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Promoting cartographic heritage via digital resources on the Web

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Summary

The Centre for Computing in the Humanities (CCH) at King's College London is a research centre that conducts highly collaborative research projects with partners from the international academic community and cultural heritage organizations. The projects encompass disciplines such as archaeology, art history, classics, history, linguistics, literature studies and music. They frequently result in the creation of digital resources that utilize a variety of technologies to present contemporary and archival material to an audience of scholars, students and members of the public. The projects provide an opportunity for CCH to research issues concerning the digitization, design, implementation and delivery of such resources. This paper discusses some of the intellectual, research, pedagogical, and practical issues affecting the use of archival cartographic material in projects that create digital resources from mixed materials for use by a wide spectrum of users. It is illustrated by examples from a number of projects. Although it is grounded in specific examples to support the points being made, the main aim is to draw out a series of general themes which affect the preparation and delivery of cartographic heritage material via the internet.

Introduction

The Centre for Computing in the Humanities (CCH) at King's College London collaborates with project partners from a variety of humanities disciplines within the education and cultural heritage community on a range of projects that involve archive materials including maps. This has given the Centre an opportunity to explore methods of digitizing, contextualizing and delivering cartographic heritage within web-based digital resources. A number of our projects combine old maps with other archival material such as photographs, images of artefacts, historical documents and multimedia material. When used together these present cartographic heritage within extensively contextualised digital resources. The tools and resources produced are used by cultural heritage organisations such as museums and galleries as well as in the College's own teaching and research. The audience for these resources are drawn from a broad range of scholars, researchers, students and members of the public with a variety of interests in the subject material. The projects themselves draw on knowledge and expertise from a variety of humanities, science, computer science, and library and information science disciplines. CCH provides an environment in which these various disciplines and practices meet, interact, and exchange knowledge and experience concerning how computing and communication technologies can be used to enhance scholarship in each field. This is the essence of the emerging discipline of humanities computing with which the Centre is deeply engaged.

The presence of old maps in collections of mixed materials on the web promotes cartographic heritage material to new audiences, both specialist and general, across many social and cultural groups. The paper does not discuss digitization, concentrating instead on issues surrounding the

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presentation of heritage map material over the web, some of which are possibly unique to maps. It will highlight some of the challenges and benefits that the projects have revealed.

Case Studies

Mapping Migration in Macedonia

This was a low budget pilot project to evaluate the use of web-based technologies and Geographical Information Systems (GIS) to explore and display information about forced migration in a region of Macedonia (now in northern Greece) from 1880 to 2000. The project ran for a few months in 2001 and provided our first experience of using maps and geographical information systems on a cultural heritage project. The use of maps in a variety of roles in the production of a mixed media collection was examined. The pilot project explored the approaches, techniques and technologies that would be required for a potential large-scale project. It identified challenges that would be encountered and possible novel solutions that could be applied within a limited budget. The project was hosted by the CCH at King's College London where it was one of a number of projects using such technologies to combine old maps with other archival material such as photographs, images of artefacts, historical documents, and multimedia material of both historical and contemporary data. It was an example of a new style of digital project in the humanities that make use of image, spatial database and text-based technologies to produce a digital museum of cultural heritage. The partners were: The Refugee Studies Centre, University of Oxford, the Centre for Computing in the Humanities, King's College London and the Research Centre for Macedonian History and Documentation, Thessaloniki.

Being a pilot project the aim was to investigate tools and methods rather than produce a final resource. The focus was primarily on how web technologies and Geographical Information Science techniques and software could be used in an on-line cultural heritage resource. The significant finds in terms of cartographic heritage concerned the delivery of old maps over the web (which will be discussed in the general 'challenges' section) and the potential value of using GIS alongside archival material. The geographical region covered by the project was subject to political and social upheaval as different nations laid claim to it during the period being studied. The cartographic heritage that has been preserved shows how maps reflect the views and political aims of their creators as the cartographers of each phase favoured the political aims of their employers. This is frequently seen in place names shown on the maps; the different languages of successive authorities are used but place names are also changed rather than just transliterated. This is useful for a variety of teaching purposes but also offers a potentially rich role for GIS. The information about these differing world views is scattered across multiple maps that were compiled at different times and at different scales. GIS offers the ability to store the place names from different times and cultural perspectives and allow the user to create maps that reflect a particular cultural viewpoint at a specific point in time and compare it to others of differing viewpoints. In this way it can be used to integrate multiple perspectives of the past allowing them to be visualised at various scales. GIS used in conjunction with cartographic heritage material could assist in the creation of a dynamic representation of time and place within culture. There are substantial problems affecting the use of GIS with historical data, which are beyond the scope of this paper, but it can still be used to produce simple but highly effective resources that can be used in conjunction with old maps. These could be in the form of maps at the same scale and time as a given archival map but reflecting a different political or cultural viewpoint of the content thus allowing a comparison of

the different world views. Within a web-based digital resource a GIS can be used to produce a variety of maps and overlays that make the archival material easier to use and interpret. It can also be the basis for implementing links between different archival material such as photos, art prints, documents, newspapers, sound recordings and moving image material that are linked by being associated with a particular geographical location. All this provides a remarkable historical and cultural context for the map material but also shows how the cartographers who created the maps were influenced by that context. When published on the web these resources are opened up to a very wide audience.

The resources produced by this style of project benefit scholars in cultural studies, refugee studies, and social science history as well as anyone with a more personal casual interest in the material. They demonstrate the application of information technology, especially GIS, to cultural and historical studies showing how it can enhance the value of cartographic heritage material and increase the understanding of the issues affecting the use of maps as historical documents.

Iraq and Britain: relations through war, independence and beyond

The story of the development of modern Iraq began in 1919. The Ottomans had ruled the territories of Mosul, Baghdad and Basra for two hundred years but the ending of World War One ushered in a period of change for the Middle East. At the Paris Peace Conference of 1919 the three provinces were united into the single state of Iraq. Through the mandate system devised at the conference former Ottoman territories across the region were placed under the supervision of the League of Nations. Administration of each mandate was entrusted to one of the allied powers; in the case of Iraq this was Britain. The early years of the new state were troubled ones. The mandate system was unpopular with many Iraqis who really wanted full independence, a revolt against the British followed in 1920. After the revolt a fresh settlement emerged. Iraq gained a monarch (King Faisal) and a form of democracy.

Iraq achieved formal independence through a treaty in 1930 (effective from 1932) though the relationship between Britain and Iraq continued long after this. Under the 1930 treaty Britain retained some military bases and continued to train the Iraqi army. During World War Two British troops entered Iraq again to suppress a coup and protect the country's northern oil fields.

The relationship between Iraq and Britain since the end of World War One has been a complex one. A little of this story is told through the images presented in this [project](#), selected from the archives of King's College London. The images cover the period from 1920 to the 1950s and represent a brief overview of some of the material that King's holds for the period.

The project produced what is effectively an annotated image library. The images encompass a range of materials which include old maps. In this case the presence of old maps allow the places named in the captions associated with the old photographs to be located on maps that are contemporary with the images themselves. As in the previous case study the maps show many expressions of the world view of the cartographers who created them and posed the problems described in the 'challenges' section of this paper.

Local history project for Key Stage 2 School Pupils

This is a project that the author is developing with a local school on a voluntary basis. The school curriculum in the United Kingdom is defined by the Government in a framework called the National Curriculum. Each subject (English, Maths, Science, History, Design Technology etc) has a

well defined curriculum and pedagogical goals but the integration of subjects, wherever possible, is encouraged. The age range seven to eleven years old is covered by what is known as Key Stage 2 (KS2). The purpose of history teaching at this age range is to introduce children to the unfamiliar world of the past and to answer questions such as: How did we get here? Where do we come from? The aim is to encourage the use of detective style work to build a picture of the past. Children use different kinds of evidence to find out about peoples' lives and events and how things have changed. Wherever possible this work is set within their own locale, thus giving it a foundation in their everyday experience and the histories of their own families.

One of the key parts of the [KS2 history curriculum](#) is described as 'A study investigating how an aspect in the local area has changed over a long period of time, or how the locality was affected by a significant national or local event or development or by the work of a significant individual'. This project sets out to facilitate this using a mixture of paper sources and ICT based tools and resources. Two of the periods of British history studied in the history curriculum are the 'Victorian era' (1837 to 1901) and 'Britain since 1930' in each case the emphasis is on studying social history within the local area of the children's home and school. The geographical area covered by the project is a suburban one on the very edge of Greater London. In Victorian times it underwent substantial development; the school itself is in a Victorian building and there are still many Victorian homes, hospitals, schools and municipal buildings in the area. The emphasis of the other topic, Britain since 1930, is on the impact of the Second World War, signs of which are still evident in the area. The former Second World War RAF fighter station of Biggin Hill is only a few miles away and the area was also directly in the path of aircraft on their way to and from London on the bombing raids of the Blitz. It was the location of many large anti-aircraft batteries protecting London and therefore became a target in its own right. Many of the later 'vengeance weapon' rockets also fell here. There are still many remnants of the wartime era in the form of old military buildings, bomb craters (evidenced by the many woodland ponds), gaps and variations in streets of houses that are otherwise uniform in age and style (where the original houses were destroyed by bombing), defenses that were built to resist invasion and old roads in open ground that now apparently serve no purpose. In short there is a lot of evidence on the ground that can be used to try and piece together the local history of the area during both the Victorian Era and the Second World War. All of this evidence is in an area that is very familiar to the children and poses many mysteries than can often only be explained by consulting old maps as part of a 'time detective' exercise.

The project uses old maps and other sources to show the history of a small area that is familiar to the majority of the pupils of the school and can be visited easily. It covers the local history of that area from the late 19th century through the 20th century. What is being developed is a teaching resource that combines physical material with digitized images, maps, documentary material in a web-based resource. The possibility of adding sound or video recordings of interviews recalling the memories of local people of war-time and post war events is being explored. The project has no budget and is dependent upon volunteers, who are plentiful and willing to put in a great deal of effort which itself shows the high level of interest that local history and old maps can create.

Challenges

Old Maps serve their original purpose as pieces of cartography, i.e. recording property, ownership, land use and topography, but in addition they are historical sources of broader interest and are often regarded as pieces of art. They perform a valuable role in local history studies by simul-

taneously showing how an area has changed while also giving a sense of continuity, each aspect being essential in the development of a sense of place.

The conversion of old maps into effective digital objects presents many challenges. We are faced with all the standard problems of digitizing what are effectively artworks; factors such as care during handling, ensuring faithful reproductions, balancing quality with optimum file size for delivery over the web, on-going digital preservation issues, etc. There are also a number of problems which arise because of the nature of the objects and the manner in which they are used. Maps are frequently produced on large sheets of paper (or other media) and the user is interested in features that appear only at high level of detail. Watch anyone viewing a map and they will almost immediately move their heads closer and examine minute details. The ability to do this must also be provided in digital versions of the map while avoiding the huge file sizes, and thus slow delivery times over the web, that are associated with high quality digital images. People viewing maps will also scan across the map following features or looking for new ones to examine; they move back from the map and scan across larger areas to find features and then move in closer to concentrate on these in detail. This is a cognitive process of moving from a view of the whole to a view of a detailed section in order to establish the relationship between the whole and the individual parts being examined. The viewer of digital versions of these maps must be able to perform these same navigation operations with the digital resource produced from them. We initially tackled this problem many years ago by creating sets of images of portions of the map at different scales and linking them manually through HTML image maps. This is a time consuming and highly error prone task. A variety of software tools to perform this task are now available, for example tools built around MrSid™ and utilities such as [Zoomify™](#). These tools allow website creators to create sets of images at different degrees of magnification from an original, link them correctly, and build in navigation aids to allow the user to pan across, and zoom in or out, of a map. They also automatically provide a reference image of the complete map with the current viewing area highlighted. The user then only downloads the detailed section of the image that they wish to view rather than a high resolution image of the whole map. All this is done through a simple interface and the user is not even aware of the underlying complexity of the task; they click on the area they wish to view and select the level of magnification they need, possibly adjusting the selection with the pan control as they go. For an example of this see the maps in the Iraq project (note that these use a mechanism that is built into the image library software ContentDM™, but the effect is the same as a product such as Zoomify™). Future work will involve the possible development of features that allow various views of the maps to be juxtaposed and compared in a variety of ways that are only possible within a digital resource.

The pan and zoom style solution offered by applications such as Zoomify™ also help solve another significant problem with heritage cartography. The maps are often valuable collector's pieces and while it is essential to gain appropriate copyright clearances before putting them on the web once they are there they are open to abuse by unscrupulous users. Copyright warnings must be displayed and watermarks can be put on the image but these may not be enough to protect the copyright owners' rights. The use of software such as Zoomify™ ensures that only relatively low resolution images are ever made available to the user. The images are delivered at the screen resolution of the monitor. The starting image showing the whole map is delivered at 72dpi which is not of sufficient quality to be used for reproduction. It would be possible for a user to zoom in and capture a set of detailed images and try to reconstruct the whole map from a mosaic of its parts but in practice the quality obtained would not be acceptable and the process would be extremely tedious.

The use of Geographical Information Systems offers many opportunities to compare different historical maps of the same area and integrate them with other historical sources. GIS also makes many exciting features available, such as 3D functions that allow old maps to be draped across topographical surfaces. GIS software can now be run on a standard desktop computer but despite the recent release of free GIS file viewers such ARCEXplorer™ fully functional GIS software is still relatively expensive. Another substantial problem is that the ‘usability threshold’ of GIS is still high, the techniques and knowledge required to use them are unfamiliar to many and it takes a great deal of time and effort to get started. To a certain extent the use of GIS software in cartographic heritage work is a distraction which may be discouraging many people from engaging with historical map material. The author believes that there is a great deal of scope for taking some GIS methods, such as layering techniques and zoom layering, and applying them in different ways (outside GIS software) in digital resources to display and manipulate cartographic heritage material. For example the possibility of comparing old maps of different ages, and thus the sequence of development of an area, by the use of digital overlays of maps is a simple but very powerful tool. It is important to remember that it is the delivery of, and facilitating the study of, the source material that matters and not to get distracted by the technological possibilities.

Concluding remarks

Historical maps record information that is essential to the investigation of the past. This is often information that is not available from any other source. On large scale maps many place names, boundaries and physical features will have survived to the present day, sometimes in intriguingly modified forms, others may exist only in echoes of the past such as street names used in the housing developments that obliterated the features they refer to. In other cases the information content of the cartographic heritage may have been eradicated completely by political upheaval. All maps capture the attitudes and worldviews of those who compiled them. Information and Communication Technology (ICT) provides new methods of exploring these and of providing alternative versions of the same information from another cultural or historic viewpoint. The study of this aspect of cartographic heritage opens up many pedagogic opportunities. Old maps represent a rich source for historical scholarship and teaching at many levels across many fields of interest. Incorporating them in teaching or in digital resources on the web stimulates new interest in cartographic heritage.

These are not just scholarly resources as there is a great deal of popular interest in history and much of this focuses on local or personal family history. In the United Kingdom the success of television programs such as ‘[Time Team](#)’, ‘House Detectives’, ‘[Who do You Think you Are?](#)’ are evidence of a deep need that is present in many of us to find out more about our own history and that of our local area. Cartographic Heritage has an important role to play here and has given rise to successful web-based businesses such as old-maps.co.uk who specialise in supplying a range of historical cartographic material to the public.

ICT, especially the web, provides a powerful medium for education, research and the dissemination of cartographic heritage to a much wider audience than ever before. This encourages a natural interest in history and geography that is present in many people and can only lead to a greater appreciation and interest in cartography and cartographic heritage.

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