Family name, Given name
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Summary of Proposal

The summary of your proposal should indicate the challenges or issues to be addressed; the overall goal and objectives of the proposed partnership; and the breadth of the partnership, and the meaningful engagement of the partners involved.

Canadian Historical Geographic Information Systems Partnership

Over the past two decades historians and geographers around the world have incorporated advances in technology to allow new understanding of historical change. The impetus has been the application of Geographic Information Systems (GIS) to historical questions and, more recently, the ability to share research results with a wide public through web mapping resources. In Canada, this exciting new work has resulted in fresh insights into how our nation has developed.

Scholarship using Historical Geographic Information Systems (HGIS) involves labour-intensive data preparation before advanced spatial analysis or visualization of patterns can be achieved. However, once data are geo-enabled (spatial data) they can be used by other scholars anywhere, over and over again. There are enormous financial and scholarly benefits to sharing spatial data but as yet no suitable frameworks exist in Canada to permit or facilitate such re-use of scarce resources.

Unlike many other countries, Canada does not yet have a central repository for national HGIS data and we also lack digitization and metadata standards for sharing of spatial data among researchers. Without a forum or a national community of HGIS practitioners and data scientists, new ideas, technical innovations, best practices and labour saving techniques are slow to be adopted. This lack of a central repository is an obstacle to the growth of HGIS research in Canada.

This project aims to consolidate efforts to address building this major historical resource, and bring efficiency and economies of scale to these endeavours. In addition, Canadians are increasingly demanding that publicly funded data and research be made easily available and accessible. This project leverages these previous investments in historical research to support the needs of the future.

By communicating with and convening meetings of existing and potential partners, we will build consensus towards the best means of achieving these goals. By creating working papers and pilot websites and applications, we will crystallize the alternatives and create a viable path forward. Although the focus of this proposal is on HGIS work done in Canada, we will also look at international solutions, and communicate with potential partners from around the world.

The Canadian HGIS Partnership will work towards its goals by achieving the following objectives over the course of a two year period. We will:

1. Build and expand a network of Canadian researchers and community members engaged in Historical GIS
2. Produce and disseminate a series of White Papers on HGIS methods
3. Develop HGIS-specific standards for Geospatial data structure and for Research Data
4. Build a pilot version of an open, accessible Historical GIS data portal.
5. Build a pilot version of an open, accessible interactive mapping website.

The research and development activities proposed are the beginnings of a strong infrastructure for conducting historical research, in a geographic context. This framework will allow for the effective creation of historical GIS research data, their storage and long-term preservation, their sharing among known and unforeseen collaborators. In addition, this project is part of the broader movement to create a new culture of openness and collaboration in research activities. The participants are committed to sharing their own research data sources, and jointly building shared resources to enable others to build on their work.

INTRODUCTION AND GOALS

Over the past two decades historians and geographers in Canada and around the world have incorporated advances in technology to allow new understanding of historical change. The impetus has been the application of Geographic Information Systems (GIS) to historical questions and, more recently, the ability to share research results with a wide public through web mapping resources like Google Maps and historical websites like the Spatial History Project. In Canada, this exciting new work has resulted in fresh insights into how our nation has developed. Scholars have used Historical GIS (HGIS) to address research questions such as:

- How did the pre-WWI census-taking in 1911 affect French-English language relations in Canada? (Gaffield et al. 2014)
- How was the pattern of distribution of the Chinese community in Victorian Victoria, BC, dispersed or concentrated within the larger population? (Lutz et al. 2014)
- How did the transformation of energy use in Canada to electricity between 1921 and 1951 affect people's lives in urban versus rural settings across Canada? (Sandwell 2014)

Two decades in, we are now in a position to see the challenges and opportunities that lie ahead.

Scholarship using Historical Geographic Information Systems (HGIS) involves labour-intensive data preparation before advanced spatial analysis can be done. It may require researchers to re-create historically correct maps, meticulously link attribute data such as census information to specific addresses and locations, and using georeferencing to align archival maps to real world features. This time-and resource-consuming work has to be completed before the analysis and visualization of historical patterns. However, once a map has been georeferenced and tagged with data, it can be used by other scholars anywhere, over and over again. There are enormous financial and scholarly benefits to sharing georeferenced data but as yet no suitable frameworks exist in Canada to permit or facilitate such re-use of scarce resources.

Unlike many other countries, Canada does not yet have a central repository for national HGIS data, such as digital maps layers of historically changing census districts, and we also lack agreed-on digitization and metadata standards for sharing of spatial data among researchers. Like most other countries, Canada does not yet have a data archive capable of preserving and disseminating more detailed, regional or local HGIS studies and projects for re-use by scholars. Without a forum or a national community of HGIS practitioners and data scientists, new ideas, technical innovations, best practices and labour saving techniques are slow to be adopted.

As a Partnership Development project, under the Connections program, this application is the first step of a project to:

1. Connect with and expand the existing HGIS community of scholars, institutions and the public using HGIS, to build resources and share ongoing innovations in the field
2. Develop national standards to ensure compatibility of data, including standards for an open repository of historical georeferenced maps and spatial data
3. Develop the necessary standards and examples of how the results of these past efforts can best be communicated to the public, students and other researchers, and to allow all of these groups to collaborate on creating their own visions of the past
4. Develop a model for archiving, preserving and disseminating completed HGIS projects
5. Develop a larger Partnerships Grant proposal to fully realize these goals

These goals contain realistic and achievable objectives, presented below. By communicating with and convening meetings of existing and potential partners, we will build consensus towards the best means of achieving these goals. By creating working papers and pilot websites and applications, we will

crystallize the alternatives and create a viable path forward. Although the focus of this proposal is on HGIS work done in Canada, we will also look at international solutions, and communicate with potential partners from around the world.

BACKGROUND

In recent years, there has been a discernible "spatial turn" in historical research and practice. Historians of diverse fields and periods have given greater emphasis to the geographical context of their investigations, drawing upon a range of spatial methods and technologies to interpret source materials in new ways. (Bonnell and Fortin 2014; Cunfer 2008; Gregory and Ell, 2007; Gregory and Geddes 2014; Knowles 2002, 2008, 2014; Lafreniere and Gilliland 2014; Olson and Thornton 2011, Sylvester et al 2006) This work may take its most creative expression in initiatives like the Spatial History Project, where a collaborative community of scholars is engaged in "creative visual analysis" and presenting results online, to further historical research. Other websites and apps use online tools to allow both scholars and members of the public to create their own visualizations of history online (egs.Mapstory.org, Esri storymaps, Snapshot Kingston, Historical Maps of Toronto.)

In particular, the Canadian research landscape has seen an increase of HGIS research projects, and the publication of their results. Landmark projects include the Canadian Century Research Infrastructure (Darroch 2014; St.-Hilaire et al 2007; Historical Methods 2007), Network in Canadian History and the Environment (NICHE), Montréal, l'avenir du passé (Sweeny, 2009), Imagining London (Lafreniere and Gilliland, 2014), and the Victoria Historical GIS (Dunae et al 2010, 2013, Lutz et al 2014). In 2014 the book *Historical GIS Research in Canada* was published by the University of Calgary Press (Bonnell and Fortin, 2014), showcasing a number of these projects from across the country (Beard et al 2014, Bonnell and Fortin 2014, MacFadyen and Glen 2014, Moldofsky 2014, Rueck 2014.) These projects all have created significant HGIS data sets, some now more accessible and some less. This project will leverage the investments made in these previous efforts, to improve connections between HGIS researchers and practitioners from Canada and beyond, to communicate more effectively with the Canadian public, and to facilitate future collaboration and communication.

We reference below several projects in the United States which already serve these kinds of purposes. In Canada, however, there has been a relative scarcity of initiatives to create similar communities and tools. This is largely due to the absence of national-level repositories of geospatial data for historical purposes on par with the United States' National Historical Geographic Information System (and others) or the United Kingdom's Great Britain Historical GIS (and others). As a result of these shortcomings, duplication of effort in creating and integrating HGIS data is a serious issue in Canada.

While the Canadian government's spatial data infrastructure and geospatial data portals, Geogratis.ca and Geobase.ca, as well as the government's commitment to Open Data access (through Canada's Open Government Portal) all provide an ever-expanding collection of tabular, research, statistical, and geospatial data for researchers, all these tools lack historical content or focus. Similarly, popular online tools such as Google Maps/Earth and OpenStreetMap focus on providing up-to-date geographic information, but are not necessarily suited for documenting, visualizing and mapping the past as it decontextualizes the data from its historical origins and environments in which the data was created and now represents. For example, showing the development of the Toronto transit system early in the 20th century on a backdrop of the road network of 2014, does not make sense.

This lack of a historical dimension continues to present obstacles to the growth of HGIS research in Canada. Although there is a greatly increased appetite for HGIS research in Canada, the practical challenges involved in launching new projects often prevent them from getting off the ground. A lack of

infrastructure also prevents researchers from being able to share and discover each other's work, or to build upon existing data. This may result in the phenomenon of "orphan" data – project-generated research data with no public home, and no resources to maintain them. An example is the Historical Atlas of Canada (Harris 1987; Kerr and Holdsworth 1990; Gentilcore 1993) - a major research project, funded by SSHRC, containing extensive maps and data, which have been looking for an effective home online for the past 20 years. Added to these major works is the multitude of smaller individual research projects, in a similar quandary. Our team has operational access to many of these data sets, old and new, for which the cost of creation runs into the millions of dollars - and the capacity to bring in contacts to access the others. This project aims to consolidate efforts to address this major historical resource, and bring efficiency and economies of scale to these endeavours.

OBJECTIVES AND DELIVERABLES

This project brings together historians, geographers, demographers, environmental scientists, and librarians who have wide-ranging experience in HGIS and interactive map-serving on the web, and who have strong connections with networks of other researchers. They each bring different strengths to the collaboration. Our institutional partners include libraries, academic units, research foundations and companies that all recognize the importance of building this collaboration.

The Canadian HGIS Partnership will work towards our goals by achieving the following objectives, using the stated timeline and implementation strategies:

1. Build and expand a network of Canadian researchers and community members engaged in Historical GIS. Timeline: Year 1 through 2

Implementation:

1a: Strategy meeting; Spring 2015: Core proponents and collaborators: Planning and strategy

1b: Mid-term conference; Spring 2016: Partners and invited interested parties: Presentation of first year's progress, networking and outreach

1c: Final conference; Spring 2017: Partners and invited interested parties: Presentation of results and presentation/discussion of plans for future

1d: Web presence: Website: Wordpress or comparable platform for internal group communication; Social media for building community and broadcasting information and events

1e. Outreach program: Presentations, workshops, poster sessions at conferences of all disciplines, and also at meetings of government and private sector data providers. We have already been doing this over the past 2 years; efforts will be expanded.

2. Produce and disseminate a series of White Papers on HGIS methods reviewing and synthesizing the literature and summarizing the experience of collaborators and partners in visualising, working with, and distributing the products of HGIS research on the web; outlining alternative approaches and best practices. These will serve as the underlying base for presentations and round table sessions at the mid-term conference, to build consensus on project implementation in Year 2. As well, a variety of publication options will be explored.

Timeline: Year 1 Draft versions to be presented at mid-term conference, Spring 2016

Implementation: Four White papers To be produced by proponents, collaborators, partners' staff and students hired for the purpose**.**

Proposed subjects for White Papers:

2a: Historical GIS data and visualization methods: HGIS Data frameworks; Creating HGIS data from variety of sources; Data management including metadata, archiving, preservation and dissemination; Mapping and visualization design: Alternative approaches and best practices

2b: Survey/inventory/catalogue of Canadian HGIS datasets Existing and ongoing HGIS data sets expected to be included in portal/network; plus investigation of the means of updating/attracting/

including future HGIS data sets
2c. New technologies and their impact on Historical GIS data: new methods of producing/integrating/visualizing born-digital HGIS data; crowd-sourcing historical information; new aspects of human-machine interaction in using HGIS content
2d. Educational opportunities in using Historical GIS
Exploration of uses of HGIS in teaching, public education, genealogy, heritage preservation and community building.

3. Develop HGIS-specific standards for Geospatial data structure and for Research Data Management and Preservation Timeline: Year 2
Implementation: Much work has been done on standards for quality control and interoperability of geospatial data, and for management of large interconnected databases. This piece of the project will apply this body of research to the unique challenges of Historical GIS. Using standards developed under bodies such as the ISO (ISO/TC 211 Geographic information/Geomatics), the OGC (Open Geospatial Consortium), and the CGDI (Canadian Geospatial Data Infrastructure) will ensure compatibility within a standardized HGIS data framework and future projects and datasets. Using the principles developed by Research Data Canada (Research Data Canada 2012-14) we will develop standards and templates for Data Management Plans for Historical GIS research outputs for archiving and long term preservation. This will ensure the continued use and reuse of data over generations of projects.

4. Build a pilot version of an open, accessible Historical GIS data portal. Timeline: Year 2.
Implementation: As a proof of concept, we will create or adapt an online data portal hosting a catalogue of HGIS base framework data, research project data, and descriptive metadata for these projects. Many of these unique data sets will originate from the holdings of current partners or collaborators. Work will include acquiring, integrating and enhancing data where necessary, for example by applying standards, adding georeferencing information, building meta-data and otherwise enforcing quality control.

5. Build a pilot version of an open, accessible interactive mapping website.**Timeline: Year 2.**
Implementation: As a proof of concept, this website will incorporate data from several projects to develop, illustrate and share best practices for visualizing and communicating the results of Canadian historical geographic research.

The portal and website will be developed using Open Standards and it will be designed for portability, interoperability and re-use by others for comparable projects, in the future. They build on past work done by collaborators and partners, and on their deep experience in developing HGIS data resources and serving and visualizing them online. They are key to this project as they will illustrate the viability of our approaches, demonstrate the need for frameworks and tools of this kind, and be the basis for development of these utilities in future projects.

SIGNIFICANCE AND APPROPRIATENESS of project in context of SSHRC's goals
In 2014, Canadians are engaging more and more with their history. It may be a way of putting rapid and accelerating change into context, and attempting to take the long view. Perhaps also the spectre of negative possible futures is a driver: climate change, political unrest, decaying infrastructure and economic uncertainty make it not only interesting but prudent to understand the experience of the past. Historical research provides the evidence and analysis necessary to provide historical context to present-day problems and challenges.

In addition, Canadians are increasingly demanding that publicly funded data and research be made easily available and accessible. Many of the current partners provide data sets of great value, which have

been created at significant costs. This project leverages these previous investments in historical research to support the needs of the future.

The research and development activities proposed here are significant because they will create the beginnings of a strong infrastructure for conducting historical research, in a geographic context. This framework will allow for the effective creation of historical GIS research data, their storage and long-term preservation, their sharing among known and unforeseen collaborators, the pooling of resources to enable the joint creation of complex or widespread geographical data sets based on local knowledge or research, the integration of isolated data sets created at many different times or places, the acquisition and development of new kinds of born-digital data, the ability for users to map and visualize many of these data in the most useful and intuitive ways, and the capability to accommodate new and as yet unforeseen forms of HGIS data in the future. In addition, this project is part of the broader movement to create a new culture of openness and collaboration in research activities. This trend is especially strong in the GIS and online mapping world (egs. Geothink.ca, New Mappings Collaboratory) The participants are committed to sharing their own research data sources, and jointly building shared resources to enable others to build on their work.

This project falls squarely within the objectives of the Connections program. These participants and partners are all engaged in this process, as can be shown by their long individual records of involvement in research and education in historical and GIS subjects, in Canada and beyond. Their engagement is also demonstrated by the multiple connections between many of these participants on past projects – the connections are well-established and strong. The potential for growth is even stronger: conference presentations made at association meetings of historians, social scientists, geographers, map and data librarians have all been met with a groundswell of support. Successful targeted HGIS conferences have already been held (Atelier-conférence canadien sur les SIG historiques, 2014.) We have a long email list of potential future partners and collaborators. The time is right to grow and establish this community.

The proponents are aware of the many other projects that have tackled aspects of these issues of geospatial data and historical research and communication of its results. There are multiple communities of researchers involved in different aspects of this: the Spatial Data Infrastructure community (eg. Geoconnections-Canadas Spatial Data Infrastructure, Canadian Geomatics Community Round Table), the Open Source Geospatial Community (OSGeo.org), the Digital Humanities (Historical) community, (eg. Geohumanities.org), the Research Data Management community (eg. Research Data Canada), and the Historical Geographic research community (eg. Historical GIS Research Network, AAG-HGIS Forum). There are also a large number of geo-visualization projects which have attempted to "put historical mapping online", in various forms, with varying degrees of success (egs. China Historical GIS, Smithsonian.com Battle of Gettysburg, Mapstory.org, Neatline.org In Canada: Historical Atlas Online, ViHistory.ca, Cybercartographic atlases.) Much of this project involves surveying and evaluating the theoretical and methodological approaches that have been used to do historical GIS, to disseminate its results, and to synthesize what can be taken from these approaches. The experience of all of the project participants in previous research and projects will enable a comprehensive re-visitation of these earlier efforts and develop our ability to forge the way ahead.

A two-year time frame allows significant work to be done on creating research products, building these relationships, and implementing pilot projects. As stated, the intention is to develop further comprehensive proposals to achieve our goals fully.

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