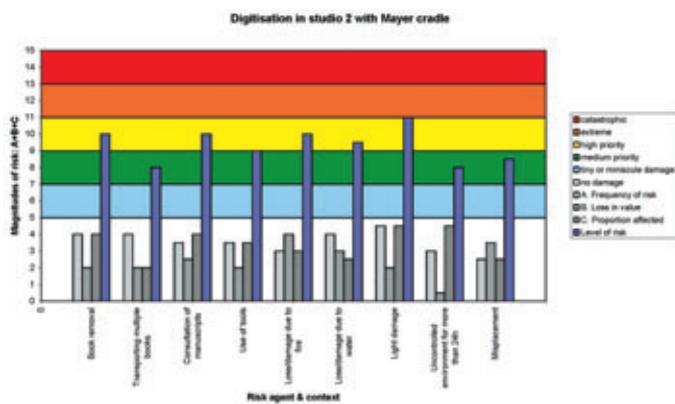
7. Results of risk assessment for condition assessment before digitisation.



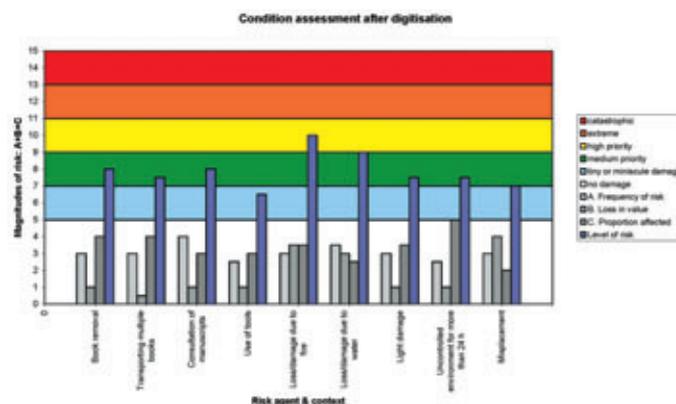
8. Results of risk assessment for Transport to and from conservation studio.



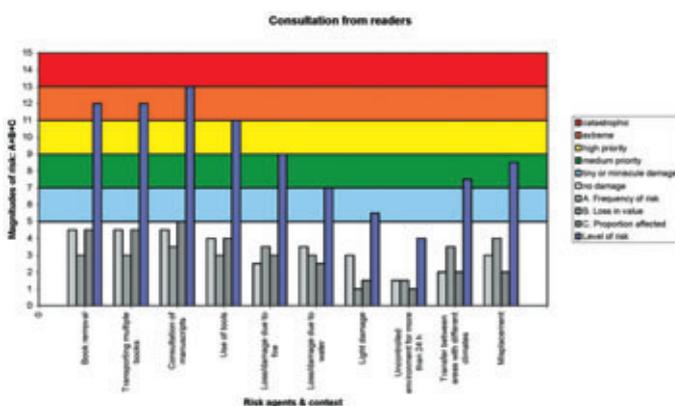
9. Results of risk assessment for Digitisation in studio 1.



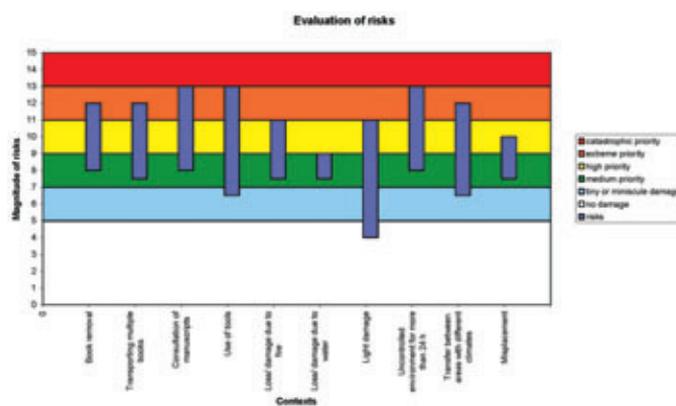
10. Results of risk assessment for Digitisation in studio 2 with Mayer cradle.



11. Results of risk assessment for Condition assessment after digitisation.



12. Results of risk assessment for Consultation from readers.



13. Evaluation of risks.

“Book removal” was calculated as an extreme to medium risk depending on context. Damage to the cover or the spine by pulling books from the head or tail caps, and possible abrasions to cover material through tight storage could cause significant harm to the collection.

“Transporting multiple books” was found to present an extreme or medium risk according to context. Manuscripts falling from trolleys by not being supported firmly or by transporting too many at the same time could cause damage to the cover and or text block.

“Consultation of manuscripts” was rated from extreme to medium risk depending on context. It was judged that damage could occur to cover and text block through poor or excessive handling.

The “Use of tools” was established to range from extreme to low risk depending on context. The covers and text blocks of the manuscripts could be damaged by using inappropriate tools during consultations like pens, sharp items, inappropriate supports or weights to keep books open.

“Loss / damage due to fire” was calculated to range from high to medium risk depending on the context. Damage or total loss due to fire caused by faulty electrical devices, or lights, terrorism or human error was taken into consideration.

“Loss / damage due to water” was judged to be medium risk due to flooding, leaking pipes, and fire sprinkler systems, because the library is purpose built and under good maintenance.

The level of risk for “Light damage” was considered to range from high to no risk taking into consideration possible damage to cover and text block through heat produced through light exposure, which can cause distortions to leather and parchment; or fading of media or substrate caused by ultra violet light.

Risk related to “Uncontrolled environment for more than 24h” was calculated to range from extreme to medium. Extreme results were found in the workflow strands of cataloguing, digitisation and consultation from readers and proved to be the highest persistent risk in this risk assessment caused through handling books in areas where environments conforming to PD 5454:2012 [12] do not prevail. Significant damage to the collection is to be expected like micro damage and distortion to the parchment support, and deformation to the leather of covers.

Similar risk related to “Transfer between areas with different climates” was calculated to range from extreme to low.

Risk of “Misplacement” including vandalism and theft was calculated to range from high to medium. Loss might occur through poor tracking when labels are misplaced on the book



14. Custom made cradle made by one of the authors.

and shelf, or incomplete foliation of items that do not instantly appear to belong to the book.

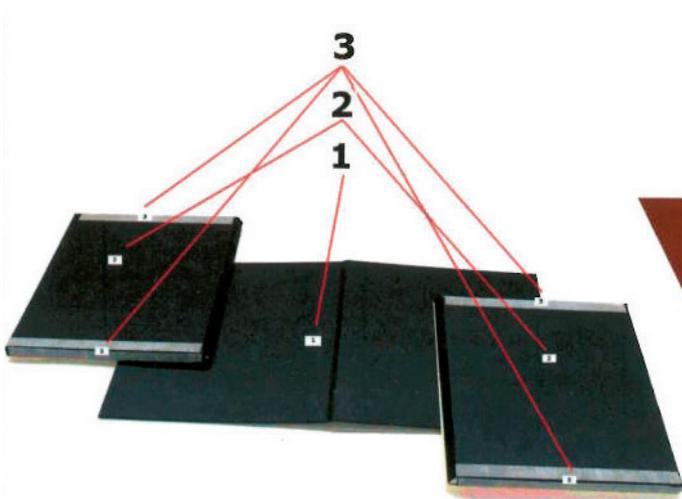
“Consultation of manuscripts”, “Use of tools”, “Book removal” and “Transporting multiple books” are the other extreme risks, which can be identified as handling of manuscripts in general. Damage can be as severe as pulling part off the binding or generally breaking the binding or the text block.

### 5. Treatment of the risks

Observing basic preservation handling rules, training, the use of cradles and limiting access time to collection items were used as control measures.

As environmental changes present the highest risks for the manuscripts it is imperative to have a maximum time that items can be kept in the digitisation or curatorial spaces, where manuscripts are only brought from preservation storage areas when the photographers or curators are ready to photograph, refer to or catalogue.

Handling presents the second highest risk overall, therefore those involved in these processes should first be trained and



15. Construction of the custom made cradle.

observe some of the basic preservation handling rules, such as clean hands, ensuring one has the correct handling equipment such as trolleys, cradles, wearing gloves where necessary and knowing the route considered as safe access route before an item is moved. This will ensure that everyone is prepared for the safe handling of manuscripts from the point of removal of an item from a shelf to its safe return.

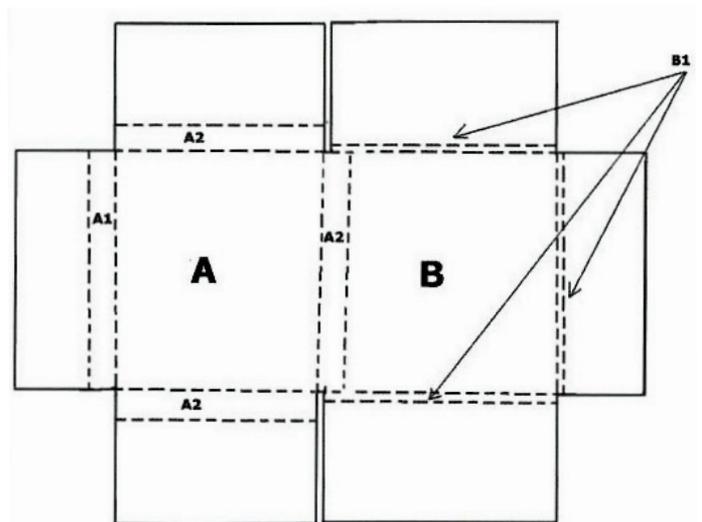
Handling during the digitization process was identified as one of the highest risks. To reduce this risk it is suggested that, in addition to the use of a Mayer cradle, a custom made book cradle developed by one of the authors should be used [13].

This custom made cradle supports the manuscripts while they are being photographed, which proved successful and has enabled the safe digitization of many of the manuscripts so far. The book is held in place by strips of linen tape, conservation paper or polyester and attached with Velcro to the book support. The covered polyethylene foam board bases are angled at the edge close to the fold. The hinged baseboard is attached to the bases by sliding it into the slots at the back of the bases.

The book support is made from three components, two pieces of board joined together by black cloth, buckram to make a hinged baseboard (1), and two pieces of polyethylene foam lined with the same buckram cloth (2). Strips of Velcro are placed on the edges of the support (3).

### 6. Continuous improvement

A continuous improvement programme reviews space, storage, updating and training of staff on handling issues and monitoring various aspects of security. The next review will take place within two years.



- A: Plastazote
- B: Board
- A1: Fold of covering material equal to thickness of A
- A2: Equals A1 plus thickness of covered base board
- B1: Fold of covering material equal to thickness of B

Good communication flow between teams proved to be important for re-evaluating and reviewing the risk assessment process. Team members are beginning to understand and appreciate the need to reduce physical and chemical risks that may harm the future preservation of the manuscripts, and flag issues as and when they present themselves.

It is expected that the documentation of this risk assessment will be referred to as part of the whole collection care risk management process of this project.

## 7. Conclusion

The process of risk assessment provided the opportunity to collate data and create risk recording spread sheets that would provide an easy route to understanding the main risks associated within this special collections digitisation project and their control measures.

In conclusion, poor or over-handling and poor storage of bound manuscripts provide the greatest risk, possibly resulting in irreparable damage.

Poor storage during cataloguing and digitisation was considered to be an extreme risk, with a score of 12 to 13. This score relates to the storage of manuscripts in the manuscript department and in the photographic studio, whose environment does not comply with PD 5454:2012. Handling, digitisation and consultation by readers present high risk scores with extreme ratings between 12 and 13. Overall no catastrophic risk was identified within any context of the project

Nonetheless, it must be noted that a recent risk assessment undertaken by the British Library highlighted that major risk agents for the entire collection were wear and tear, theft and

dissociation. In turn these are still relevant to the potential risks associated with this pilot project, and consequently must not be ignored especially during the handling workflow strands of this project.

A bound manuscript is a complex structure where all elements are subject to various degrees of deterioration. Leaving a book open for too long can damage its spine structure, and cause inks and pigments to fade. The aim is to minimize risks, through training in handling, best practice in collection care by monitoring and safeguarding the preservation requirements during handling.

Consequently it is crucial to understand these various elements of manuscript construction, and how each element works when a manuscript is being consulted. It is also worth appreciating that manuscripts have survived longer in our care because they are normally kept within a controlled and constant environment.

The aim of Collection Care is to minimize such risks by providing adequate information and training relating to handling issues for those staff and public involved in the handling of collection items. Our main focus is to ensure best practice in Collection Care by monitoring and safeguarding the preservation requirements of collections during handling, whilst facilitating the process of their safe access. Ultimately risk mitigation only succeeds in its aim to reduce risk through a coherent approach within the various levels of project communication, and it is only with this in mind that we can all help to ensure the future preservation of the collections in our care.

This risk assessment project became a point of reference for similar digitisation projects, and assisted in the development of other handling strategies within the British Library.

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- [10] The Mayer cradle is designed to facilitate the digital capture of fragile, restricted opening volumes. It was invented, and is built by Manfred Mayer of The University Library, Graz, Austria.
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# Ensuring Long-Term Access to the Memory of the Web

## Preservation Working Group of the International Internet Preservation Consortium

by **Clément Oury**, former Co-Leader, Preservation Working Group, Head of Digital Legal Deposit, Bibliothèque nationale de France,  
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### About Web Archiving and Preserving Content

Archiving the Web is the process through which documents and objects on the World Wide Web are captured and stored. There are and have been a number of ways through which this has been accomplished, but the end result is archived Web content (Web site, page, or part of a Website) that is preserved for future researchers, historians and the general public. Since the early days of the Web, much attention has been paid to the processes of capturing Web resources as a necessary first step for preservation. Since that time, International Internet Preservation Consortium (IIPC) members involved in archiving culturally important Web content have created Web archives of several petabytes of data. However, relative to many of the approaches that have been either proposed or implemented for other types of digital collections, efforts to sustain long-term access to those resources are comparatively immature.

Preservation involves maintaining the ability to present meaningful access to information over time. In the context of Web archives, the intention of preservation is to retain access to archived Web resources, so they can continue to be used and understood despite changes in access technologies or without unacceptable loss of integrity or meaning.

There is also divergence in the understanding of what preserving Web content actually means. Defining the basic unit to be preserved is necessary in choosing how we count and evaluate our assets and has implications on the level of treatment we apply, including packaging the data and choosing metadata.

- Are we preserving each harvested Web file/Web page? If so, each individual Web file should be processed as a separate document, which leads to according individual treatments such as identification, characterization and description at that level of granularity.
- Are we preserving Websites? Websites are generally viewed as the logical units of the World Wide Web and institutions generally catalogue at this level.<sup>1</sup> One complexity is defining a Web site. For example, hillaryclinton.com was captured by the Library of Congress during the 2008 Presidential Election. Is the Web site hillaryclinton.com or is it also her archived Facebook, Twitter, YouTube, and video content? If an institution wanted to record the original structure of the Website

1. <http://netpreserve.org/working-groups/resources/iipc-preservation-working-group-report-iipc-steering-committee>

(notably recording the hypertext relationships between each file), they would need to produce a very complex and large metadata file.

- Are we preserving the artifacts produced by the crawl engine? Content information is then all data produced by a single harvesting process of a robot. They are generally stored in container files.

### 1. The Preservation Working Group (PWG)

The IIPC, chartered in 2003, is made up of institutions with basically similar goals of preserving Web content for heritage purposes and which generally share the same harvesting and access tools. Membership of the IIPC is constituted by regional, national, research, non-profit and academic libraries and archives, and service providers. The managing committee is called the Steering Committee (SC).

In January 2007, the SC confirmed the establishment of a Working Group on Preservation. The SC has charged the PWG with the following mandate:

- Characterize large scale Web archives in order to
  - Identify relevant approaches, standards and practices already used for preservation of other digital assets.
  - Report on how they might be used with archived Web resources and/or
  - Identify the gaps and promote new approaches.
- Make recommendations for enhancements or additions to tools, standards, practices, guidelines, testing, and possible further studies/research.
- Promote recognition of the unique requirements to preserve archived Web resources not achieved by other preservation programs for digital assets.

The inaugural meeting of the IIPC PWG was held in conjunction with the General Assembly of the Consortium, held in Paris in April 2007. The 2007 PWG focused primarily on practical issues associated with characterization of Web archives. It concluded that :

- Many existing standards and approaches are applicable to Web archives but in some cases require some adaptation for large-scale Web archives.
- In terms of standards, OAIS offers a high-level framework, which can be applied to Web archives.

- The Trustworthy Repositories Audit & Certification: criteria and checklist (TRAC) provide a more detailed implementation of OAIS. The PWG conducted an in-depth analysis of TRAC Section A (Organizational Infrastructure) and identified nine of the twenty four criteria which it believes to be of immediate practical utility for Web archives and a further four which it believes will become critical in the near future.
- Future development of JHOVE 2 and DROID 2 are seen as a widespread recognition of the need to develop greater efficiency in processing digital objects.
- There is a dearth of relevant training.
- Issues associated with the ability to maintain accessibility still require attention.

In 2009, the PWG was re-energized and reconstituted itself with two co-leaders, Clément Oury, Bibliothèque nationale de France and Gina Jones, Library of Congress. Tobias Steinke subsequently replaced Clément as co-leader in 2011. In 2009, a new Terms of Reference (TOR)<sup>2</sup> was submitted to the SC. The TOR defines roles and activities for the PWG leaders, Working Package (WP) leads and PWG members.

- PWG leaders oversee the activities of WP leaders and take the lead on ensuring effective internal and external communications.
- WP leaders manage the activities of WP members and take the lead on ensuring effective communications with the WP team.
- PWG members actively participate in WPs.

### **Current Goals and Working Fields of the PWG**

The PWG focus is on policy, practices and resources in support of preserving the content and accessibility of Web archives. The PWG aims to understand and report on how approaches used for other kind of digital resources might be used with Web archives as well as the special characteristics of Web archives that might require new approaches. It also makes recommendations for additions or enhancements to tools, standards, practice guidelines, and possible further studies/research.

Working Fields (WF) are long-lasting research areas for which a Work Package (WP) may be designed to address part or all of that research area. The following WFs have been identified as relevant to the PWG and to the preservation of archived Web resources. They may be considered as the scope of the PWG:

- objectives and concepts of preserving archived Web resources;
- preservation metadata for archived Web resources (capture, packaging, usability);
- preservation workflows and digital repository functions and requirements (including questions related to Web archives storage);
- preservation strategies for long-term access to archived Web resources (migration, emulation);
- technical documentation (notably Web technical environment documentation);
- evaluation of digital preservation tools and gaps for use by Web archiving institutions;
- organizational issues (costs, sustainability, promotion, skills, etc.).

2. [http://netpreserve.org/sites/default/files/attachments/PWG\\_TOR\\_final.doc](http://netpreserve.org/sites/default/files/attachments/PWG_TOR_final.doc)

## **2. PWG activities and achievements**

As stated in the terms of reference of the PWG, its interest covers a broad range of activities, from the development of tools and standards to the promotion of Web archive special needs towards the larger digital preservation community.

### **Standards and best practices development**

Only few standards are Web archiving specific – but those are critical ones. To store and preserve their collections, most Web archiving institutions are using the ARC format or its successor, the WARC format (hereafter collectively referred to as W/ARC format). The former, designed in 1996 in the pioneer years of Web archiving, is a container format where all harvested Web files are stored as ARC records, along with selective metadata (URL, harvesting date, checksum, etc.). The latter is essentially an improvement of the ARC format, with unique identifiers for each records and a larger set of metadata. The main advantage of the WARC format is to be an official ISO standard (ISO 28500:2009)<sup>3</sup>.

Evolution, usage and enrichment of these formats are critical goals of the PWG. Some of its members were involved in the WARC standardization process, as they were also in the writing of the format implementation guidelines, which give advices to create WARC files well designed for long term preservation.<sup>4</sup> A last step was lacking: in order to characterize W/ARC files, i.e., in order to record the significant information and metadata that describe those files, it was necessary to have a characterization scheme. Such a scheme was proposed in 2011 by the BnF along with other PWG members: the containerMD scheme was released.<sup>5</sup> It is primarily intended for W/ARC files but it is also able to describe all kinds of container formats, notably the GZIP format, which is commonly used for the lossless compression of Web archives.

Additionally, some PWG members are also working in maintenance bodies of other preservation standards, such as the PREMIS editorial committee or METS editorial board. They are keen to promote the specific needs of Web archives. Finally, some PWG members are involved in an ISO working group whose goal was to define statistics and quality indicators for Web archiving; they were, of course, in charge of those related to preservation<sup>6</sup>.

### **Development of digital preservation tools for Web archives**

As a working group of the IIPC, the PWG actively supports and helps the development of dedicated software, either by requesting direct funding or by encouraging the cooperation between IIPC members. The PWG supports open source tools in order to offer them to a wider community and, whenever possible, it tries to build dedicated functionalities upon already existing software used in the digital preservation realm. In this domain, we can list as major achievements:

3. <http://bibnum.bnf.fr/warc/>

4. <http://www.netpreserve.org/resources/warc-implementation-guidelines-v1>

5. <http://bibnum.bnf.fr/containerMD-v1/>

6. <http://netpreserve.org/projects/statistics-and-quality-indicators-Web-archiving>

- Development of JHOVE2 modules for Web archives. JHOVE2 is the new version of the widely adopted JHOVE1 validation and characterization tool. Compared to JHOVE1, this new version offers two main features that are especially of interest for Web archives. First, it distinguishes identification of file format and the more detailed validation and characterization. The latter is performed by specific JHOVE2 modules (a new module has to be developed for each format), whereas the former is performed by other tools (notably DROID). Second, JHOVE2 is able to perform analyses at different levels when it deals with container formats. It is thus able to validate and characterise W/ARC files and then (optionally) identify, validate and characterize all files contained within as W/ARC records. It is critical to have a characterization tool for Web archives. Web archives contain hundreds or thousands of formats on which institutions have very little information. Moreover, the MIME type sent by the server during the HTTP transaction is unreliable. This is problematic in that knowledge of file formats is the cornerstone of many preservation strategies! Two developments were thus fostered by the PWG.

- The first one was funded by the BnF as part as the development process of the Web archives ingest module for its digital repository. A private company developed, for the BnF, a GZIP and an ARC module for JHOVE2, and opened the possibility to use File instead of DROID in the identification process. The PWG acted as the forum where BnF specifications were reviewed by members, notably by the California Digital Library, responsible of the core development of JHOVE2.
- The second development project, directly funded by IIPC and performed by the National Library of Denmark, added a module for the WARC format. GZIP, ARC and WARC modules may be downloaded freely and will soon be released in the JHOVE2 main branch.<sup>7</sup>

- The “WARC tools” project. This project is intended to develop a suite of open source tools that support and promote the use of the WARC format. It encompasses indeed a wide range of functionalities:
  - production of and access to WARC files;
  - metadata and statistics extraction;
  - WARC record filtering according to different filters (URL of record, format, etc.) and
  - conversions from ARC to WARC format.
- Strictly speaking, this IIPC-funded project was not initiated by the PWG, but the Group has been in charge of the writing of specifications, and the tests will be performed by PWG members. Interim releases are already available.<sup>8</sup>

### Research work

Besides the promotion and support of tools development, the PWG has also performed more prospective research works. In 2009, the National Library of Australia conducted intensive inquiries into the current solutions for the migration or emulation of digital content, in order to see if they were fit for Web archives and in order to identify the gap between existing and desirable solutions.<sup>9</sup> With the same goal – understanding what would be necessary to maintain access to Web archives – the BnF conducted in 2010 a large-scale study of file formats available in Web archives, from the end of the 1990s to the then-

current year.<sup>10</sup> This study was built on information provided by nine PWG members from seven different countries. Two years later, the British Library analysed the file formats in their own Web archive and the changes over time.<sup>11</sup> These two examples correspond to the above mentioned PWG objective of describing the Web environment.

### Knowledge exchange

As the IIPC groups the leading institutions in the field of Web archiving, the PWG represents an excellent forum to exchange and share information and best practices. For example, most PWG members are building or intend to build digital repositories where they will ingest their Web archives in order to preserve them in the long run. According to the OAIS model, the ingested and stored resources should be part of an “information package” aggregating the Web archive data and different kinds of metadata. There are many ways to design these information packages – defining the data model, deciding what metadata should be recorded, choosing a packaging scheme... and there is no single best way – it always depends on the missions, the objectives and the resources of the institution. Examples of information packages were shared through the IIPC forum, in order to help institutions already having a packaging model assessing it, and to help less advanced institution finding examples and ideas to answer their specific needs.

### Promotion of Web archives

Advocating for the understanding of Web archives as a primary target for digital preservation is the last goal of the PWG. On one hand, the PWG uses the IIPC Website – recently redesigned – to publish documentation and reports, even though it is sometimes hard to determine what should be publicly accessible and what is more sensitive and should be distributed to PWG members only. On the other hand, the PWG – as a whole or through individual presentations of its members – promotes its own activity in publications and conferences. Two events are of a particular importance: the General Assembly of the IIPC (which takes place every year generally in April or May), and the iPRES conference that gathers worldwide experts in digital preservation. A panel on Web archive preservation was held, for example, during the most recent iPRES conference (October 2012).

## 3. Future directions

The PWG will continue the current activities but also discuss and initiate new possibilities to deal with preservation for Web archives. This will always be a mixture of fruitful discussions to share ideas and thoughts about general strategies and practical approaches to find helpful solutions for concrete problems. Of course, the practical work is driven by the projects and activities in each member institution.

The general problem of digital preservation remains providing access to the content in the most authentic way. There is no obvious strategy regarding how to do this for a Web archive in

7. <https://bitbucket.org/nclarkekb/jhove2-iipc>

8. <http://code.hanzoarchives.com/warc-tools>

9. <http://www.netpreserve.org/sites/default/files/resources/Methodologies.pdf>

10. [http://netpreserve.org/sites/default/files/attachments/Poster\\_ipres2010\\_Webarchivefileformats\\_oury%281%29.pdf](http://netpreserve.org/sites/default/files/attachments/Poster_ipres2010_Webarchivefileformats_oury%281%29.pdf)

11. <http://arxiv.org/abs/1210.1714>

the long run. The usual strategies of migration and emulation might not be as suitable for Web archives in the same way as they are for other digital archives. Each institution with a digital archive has to deal with the challenge of finding the best solution for their collections. In the PWG, this process is discussed in regular meetings and will lead to new activities to support the task. The question of migration or emulation depends on different factors and the scope of each institution. The PWG will continue to identify these factors and the dependencies on significant properties.

One important step to deal with the changing environments is to keep a record of the problems and environments. The PWG has initiated two databases.

- In a risk database, each institution can assess potential risks and problems for Web archives in a systematic way. Examples for these risks could be “Archived content becomes corrupted”, “Inability to adapt to fundamental changes in Web concepts or components” or “Not enough storage space for Web archives”. The database allows filtering the risks and accessing different categories.
- A second database describes the Web environments for a certain time period. This includes specific Web browsers like “Internet Explorer 3.0” but also typical viewer applications and plugins that were installed at that time. Keeping the look and feel of the original usage is only possible if the environment used by the majority of Web page visitors of the time period is known. This knowledge is the requirement for a preservation strategy like emulation. The PWG started by collecting the actual used and still known Web environments in its member institutions; based on this data, it builds a searchable database, which will hopefully lead to emulation workflows for Web archives.

Both databases exist in an early version and will be developed further for public access.

The PWG is hopeful that member institutions’ research may lead to future WP(s). Findings of the Bibliothèque nationale de France and of the British Library on file formats in Web archives were discussed in the PWG and further analysis could help focus preservation actions on certain file formats. Another interesting aspect is the preservation of the actual view of the user. The IIPC member Hanzo Archives harvests not only the Web page but also takes a screenshot of it. For interactive experiences on the Web like online games, it might be helpful for the future understanding to record and archive a video of the actual usage. This aspect of storing not just the harvested primary content but also secondary material about the user experience could be something for further investigation in the PWG. There is also an activity to collect stories of observed digital damages.<sup>12</sup> Historically speaking, there are just a few pre-2000 Web archives, but hopefully the PWG could provide and point out existing cases of digital damages to learn from.

Migration is not only a possible solution for providing access to obsolete file formats; it is also a necessary activity to maintain the Web archive itself. Most of the existing Web archives have a legacy collection of data packaged in ARC files. Switching to the newer WARC format is desirable but is a challenge for the institutions, especially if they already have a huge amount of data in ARC. The PWG supports the development of tools for this conversion. The study of the migration process itself will help understanding migration activities on file formats in general and provide valuable information on efficient management of Web archives.

In conclusion, the PWG is not only a forum to exchange experiences and ideas about preservation of Web archives. It is truly a working group in a sense that practical solutions are developed cooperatively.

12. [www.atlasofdigitaldamages.info](http://www.atlasofdigitaldamages.info)

## Announcements

### "Preventing Pests by IPM", Preservation Advisory Centre training day, 10 January 2013, British Library, London, UK

Led by David Pinniger, Independent Consultant Entomologist, this one-day workshop introduces Integrated Pest Management (IPM). It is aimed at anyone with responsibility for library and archive collections. Participants will learn about the main insect pests: what they need to live, how to identify them, the damage they cause, how to control them and how to prevent them becoming established.

Cost: £100.00 + VAT including lunch and refreshments

Programme and booking details: <http://www.bl.uk/blpac/pests.html>

### Call for Papers: IFLA WLIC 2013 Satellite Meeting, "Creating the future: preserving, digitizing and accessing all forms of children's and young adults' cultural heritage", 14-15 August 2013, Bangkok, Thailand

IFLA Section Libraries for Children and Young Adults, IFLA Core Activity on Preservation and Conservation (PAC), Thailand Knowledge Park and ThaiBBY invite you to submit a proposal for a presentation on the theme "Creating the future: preserving and digitizing all forms of children's and young people's cultural heritage", the IFLA Pre-Conference to be held in Bangkok, Thailand, 14-15 August 2013.

#### Pre-conference Venue

Thailand Knowledge Park

#### Expected Audience

The expected audience is likely to include children and young adults' librarians, National Libraries, libraries serving indigenous people, librarians working in audiovisual and multimedia, storytellers and other performers for children, other professionals working on children's and young adult's reading, students and university professors and partners of libraries in joint reading promotion programmes.

#### Topics

We are particularly interested in presentations on the following topics:

- Preserving and/or digitizing books, journals and original artwork for children and young adults

- Preserving and/or digitizing immaterial children's and young adults' culture: storytelling, puppets, theatre, rhymes and songs...
- Preserving and/or digitizing web pages, video games, TV programmes, audio cassettes
- Preserving and digitizing local content and indigenous knowledge, for inclusion of all citizens at the library
- Giving access to digitized collections for children and young adults
- Libraries and partners for conservation and/or digitization: museums, NGOs, corporations...

#### Submission Guidelines

- Proposals should be sent before January 31<sup>st</sup> 2013 via email to: Kirsten Boelt ([kbt-kultur@aalborg.dk](mailto:kbt-kultur@aalborg.dk))
- They must include (in English):
  - Title of paper
  - Summary of paper (up to 500 words- ½ page)
  - The speaker's name, address, telephone and fax numbers, professional affiliation, email address and biographical note (40 words)
- The official language of the meeting is English. No simultaneous interpretation will be provided.
- The abstracts will be reviewed by the Review Committee. Successful proposals will be identified and announced by February 22, 2013.
- Full text papers should be provided by 15 April, 2012; papers should be 3-20 pages long. They must be written in English, include an abstract and be in a Word file.
- Oral presentations of papers will be of 20 minutes. Presentations must be in English.

#### Important Dates

Deadline for submissions: January 31, 2012  
Notification of acceptance/rejection: February 15, 2012

Final program and full registration information: March 10, 2012

Deadline for submission of final papers' texts: April 15 2012

#### Expenses

Registration fees will be waived for the speakers. However, it is the speakers' responsibility to find funding for travel, accommodation and associated costs, which IFLA and its Sections are not in a position to fund.

#### Sponsors

IFLA Section Libraries for Children and Young Adults

Chair: Viviana Quiñones ([viviana.quinones@bnf.fr](mailto:viviana.quinones@bnf.fr))

IFLA Core Activity on Preservation and Conservation (PAC)

Director: Christiane Baryla ([christiane.baryla@bnf.fr](mailto:christiane.baryla@bnf.fr))

Thailand Knowledge Park, Bangkok

### IFLA World Library and Information Congress: IFLA-PAC Core Activity Open Session, 17-23 August 2013, Singapore

During the IFLA WLIC 2013, the IFLA PAC Core Activity will organize a session on the following topic: "From paper preservation to digital preservation: innovations in Asia." IFLA PAC Core Activity has several regional PAC Centres in Asia working and lobbying in preservation: Beijing, Tokyo, Seoul, Almaty. The open session will be the occasion to present new tools and initiatives in Asia, using the IFLA network in the continent.

More details on this session will be provided later.

Contact: Christiane Baryla ([christiane.baryla@bnf.fr](mailto:christiane.baryla@bnf.fr))

### V Jornadas de Conservación y Restauración, 30-31 de agosto de 2013, Biblioteca Nacional del Perú

Los días 30 y 31 de agosto de 2013 se llevarán a cabo las V Jornadas de Conservación y Restauración organizadas por el Instituto Superior de Conservación y Restauración Yachay Wasi.

La gran acogida y la numerosa asistencia que ha conocido este evento desde sus inicios en el año 2003 nos motiva a organizar esta V edición esperando contribuir de esta manera a la actualización y reafirmación de la profesión.

Las Jornadas tienen como objetivo principal establecer un espacio de discusión y divulgación de los proyectos, investigaciones y acciones que conciernen a la conservación y/o restauración del Patrimonio Cultural del Perú y de Latinoamérica. Asimismo, busca actualizar a los conservadores/restauradores en los distintos materiales y técnicas aplicadas internacionalmente con miras a evaluarlas y contrastarlas con las utilizadas en la región, así como definir la ética de la profesión.

Informes:

Instituto Superior de Conservación y

Restauración Yachay Wasi

Av. San Martín 141, Barranco

Lima-Perú

Tel. (511) 252 9145

[fiorella.huerto@yachaywasi.org](mailto:fiorella.huerto@yachaywasi.org)

[www.yachaywasi.org](http://www.yachaywasi.org)

## Report

### **“The Blue Shield and emergency responses for cultural property: the role and necessity of national committee”, September 7, 2012, the Tokyo National Museum, Tokyo, Japan**

By Naoko Kobayashi, IFLA-PAC Regional Centre for Asia Director

Nearly eighty experts in cultural property gathered for a meeting titled “The Blue Shield and emergency responses for cultural property: the role and necessity of national committee” held at the Tokyo National Museum on September 7, 2012. The organizer was the Japan Consortium for International Cooperation in Cultural Heritage (JCIC Heritage) and the IFLA-PAC Regional Center for Asia was one of the co-sponsors. Five lectures and a panel were given and the first step toward establishing a Japanese committee of the Blue Shield seems to have been taken.

#### **Background**

The JCIC Heritage, organizer of this meeting, is a networking consortium that aims to contribute to the sustainable development of “international cooperation” related to the preservation of cultural heritage. It primarily deals with foreign cultural properties, but since the Great East Japan Earthquake, it has become interested in preparedness to safeguard Japanese cultural property from disaster.

As you know well, the Blue Shield is an international organization working for the protection of cultural heritage. It is composed of five non-governmental organizations; International Council on Archives, International Council of Museums, International Council on Monuments and Sites, Co-ordinating Council of Audiovisual Archives Associations and IFLA. The activities are managed by the international committee, the association of national committees and national committees in nineteen countries. At present, there is no national committee in Asia and this meeting was the very first occasion to discuss the establishment of a national committee in Japan on which all national organizations related to the NGOs above gathered round.

Just after the Great East Japan Earthquake, the “Cultural Property Rescue Programme,” a national-level and cross-institutional emergency response project, was organized by the Agency for Cultural Affairs for salvage and treatment of damaged cultural heritage. The Rescue Programme enabled us to save damaged materials in a collaborative way. But as this project is a temporary one due to end in March 2013, it will not be able to help the completion of salvage work or prepare for future disasters. Therefore, there recently has been a growing demand in the Japanese cultural heritage community to establish a cross-institutional and permanent organization like a national committee of the Blue Shield to cope with disaster.

#### **Lectures and a Panel Discussion**

The keynote speaker was Ms. Corine A. Wegener, President of the US Committee of Blue Shield (USCBS). She told us how she succeeded in establishing the USCBS. She has been a curator of the Minneapolis Museum and had been working part-time for the US military for more than twenty years. When she was sent to Baghdad, Iraq, in 2003, she witnessed destruction to museum collections committed during armed conflict. At that time, the US was not able to send experts to treat the cultural property. She strongly felt the necessity of “a large umbrella” under which experts would cope with emergency situations in times of armed conflict. She negotiated with the US military, the US government and other cultural property organizations. And at last, the USCBS was established in 2006. Under the umbrella of the USCBS, she coordinated initial activities to protect cultural property in Haiti after the earthquake in 2010. We knew the necessity of cross-institutional cooperation among the cultural heritage communities to cope with disaster, but we had not realized the importance of communication with the government and the military. Her lecture described real activities to protect cultural heritage in time of armed conflict and showed us further challenges.

The other four lectures were given by Japanese experts in museums, archives, immovable cultural property and science. Mr. Ken Okada, a conservation scientist at the National Research Institute for Cultural Properties, Tokyo, and a main member of the

secretariat of the “Cultural Property Rescue Programme,” referred to the program as the largest project to salvage cultural property in the history of Japan. He also pointed out financial problems. He mentioned that each organization that participated in the program had to pay the expenses of its own activities as no national budget was allotted to the project, and that it was essential to get necessary funding steadily to prepare for disaster in future.

Mr. Yuji Kurihara from the Kyoto National Museum, one of the main actors to launch the “Cultural Property Rescue Programme” in March 2011, also noted the importance of a permanent organization and appropriate funds to be prepared for emergency. Even if a good collaborative network among cultural property experts exists, their organizations cannot deal with emergency activities continuously without a reliable organizational base and proper funds.

Dr. Yuji Adachi from Kobe University insisted that pre-registration of cultural property helped emergency activities a lot especially in the field of historic buildings. Dr. Yujiro Ogawa from Bosai International described emergency response as “just putting plans into practice” and the audience totally agreed with his description. Both emphasized the importance of disaster preparedness.

In the last part of the meeting, experts from the national committees of ICOMOS, ICOM, national film center and national library (IFLA-PAC Regional Center for Asia) joined with the speakers for a panel discussion. It became clear that a cross-institutional and permanent organization should be established to prepare for future disaster, as well as to complete the rescue work for cultural property damaged by the Great East Japan Earthquake. But can we establish a new organization based on the “Cultural Property Rescue Programme”? Where should the secretariat be located? How can we build a framework that enables employed experts to join emergency activities on the ground for a certain period? How can we get funds steadily? Many challenges were discussed and left undecided. We are still struggling in each field.

**Photo by the Japan Consortium for International Cooperation in Cultural Heritage**



# PAC CORE ACTIVITY

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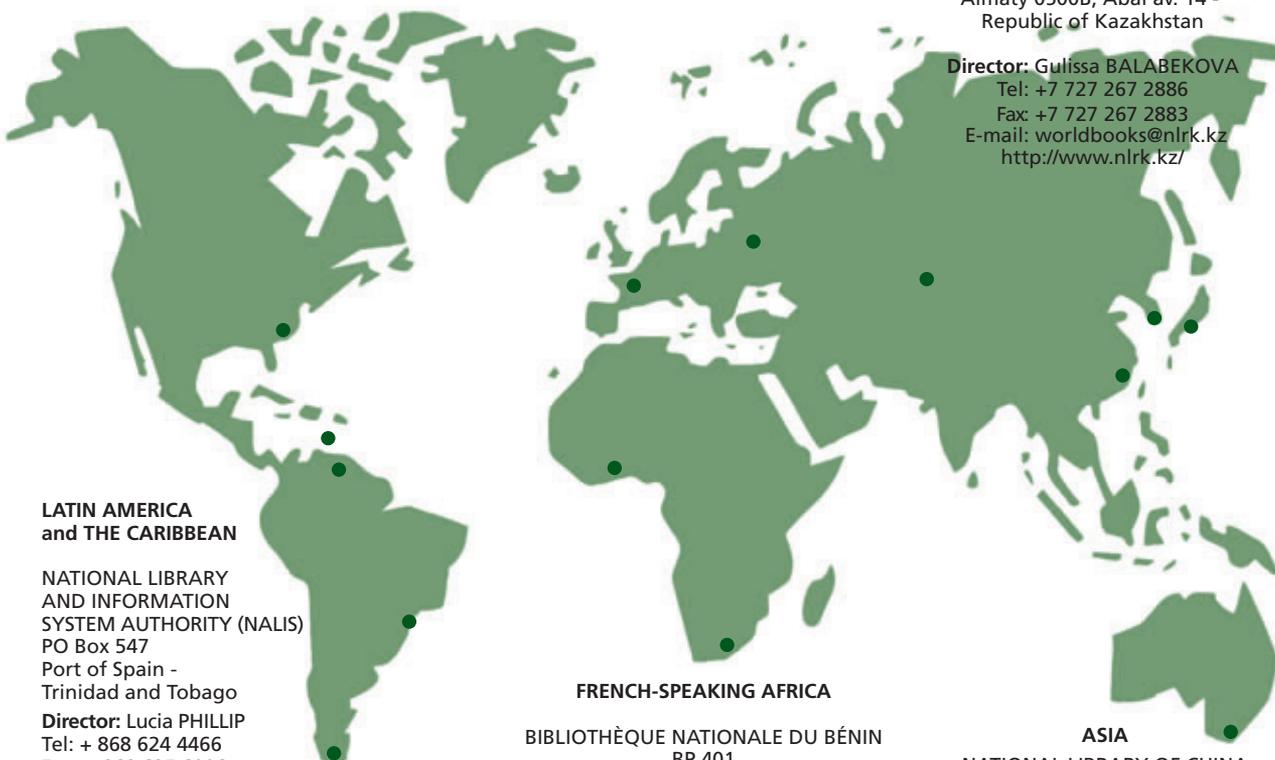
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