Unleashing the Power of the Panorama – Part 1

History - Panorama Paintings: Ancient Chinese landscape paintings date back to the twelfth century. They captured beautiful sweeping views and are rare and cherished works. However, it was not until 1792 that Robert Barker, a Scottish painter, coined the word *"panorama"* from the Greek words *Pan* ("all") and *Horama* ("view"). Barker first created panorama landscapes of his home town of Edinburgh in 1787. Barker went on to commercialize his panoramas and made a fortune by exhibiting his works in a building in Liecester Square in London. Customers stood on a platform under a skylight that provided even lighting and with Barker's masterful technique of obtaining a unique perspective in his drawings, the audience enjoyed a stunning and detailed panoramic experience. Barker went on to exhibit over one hundred and twenty works.

Panorama paintings also became very popular in Europe where it was common for cities to have more than one exhibition. These works were often referred to as cycloramas and allowed the viewer to stand in a chamber with a three hundred and sixty degree view of the panorama painting. There would often be music and a narrator telling the story of the event that the painting depicted. The artists went on to enhance the experience by creating elaborate theatres that would actually rotate the audience for the viewing with accompanying music, lighting and sound effects. These theatres were the predecessors to the modern movie theatre.

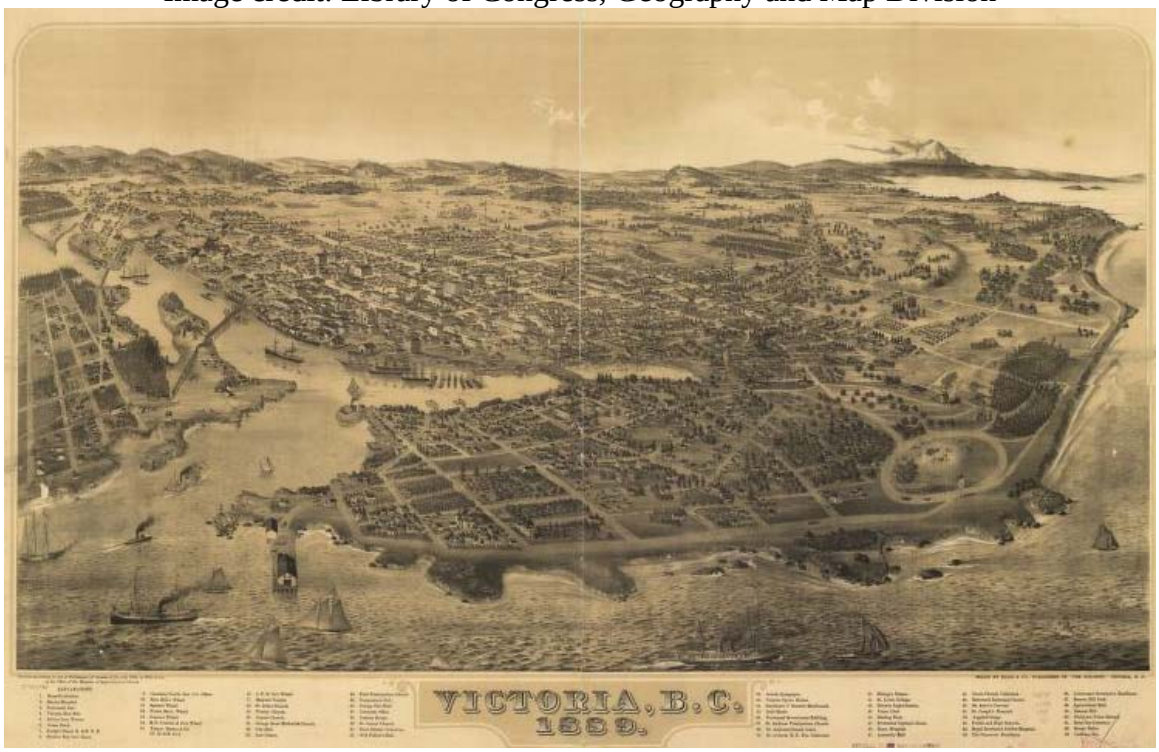
History - Panorama Photographs: The daguerreotype photograph process was invented in 1839 by French inventor Louis Daguerre. It was not the first photographic process, however, it was the first to be commercially viable. The daguerreotype is a negative image that is exposed directly onto a mirrored plate (copper plate covered with silver) that reflects the image to make it appear positive and is able to create very detailed images. This led photographers to use one or more daguerreotype plates side-by-side to create panoramic views of city and landscape scenes.

The daguerreotype panorama was replaced by a conventional camera process using wet-plate glass negatives that were emulsified, sensitized and exposed in the field while the plates were wet. The camera was rotated to take the next section of the panorama view. Prints could then be made, trimmed, arranged and mounted to form the panorama.

Two main types of dedicated panoramic cameras were developed in the mid to late nineteenth century. The swing lens camera enabled the camera lens to rotate and expose the stationary film whereas the 360-degree rotation camera actually rotated the camera with the film. The Al-Vista and the Kodak Panorama came out just before the turn of the century and the Sears, Roebuck & Co. sold the Conley Panoramic Camera starting in 1911 - all of which helped commercialize the process. The Cirkut panorama camera was a popular professional model produced between 1902 and 1924. There have been scores of panorama cameras invented over the last one hundred fifty years and there are still many film and digital based panorama cameras available today.

Historic Panorama Map & Photo Collections: Panorama maps and photographs became very popular in North America from the mid nineteenth century to the early twentieth century. These images created incredibly detailed accounts of the early developing urban landscapes and other infrastructure. The panorama maps are non-photographic renderings that are drawn in a unique oblique birds-eye aerial view. They are generally not drawn to scale, however, they show street patterns, individual buildings, and major landscape features in perspective. The process involved a vast amount of painstakingly detailed work. Frames or projections were developed that showed the perspective pattern of streets. The artist then would have to walk each street and sketch the buildings, trees, and other features to create a complete and accurate landscape as if viewed from a height of 2,000 to 3,000 feet above ground level.

Birds-eye aerial panorama perspective map of Victoria, BC 1889
Ellis & Co.
Image credit: Library of Congress, Geography and Map Division



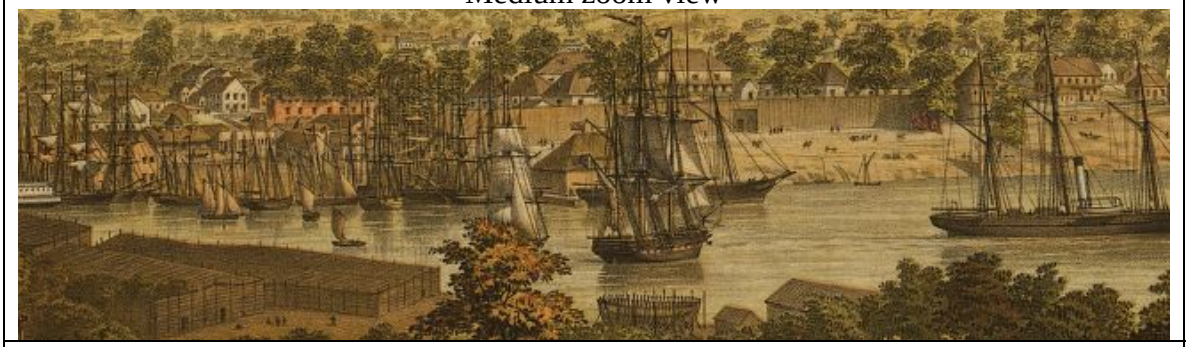
The U.S. Library of Congress (LC) has preserved and archived over fifteen hundred panorama maps from locations across North America. The largest panorama print in the collection is nine feet high by 24 feet long. The LC preserved the panorama maps in a digital form by scanning the hard-shell prints at a resolution of 300 dpi (24 bit color, RGB separation). You can browse the panorama map index on line and then launch the Mr. SID high resolution image viewer to navigate each image to examine the minute details of each scene.

Panorama maps were not as popular in Canada, however, the national archive has a collection of one hundred and twenty one panorama maps of locations throughout Canada. The LC collection includes four panoramas from British Columbia. In order to illustrate the detail of these historic panorama maps, see the screenshots of a panorama map of Victoria, BC drawn by H. O. Tiedemann and T. Picken in 1859 (lithograph published: London, Day & Son, 1860). Tiedemann was the author of the last townsite plan of Victoria for the Hudson Bay Company that is on deposit in the Victoria Land Title Office. Tiedemann also designed various buildings in Victoria, including the current Maritime Museum and he was the lead explorer of a survey crew in Bute Inlet and the Homathko River (1972/1975) for the CPR.

Image credit: Library of Congress, Geography and Map Division.

Full panorama map view

Medium zoom view



Full zoom view

Modern Panorama Technology: With the advent of the internet, immersive panorama photographs have become very popular for showcasing real estate, tourist destinations, and a host of other facilities since the mid 1990's. During the early stages of the internet,

bandwidth access was very limited and the image resolution and detail was minimal. The industry has matured to the point today where users are able to enjoy stunningly detailed panorama images displayed in sophisticated viewers sporting powerful navigation controls and many other rich features. Streaming technology enables gigapixel images to be displayed smoothly and seamlessly to the viewer.

The *Global Connection Project* is a joint project of Carnegie Mellon University, NASA, Google, and National Geographic. These large organizations are collaboratively working with experts and other interested parties to create powerful and simple to use tools that enable the average person to visually share their part of the world with everyone else on the planet. Their goal is create a global environment by enabling people to connect with other people all around the world in order to learn, share and explore the planet through dynamically viewable high resolution images displayed over the internet.

The *Global Connection Project* has developed three main tools: 1) a robotic camera mount (consumer model for $279 – under beta test) for capturing very high-resolution (gigapixel and up) panoramic images using most types of standard digital cameras 2) custom software for automatically creating high-resolution gigapixel panoramas 3) a website for exploring, sharing and marking-up gigapixel and other types of panoramas.

The big three (Google, Yahoo & Microsoft) have also been actively enhancing their online mapping services in order to maximize their market share of viewers. Google has added *"Street View"* which provides the user with the ability to click on map sites and immersively look around and explore street level panorama images. The user is able to navigate, link to and open nearby panoramas for a very creative visual tour, however, the quality of the images is fairly poor (lens flare, distortion & stitching errors). Microsoft Live Earth has added stunning high resoultion birds-eye oblique aerial imagery that a user can dynamically navigate and explore. The imagery is excellent, however, there is very limited coverage.

"EarthMine" is an exciting new company that has developed a process to create a spatially accurate 3D environment that will enable the user to dynamically navigate a connected line string of high resolution panoramas. The 360 degree coverage panoramas are collected using stereo panorama cameras mounted on the roof of a vehicle which provides a somewhat elevated view. The imagery for the city of San Francisco was collected in three weeks using one vehicle.

Special processing techniques are used to create full 3D model properties for the panoramas. *EarthMine* uses a flash based viewing system and can be used in an internet browser or with many standard GIS applications. A unique feature of *EarthMine* is the ability for the user to make measurements of visible objects within the panoramas by simply clicking on them with a mouse and to mark-up and label the imagery and create links. I see the *EarthMine* data as a very useful new kind of map theme that enhances the viewers experience and can be used for many applications. It is still in the beta stage and it looks like the map data will first be available to larger clients like federal, provincial and local governments and large corporations.

Like any map theme, there is always a need to collect and analyse your own project specific information. Part two of this article will explore practical ways to capture, view and actually measure and map visible objects from your own panorama imagery.

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