'The Topography of Golgotha': Digitization of Maps and Aerial Photography of World War I

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“THE TOPOGRAPHY OF GOLGOTHA”:
DIGITIZATION OF MAPS AND AERIAL PHOTOGRAPHY
OF WORLD WAR I

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The literature on digitization projects provides many lists of criteria for the intelligent selection of a digitization project. Appropriate criteria include:

- Value (rareness, uniqueness)
- Demand
- Non-duplication
- Collaborative potential
- Enhancement of intellectual access
- Enhancement of image quality
- Intellectual property rights available
- Preservation, provision of surrogates
- Technical feasibility
- Safe digitization
- Intellectual control available

This particular project was not selected in the intellectually correct manner, using any of these criteria, although by the end of the project we do expect to achieve all of these benefits! This particular project started out just as an attempt to improve access to a unique collection.

In the beginning, McMaster University Library’s Map Collection had a few maps showing trenches, which we regarded as absolute treasures. Whenever anyone was interested in World War I, we would trot these precious things out to the amazement of all.

While chatting with a colleague one day, I learned that in fact there were actually many hundreds of trench maps downstairs in Research Collections, and also boxes and boxes of aerial photographs. McMaster Library has an astonishing amount of archival material on both World Wars due in part to our collection focus on the philosopher Bertrand Russell who was a peace activist. So we have all the papers of Russell and the peace movements, but we have also collected corollary materials such as recruiting posters, literature about the resistance movements, and the private collections of soldiers and officers—letters, diaries, maps and photos.

This was a big surprise—the few maps we had been treasuring and showing off so proudly were actually only the very tiniest tip of an iceberg lurking downstairs. The trench maps were described in our library catalogue using an archival description, which cheerfully informed researchers that we have “1.8 metres” of maps. As you can imagine, this access point left us with lots of room for improvement. We actually started this project as an attempt to uncover what we have in our collection and to prepare some kind of finding aid that would be more helpful than “1.8 m”.

Our initial project consisted of developing an Microsoft Access database of all the maps and some kind of simple webpage access tool so that researchers could know what we own. And in the process of creating a database, we gradually discovered that we have 427 maps of various scales:

- 1:40,000 maps, used as broad operational overview and Officers’ planning maps
- 1:20,000 maps, used for artillery purposes
- 1:5,000 and 1:10,000 maps, used for trench raids, gun placements and very detailed logistics

The maps cover all years of the war, with heaviest emphasis on 1917 and 1918 (which is when map production had become efficient, mechanized, local). Most maps are produced by British Ordnance Survey, although there are a few French and German maps. A lot of the maps in our collection have apparently come from the papers of Canadian officers and soldiers, as many of them show areas of Canadian action such as Vimy, Cambrai and Canal du Nord. Many show the Canadian sector during “The Last Hundred Days” campaign.
More than half of the maps in this collection (227 of the 427) are “trench maps”, i.e. they show in great detail the allied and enemy trenches, with “street names”. Figure 1 shows the British trenches in blue (including and to the left of the Beaumont Trench) and the German trenches in red (to the right).

This type of trench map cartography stemmed from advances in warfare during WWI. In previous wars, information about the enemy was gathered by sending out cavalry to do reconnaissance, and warfare consisted of active charges against the enemy. The advent of weapons like the machine gun meant that traditional methods of movement were suicidal, and resulted in a continuous line of trenches running from the English channel to Switzerland. Cavalry could not get behind enemy positions to assess the topography. Trench warfare meant that neither side moved very far very quickly and attacks were measured in yards. Suddenly large scale maps became very important. Also artillery guns had to fire at enemy targets that they could not see. Your guns had to be carefully hidden, and you needed to know very precisely where the other guys’ guns were located. So detailed topographic maps were essential to range and fire guns accurately over your own trenches.

We also discovered that we have 478 air photos from World War I. Many of these are annotated on the recto or the verso with military information. Virtually all of them have a cryptic alphanumeric reference number printed on the recto, which Library Assistant Gord Beck was able to eventually decode and relate to the map referencing system. So for most of these air photos we know the approximate area and the date.

As he gradually recorded what is in this collection, Gord has discovered that it is actually an amazing representation of the evolution of cartography over the time period that this collection covers. There are very few existent collections with this depth of material. The primary similar collection is at the Imperial War Museum in London. In Canada, the University of Victoria, the National Map Collection and the new War Museum in Ottawa have some holdings. Generally these maps were considered to be ephemeral; they were constantly being updated and replaced. And of course, the conditions at the front line were abysmal, so preserving maps was
not really the big concern. This is a type of cartography that did not survive very well in large quantities.

Our holdings are particularly interesting because there are so many maps that concern areas of Canadian offensives. We all know that the World Wars are a topic of great interest (witness the recent celebrations and made-for-TV movies on Vimy). In some cases, we have several maps of the same areas at different time periods.

Since we have mounted our first set of simple webpages, we have received many email inquiries from around the world from people who have a reference number for the place where some relative was killed. Now that we have organized this collection, Gord can explain these reference numbers to people and sometimes send them a scanned image of the place where their relative fell, which is very satisfying. Many of you may already have seen our WWI webpages at http://library.mcmaster.ca/maps/ww1/home.htm. We actually finished them and put them on the web several years ago. When you click on the links to the map indexes, you get a simple grid map showing the areas of coverage. When you click on any one of the grid squares, you get a table showing the maps we have that cover areas within that grid square. And when you click on any one of the map sheet numbers, you get a detailed record describing that particular map—good solid bibliographic information, generated from an Access database. And the immediate user reaction...GREAT, WHERE’S THE MAP?

So McMaster University Library has been attempting to attract funding to create the digital images of these maps for 3 or 4 years. We have had near misses several times. Once we thought we had found a willing sponsor, but in the end his wife objected to a military project. With the advent of a new University Librarian last July, our institutional priority shifted to digitization projects. When the new UL asked for a list of potential digitization projects, we were standing by the door! And this is why this collection is McMaster’s first major digitization project—everything was ready. Metadata, webpages, supporting research was done. Copyright clear. The map people were ready to deliver a digitization project that could make a splash in the shortest possible time span.

Our strategy for the creation of the digital images has been out-sourcing, or contracting out of the scanning process. Many of you will have met Bruce and Sean Vallillee, founders of one of the first commercial digitization companies in Canada, now under the name Perimeter Digital. We started talking to Bruce Vallillee in 1999 about digitizing the trench maps. Because he was a WWII veteran himself, he was really interested in the project and tried to help us for years to find sponsors, which really is above and beyond the call of duty. We often joked that I was actually trying to get the whole collection done, one sample image at a time, because every time we had a new prospect of a donor I’d ask them to send me a fresh sample! So I don’t know which of us was more pleased when our patience finally paid off. Perimeter Digital provided the digitization services and also contributed an in-kind donation to the funding of the project, in memory of Bruce Vallillee who unfortunately didn’t live to see us finally get the collection scanned.

Advantages of Out-sourcing

Out-sourcing the digitization has the advantages of ensuring that high-end equipment, software, technical expertise and labour are all provided by the service provider, rather than the library. The customer can insist on consistent image quality. If you have dipped into the literature on digitization, you will know that there are a great many very technical decisions that have to be made—what hardware, what editing software, what formats, what resolution, what processor speed, what storage medium, etc. etc. One great thing about outsourcing is the elimination of a lot of these technical decisions. You must articulate clearly what you want to receive as the end product, but you don’t have to care about how the service provider achieves this. We learned that Perimeter Digital purchased a very expensive new drum scanner in order to achieve the quality they had guaranteed for our air photos. If we had gotten into the midst of digitizing ourselves and discovered that our output was not good enough, would we have been able to skip out and purchase the absolute ultra new equipment? I think not. Technological obsolescence is the worry of the service provider rather than the Library, which is very nice for a change.

So basically we paid for a very high quality end product, exactly to our specifications, rather than
for equipment, maintenance and personnel. We were originally quite excited to learn that there is a new compressed PDF format available. Because so many other Library products use the Acrobat Reader, we were really hopeful that this would be a great solution to simplify access to the images by end users. Perimeter Digital delivered the finished images to us in two formats. There was no extra cost for this because all the costs are in the scanning and editing processes, so this was just an add-on freebie. But in the end, we have been very disappointed with the pan and zoom capabilities of the compressed PDF in Acrobat Reader. We are going to stick with the MrSID format, which pans and zooms extremely quickly and seamlessly.

Additional advantages of out-sourcing included speed and staff costs. If you have been doing any work with digitizing materials yourself, you will know that scanning at very high resolution (600 dpi) is an extremely slow process on most desktop equipment. And then there is the staff time involved in editing steps. Out-sourcing the digitization step of this process got us nearly 1,000 highest quality images delivered complete in 28 days. My staff spent their time instead on other aspects of the project. I've been referring to “we” but here I am only talking about the Map Collection’s Library Assistant Gord Beck. Gord has a personal interest in military history and he has completely absorbed himself in this project. And the result is some outstanding complementary material to support these collections, including guides to the interpretation of marginal information and symbol keys. So the time Gord did not spend standing watching the scanner hum was spent instead on the creation of the databases to capture the bibliographic information and some really productive research and content to aid users of the collection.

Disadvantages of Out-sourcing

The most painful part of out-sourcing the digitization process was a large cash outlay all at once. But in my opinion, out-sourcing may not actually be more expensive in the long run. If you create images in-house, you invest in equipment, labour, training, etc. over time, rather than all at once.
Outsourcing FEELS expensive because you see the bill all at once. Most literature on digitization projects suggests that the actual digitization of the object is not where the highest costs are incurred. The highest costs are generally reckoned to be in staff costs of various kinds, some obvious like time and training, and others less obvious like benefits, equipment maintenance and infrastructure support costs. The air photos are small enough that we could have done them ourselves in-house and we did do some samples using Zoomify. But basically, the cost of $30.00 per photo represents let’s say 45 minutes of a Library Assistant’s salary and benefits. We paid about $15,000.00 for 478 air photo images, and that represents potentially 375 hours of staff time. There is no possible way we could have found that many uninterrupted hours or created that many images in-house in that time span. So my conclusion is that out-sourcing the creation of the digital images is a great bargain—if you can afford it.

It is important to be able to articulate your requirements when dealing with an outside digitization service provider, to avoid communication problems and to ensure that you get what you really need. It is important to choose a digital service provider who is knowledgeable about the handling of archival materials and who will guarantee their safety and security. There are probably certain really fragile materials which you just simply will not send off-site. And finally, by outsourcing, we hired in digital expertise rather than attempting to develop it ourselves in-house. So, as in anything where you hire an outside service provider, you have the consequence of again having to hire an outside service provider for any future projects.

For me, out-sourcing was the right solution. Digital expertise can easily be found and hired outside the Library. Perimeter Digital has absolutely top-of-the-line equipment and technicians. Expertise in WWI military cartography and in the creation of bibliographic databases cannot be hired outside. So the expertise that Gord has developed is the more important skill set to retain in my opinion. Contracting out the technical parts of this project has allowed us to make the best use of his time and energy, and I think will result in a really valuable end-product, because of the amount of research he has been able to devote to developing the value-added information to accompany the images.

So what are we going to do with all these lovely images? We have ordered LizardTech Express Server software to deliver the MrSID images directly to the desktop of the remote user, without requiring the installation of a plugin. Carl Spadoni, our Director of Research Collections, has applied for a large grant from the Canadian Memory Fund through the Department of Canadian Heritage on the theme “Peace and War in the 20th Century”. If successful in this grant application, we will be hiring a web designer and some technical staff to create a slick set of webpages to incorporate the trench maps and air photos with a larger collection of materials on individuals, peace organizations, protest groups, war songs and Canada at war. And if the grant application is not successful, then our second choice will be to develop a web-searchable database and add the images to our existing webpages. And if all else fails, we will have a Humanities Multimedia class develop some kind of websuite for us as a class project. The reason why this option is at the bottom of my list is the amount of time it takes to get something like this into the academic stream.

And finally, McMaster has just hired a “Digital Strategies Librarian”. This is a new position and the incumbent will be charged with developing and executing all future digitization projects. So we are really hopeful that our next ventures into the field of digitization will in fact follow all those intellectually sound guidelines that we kind of ignored in my opening paragraph!

Post-Conference Update: McMaster was successful in obtaining the LAC grant for the “Peace and War in the 20th Century” project (see http://dailynews.mcmaster.ca/story.cfm?id=4749 and http://dailynews.mcmaster.ca/story.cfm?id=4866). The resulting website should be officially launched in June 2008.