



Fall 2017

# An Exploration of Digital Sketch Mapping, Interview and Qualitative Analysis to Document a Therapeutic Landscape in Whatcom County

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AN EXPLORATION OF DIGITAL SKETCH MAPPING, INTERVIEW AND QUALITATIVE ANALYSIS TO  
DOCUMENT A THERAPEUTIC LANDSCAPE IN WHATCOM COUNTY

by

George Edward Juszynski

Accepted in Partial Completion  
of the Requirements for the Degree  
Master of Science Geography

Dr. Gautam Pillay, Dean of the Graduate School

ADVISORY COMMITTEE

Chair, Dr. David Rossiter

Dr. Grace Wang

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**MASTER'S**  
**THESIS**

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George Juszynski  
October 23, 2017

AN EXPLORATION OF DIGITAL SKETCH MAPPING, INTERVIEW AND QUALITATIVE ANALYSIS TO  
DOCUMENT A THERAPEUTIC LANDSCAPE IN WHATCOM COUNTY

A Thesis  
Presented to  
The Faculty of  
Western Washington University

In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Science

by

George Edward Juszynski

October 2017

## ABSTRACT

*Recent literature cites interest toward utilizing new technologies to unify methods within geography. One area showing promise towards fulfilling this goal is qualitative GIS (QGIS), which combines the methods of social/cultural and spatial/analytical geographers. QGIS research combines sketch maps with GIS and qualitative research methods to uncover “hidden geographies” found within the individual geonarratives of individuals and within groups of individuals. This thesis explores the merits of using newly developed technology for digital sketch maps acquisition, computer assisted qualitative data analysis (CAQDAS) and qualitative geographic information system (QGIS) analysis for the discovery of “hidden geographies”. The case study demonstrates the utility of touchscreen technology to collect sketch maps and the complementary effect of combining social/cultural and spatial/analytical methods to visualize the hidden geography within the therapeutic landscape of student veterans in Whatcom County, Washington. This exploration also suggests direction for further research using digital sketch map acquisition for gaining insights into other socio-spatial processes that are not captured by traditional geographical analysis methods.*

*Keywords: Sketch maps, cognitive maps, mental maps, CAQ-GIS, qualitative GIS, digital sketch map collection, geographic information systems (GIS), geo-referencing, mixed methods, data integration, qualitative analysis software, therapeutic landscapes, hidden geographies*

## Acknowledgements

My understanding of the growth mindset is that the most useful and intense learning comes from seeking experiences from outside one's comfort zone. In terms of comfort zones, completing this thesis was no walk in the park. It was more like walking home from Siberia. I am very pleased to have finished the walk home.

I am grateful to many kind and indulgent guides who helped me find my way. I have had the support and encouragement of my committee chair, Dr. David Rossiter, without whose guidance and persistent help this thesis would not have been possible. I appreciate the feedback offered by my committee members, Drs. Grace Wang and Tammi Laninga, whose insightful comments made the text read less like a how-to manual and more like a thesis.

I received generous support from 2 fellow students in my graduate cohort, Jacob Lesser and Daniel Nessly. Jacob Lesser helped take the *idea* of the SketchMapper application from pie-in-the-sky into a real-life working utility. Daniel Nessly who, thanks to his respect and influence in the WWU student veteran community, was instrumental in providing my project with student veteran participants to sketch map their health neighborhoods.

I am thankful to Dr. Michael Medler who introduced me to the authors of the health neighborhoods study that inspired the direction of this thesis. I have greatly benefited from invaluable input from Richard Scholz, who generously shared his ideas and health neighborhood study data with me. I am thankful to Dr. Marc Pierson, who, in the early days of the thesis, offered many exciting possibilities my thesis project could investigate.

Without Tyson Waldo's instruction and guidance in GIS, I'd have no sketch maps or maps of any kind in this thesis. I appreciate Dave and Diane Knutson who kindly and regularly inquired about the health of my thesis and the health of me and my family. Ed Weber helped me navigate the geography of all the forms and requirements the graduate school needed to submit the thesis.

Finally, and most importantly, I am grateful to Monika, my wife, who tolerated living through the thick and thin of being a graduate student and my son Max, who kept rooting for me as I spent time working on the thesis when I should have been spending time with him.

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## *Chapter 1 Background, History and Aims of Research*

This thesis is about an exploration of the merits of using digital sketch maps acquisition, computer assisted qualitative data analysis (CAQDAS) and qualitative geographic information system (QGIS) analysis for the discovery of “hidden geographies”. It is written in five chapters outlining the evolution of my research questions and findings. A case study, which investigates the health neighborhood of student veterans, demonstrates the results of my research. Chapter 1 outlines the structure, background, history, aims and research questions of this thesis. Chapter 2, the literature review, describes the context and supporting literature, leading to development of my research questions and case study. Chapter 3 is a discussion of the research methods that I used to collect and analyze sketch maps data using a digital sketch mapping tool. Chapter 4 discusses the results of the research and findings of my research. Chapter 5 discusses insights, limitations and generalizability of this research. The appendices include my analysis codebooks, data collection protocols, and documentation submitted to WWU’s Institutional Review Board (IRB).

### [What is a hidden geography?](#)

“Whosoever wins the war gets to rewrite the history; whosoever wins the war also makes the maps.”<sup>1</sup>

This aphorism, shared with me long ago by a learned historian, succinctly summarizes the monopoly over knowledge production by those who happen to be in power. The history and the maps produced by the dominant power structure are in the public domain under the auspices of governmental bodies

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<sup>1</sup> Dusiewicz, Brother Frank CR, Aphorism about power structure, history and map making (personal communication), ca 1976.

such as federal, regional or municipal GIS databases or in a database of economic activity. The maps produced using these public domain sources represent the collective view of the world as understood by those who are at the top of the power structure. There are, however, other sources of geographical knowledge production constructed by individuals who are not part of the dominant power structure. These alternative sources of geographic knowledge, hidden geographies, arise from individuals and groups who have their own internalized version of geographical spaces not necessarily aligning with geographies existing in the public domain.

Hidden geographies are maps created by individuals and groups who have a personal understanding of a space that is not available from census information or other sources available in the public domain. McConchie describes maps made by the artist Kanarinka (sic) into who uses digital mapping and the experience of urban space on the body.<sup>2</sup> Brennan-Horley documents key creative spaces known only to members of Darwin, Australia's creative class through collections of sketch maps.<sup>3</sup> McKittrick and Peake describe the work of Edouard Glissant, who describes the landscape of the Caribbean through the eyes of eyes of escaped slaves.<sup>4</sup> Dyck documents the changing geographies of women with multiple sclerosis as their household socio-economic status changes.<sup>5</sup> The maps produced are geographies that present

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<sup>2</sup> Featured Article Kanarinka, "Art-Machines, Body-Ovens and Map-Recipes: Entries for a Psychogeographic Dictionary," *Cartographic Perspectives* 0, no. 53 (January 3, 2006): 24–40, doi:10.14714/CP53.360; A. L. McConchie, "Mapping Mashups: Participation, Collaboration and Critique on the World Wide Web" (University of British Columbia, 2008), [https://circle.ubc.ca/bitstream/id/7990/ubc\\_2008\\_fall\\_mcconchie\\_alan](https://circle.ubc.ca/bitstream/id/7990/ubc_2008_fall_mcconchie_alan).

<sup>3</sup> Chris Brennan-Horley, "Mental Mapping the 'creative City,'" *Journal of Maps* 6, no. 1 (January 2010): 250–59, doi:10.4113/jom.2010.1082.

<sup>4</sup> Katherine McKittrick and Linda Peake, "What Difference Does Difference Make to Geography?," in *Questioning Geography*, ed. N. Castree, A. Rogers, and A. Sherman, n.d., 49.

<sup>5</sup> I. Dyck, "Hidden Geographies: The Changing Lifeworlds of Women with Multiple Sclerosis," *Social Science & Medicine* (1982) 40, no. 3 (February 1995): 307–20.

alternative visions of the world, personal and subjective geographies; hidden knowledge until disclosed to the researcher.

These alternative geographies appear in the literature under various names such as counter maps, critical geographies or public participation GIS.<sup>6</sup> In the two primary bodies of work which guided my research design, Christopher Brennan Horley refers to alternate geographies as vernacular or hidden geography, while Scholtz refers to these geographies as “non-system resources that support health”.<sup>7</sup>

Feminist GIS research is aware of power differences in social and economic realms and focuses on geographies which capture the geographic knowledge of groups who are not part of the dominant power structure.<sup>8</sup> Feminist geographers recognize that geographic knowledge is produced from multiple points of view and refer to the idea of geographies which incorporate “multiple ways of knowing”.<sup>9</sup> Hidden geographies incorporate multiple ways of knowing into geographic knowledge production as well.<sup>10</sup> In contrast to the geographic information found in the public domain and produced by entities which dominate the power structure of the community, hidden geographies are collected from the lived experiences of individuals and groups.<sup>11</sup>

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<sup>6</sup> Nancy Lee Peluso, “Whose Woods Are These? Counter-Mapping Forest Territories in Kalimantan, Indonesia,” *Antipode* 27, no. 4 (1995): 383–406; R. Sieber, “Public Participation Geographic Information Systems: A Literature Review and Framework,” *Annals of the Association of American Geographers* 96, no. 3 (2006): 491–507.

<sup>7</sup> Brennan-Horley, “Creative City Mapping: Experimental Applications of GIS for Cultural Planning and Auditing” 2012, <http://ro.uow.edu.au/cgi/viewcontent.cgi?article=4235&context=theses>; Allan Friedlob et al., “Patient Health Neighborhood Mapping Proposal: Actionable Research for Patient Centered Care and Patient Activation” (Bellingham, WA: Critical Junctures Institute, 30 2009).

<sup>8</sup> Mei-Po Kwan, “Feminist Visualization: Re-Envisioning GIS as a Method in Feminist Geographic Research,” *Annals of the Association of American Geographers* 92, no. 4 (December 2002): 645–61, doi:10.1111/1467-8306.00309.

<sup>9</sup> Meghan Cope and Sarah Elwood, *Qualitative GIS: A Mixed Methods Approach* (SAGE, 2009).

<sup>10</sup> Noel Castree, Alisdair Rogers, and Douglas Joel Sherman, eds., *Questioning Geography: Fundamental Debates* (Malden, MA: Blackwell Pub, 2005).

<sup>11</sup> Dyck, “Hidden Geographies”; Isabel Dyck, “Using Qualitative Methods in Medical Geography: Deconstructive Moments in a Subdiscipline?,” *The Professional Geographer* 51, no. 2 (1999): 243–53, doi:10.1111/0033-0124.00161.

My exploration on the topic of hidden geographies is inspired by two studies which use hand-drawn mapping to find hidden geographies. The first study, performed by Scholtz and Friedlob, was a byproduct of a larger healthcare improvement project that occurred in Whatcom County between 2005 and 2010.<sup>12</sup> Scholz and Friedlob collected over one hundred sketch maps and interviews from residents of Whatcom County to understand the “health neighborhood” of this group of individuals. Scholz and Friedlob defined health neighborhood as “any person, place, thing or activity that you use to maintain and or improve your health”.<sup>13</sup> The participants of the study drew a sketch map of their health neighborhood and then described all the components of their health neighborhood. The desired outcome of the study was to produce a geography of the “hidden” healthcare neighborhood components not found among records in the public domain. The policymakers and practitioners sponsoring this work desired a navigable map of these hidden healthcare neighborhood components as a resource to improve patient care.

The second study, performed by Brennan-Horley, documented the geography of “Darwin’s creative epicenter” in the city of Darwin, Australia, as described by members of Darwin’s creative class.<sup>14</sup> The creative class is a socioeconomic group described by Richard Florida as well educated, knowledge-based workers who draw on complex bodies of knowledge to solve specific problems.<sup>15</sup> Brennan-Horley’s aim was to document existing creative activities and spaces in Darwin and to develop qualitative methods

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<sup>12</sup> Friedlob et al., “Patient Health Neighborhood Mapping Proposal: Actionable Research for Patient Centered Care and Patient Activation.”

<sup>13</sup> Richard Scholtz, “Mapping Your Health Neighborhood,” pg. 3 Conference Proceeding, The 4th International Conference on Patient- and Family-Centered Care: Partnerships for Enhancing Quality and Safety (Philadelphia, PA: Institute for Patient and Family Centered Care, 17-19 2009), [http://www.cmccg.com/media/handouts/29FC01/H7\\_Handout\\_Scholtz\\_Richard.pdf](http://www.cmccg.com/media/handouts/29FC01/H7_Handout_Scholtz_Richard.pdf).

<sup>14</sup> Brennan-Horley, “Mental Mapping the ‘creative City.’”

<sup>15</sup> Richard Florida, *Cities and the Creative Class* (Routledge, 2005).

for mapping perceptions of “creative Darwin” using GIS.<sup>16</sup> The participants of the study made markups over a paper base map of Darwin and described their personal knowledge of creative spaces as they were interviewed by the researcher. This collection of hidden geographies was compiled into a three-dimensional map of creative spaces found within the city and used by policymakers to develop and plan creative spaces within the city of Darwin.

The two studies used different techniques to collect and document hidden geographies. Sholtz et.al. used mental maps; Brennan-Horley used sketch maps to discover hidden geographies. In both cases, producing a map of the findings was a desired result. The Scholtz, et al. study was less overtly geographical in nature because participants were asked to draw a sketch map of their health neighborhood on a blank piece of paper and only about 40% of these maps contained specifically spatial content. The Brennan-Horley study was very specifically geographical in nature in that subjects made markups of creative spaces on a paper base map of Darwin. The Brennan- Horley study produced a map of creative spaces in the city. The most interesting results of the Scholz et al. study was the visual content represented within the drawn mental maps and especially the thoughts and ideas about health neighborhoods contained within the recorded interview data.

These two studies led me to develop two questions related to the larger research agenda within the discipline of geography. In 2004, the centennial year meeting of the American Association of Geographers, Alexander Murphy in his plenary address reviewed the past, present and future of

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<sup>16</sup> Brennan-Horley, “Creative City Mapping: Experimental Applications of GIS for Cultural Planning and Auditing.”



geography<sup>17</sup>. Murphy's plenary address proposed a research agenda for geographers to fulfill in the second century of the American Association of Geographers. The first item on Murphy's agenda for geography's future is for geography as a discipline to develop a unified methodological framework following the lead of other mature sciences. Within this goal, Murphy calls on geographers to find a way to reconcile the long standing and theoretical schism between physical geographers and cultural geographers. The second overarching research goal which Murphy calls upon geographers to develop is to find ways to use the technological advances available to geographers.

### Two Research Questions

These two goals led me to develop my research questions and the aim of this thesis. In my first research question, "***How does exploration of digital sketch mapping and CAQDAS contribute to the research agenda goal to unify methodologies within geography?***", I address Murphy's first goal of unifying methodologies within geography by exploring the use of GIS (commonly viewed as a quantitative tool) to answer a question about hidden geographies (a question that is qualitative in nature). My second research question, "***What are the utilities and merits of a digital sketch mapping application used for collecting information about hidden geographies?***" addresses Murphy's goal to use technological advances in geography by developing and using a digital sketch mapping tool to collect and analyze hidden geographies.

My aim is to extend the research of unifying methodologies in geography and to use new technologies within geography by experimenting with a method of digitally collecting sketch maps within computer assisted qualitative data analysis software (CAQDAS) and performing both quantitative and qualitative

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<sup>17</sup> Alexander Murphy, "Introduction, Annals of the Association of American Geographers Centennial Forum: Where We Have Come From and Where We Are Going," *Annals of the Association of American Geographers* 94, no. 4 (2004): 701–2, doi:10.1111/j.1467-8306.2004.00422.x.

analysis on the data from a case study of health neighborhood sketch maps drawn by student veterans in Whatcom County. Given that the hidden geography is held in the individual and collective perceptions and understanding of a geographical space by a group of individuals, I needed a question and a group of people that were accessible to me in a geographical area that I had some personal familiarity with. The question, geographical area, and population I chose to document the hidden geography of consisted of the “health neighborhood”, in Whatcom County (and beyond) of a group of student veterans attending Western Washington University.

## Chapter 2 Literature Review

### Overview

In this chapter, I review the literature that informs my research questions and my research design. My frame of reference for the understanding of the issues within the scope of the study is guided by several groups of geographers. First, I review Alexander Murphy's plenary remarks at the 2004 centenary meeting of the American Association of Geographers.<sup>18</sup> Murphy summarized the methodological and theoretical progress of geography's last century and put forth a research agenda for geography's second century. Murphy outlines two research agenda items for geography's second century. Murphy's first agenda item is for geography to develop a unified methodological approach as have other mature sciences. One facet of attaining a unified methodological approach within geography is to reconcile the long standing disconnect between spatial analytical and social cultural geographical methods. The second agenda item is for geography to make use of use technological of advances available to the field. I will review how geographers have responded to these two challenges. To understand the basis of the "unification of methods challenge" in geography, I review some history of how quantitative versus qualitative methods in geography came to be at odds with each other. I then discuss how the theoretical framework of cultural geography and feminist geography contribute to fulfillment of Murphy's goals. I outline evolution through several areas of research, referred to by Kwan as hybrid studies and boundary projects, as they use both qualitative and quantitative methods and technologies to unify methods in geography.<sup>19</sup> I outline the development of neogeography, a crucial step toward the development of qualitative GIS. Next, I review the history of hand-drawn maps as guided by Boschmann

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<sup>18</sup> Ibid.

<sup>19</sup> M. P. Kwan and G. Ding, "Geo-Narrative: Extending Geographic Information Systems for Narrative Analysis in Qualitative and Mixed-Method Research\*," *The Professional Geographer* 60, no. 4 (2008): 443–465, doi:10.1080/00330120802211752.

and Cubbon, whose review of the many studies related to hand-drawn maps provided clarity to my understanding of the multiple theoretical frameworks contributing to the development of QGIS (qualitative GIS) as used in my thesis.<sup>20</sup> I follow the evolutionary background of hand-drawn maps, beginning within the subdiscipline of behavioral geography and trace the development of geographers' efforts to reconcile quantitative and qualitative methodology as it relates to the use of hand drawn maps, specifically the evolution and relations between mental maps and sketch maps, as used today, and the culmination of this evolution in QGIS (qualitative GIS). Since my case study is situated within the subdiscipline of medical and health geography, I briefly refer to the theoretical history of this discipline and its efforts to respond to Murphy's call for unification of methodologies. Finally, I will discuss two case studies using hand-drawn maps that influenced me personally and led me into this line of research. Having outlined the body of literature of what has been done and what needs to be done I will then describe my contribution to this research agenda.

#### [The 2004 AAG Centennial Meeting; A Retrospective and Prospective of American Geography](#)

My literature review begins in 2004 at the centennial meeting of the AAG (American Association of Geographers). In his plenary remarks at the centennial meeting of the AAG, President Alexander Murphy reviewed the progress made in the last 100 years of American Geography and put forth a research agenda for geographers to fulfill as they move into geography's second century. As I review the developments in fulfilling Murphy's agenda, I emphasize developments in the use of hand drawn maps and the subdiscipline of qualitative GIS (QGIS) as related to my thesis. The most important item

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<sup>20</sup> E. Eric Boschmann and Emily Cubbon, "Sketch Maps and Qualitative GIS: Using Cartographies of Individual Spatial Narratives in Geographic Research," *The Professional Geographer*, no. ahead-of-print (2013), <http://www.tandfonline.com/doi/abs/10.1080/00330124.2013.781490>.

on geography's research agenda is to follow the tradition of other mature scientific disciplines to create a unifying methodological framework<sup>21</sup>. To carry out this goal, Murphy says, geographers must reconcile long-standing theoretical and methodological differences between spatial-analytical (quantitative) geography and social-cultural (qualitative) geography. Much of geography's difficulty with methodological reconciliation stems from interpretation of Kuhn's work, "On the Structure of Scientific Revolutions".<sup>22</sup>

#### [How Kuhn Caused the Qualitative Versus Quantitative Rift in Geography](#)

Kuhn published his influential treatise about the history of science in 1962 proposing a unique view of how science progresses. Prior to Kuhn's work on the nature of scientific revolutions, accepted thinking was that scientific process moves forward by rational and incremental addition of new facts to established facts and theories. Kuhn's view of scientific process is that progression occurs in a series of revolutionary episodes in which a particular theoretical paradigm is accepted and guides research within a scientific discipline. As research under a paradigm continues, anomalies are discovered. These anomalies are discoveries which the accepted paradigm does not explain. As the science progresses, more anomalies are discovered, and this causes a situation of anomie. As anomalies accumulate, there is a certain amount of anxiety and dissatisfaction among workers in the discipline (it is that same feeling that occurs in political revolutions). Theoretical sides are chosen, heated discussions pervade the discipline. Eventually someone develops a new paradigm which sufficiently answers the questions posed by the accumulation of the discovered anomalies. A paradigm shift occurs in which the new paradigm is suddenly and swiftly adopted (a scientific revolution). The new paradigm results in new and

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<sup>21</sup> Murphy, "Centennial Forum."

<sup>22</sup> Kuhn, *The Structure of Scientific Revolutions*.

revolutionary findings within the discipline and... a new revolutionary cycle begins. Kuhn further asserts that scientific revolutions do not progress in a rational fashion. They are influenced by a mix of human interactions and even fad and fashion of the time.

The scientific revolution at the beginning of this literature review occurs when the AAG is 50 years old. In the 1940's and 1950's technological and statistical analysis models developed while fighting WWII were adopted by other scientific disciplines and geography, in response to concerns over being viewed as unscientific and overly descriptive, also adopted a quantitative approach to analysis of spaces. Taking a cue from psychology, economics and other social sciences this dissatisfaction with the descriptive approach led to adoption geography's quantitative approach. This new geography's methodological framework changed from an ideographic (descriptive) pursuit to a (nomothetic) empirical lawmaking pursuit. The adoption of this paradigm is geography's quantitative revolution.<sup>23</sup>

Soon after acceptance of geography's new methodological framework, a series of debates emerged conveniently described as the battle of the "Qualitatives" (social/cultural, human, cultural geographers) versus the "Quantitatives" (analytical/spatial, physical Geographers).<sup>24</sup> The quantitative revolution in geography resulted in adoption by physical geographers of the scientific method (and in general a more quantitative and inductive model of knowledge generation). Scientific method involves the collection of data and observations, hypothesis building and testing, theory generation and finally, the development of general laws applicable to multiple situations and used to predict behavioral responses to

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<sup>23</sup> Castree, Rogers, and Sherman, *Questioning Geography*.

<sup>24</sup> T. H. Elkins et al., *Reflections on Richard Hartshorne's the Nature of Geography* (Washington, DC: Assn of Amer Geographers, 1989).

geographical spaces. The essence of the discord between qualifiers and quantifiers is the belief that each the other's method does not fully describe a geography.

One of Kuhn's more controversial ideas is the introduction of the human factor into the progression of science. To paraphrase Kuhn's thoughts on the human factor, he says that in science, as in haute couture, you'll find fad and fashion.<sup>25</sup> Among the geographers who resisted joining quantitative revolution were the cultural geographers. The steadfast resistance of cultural geographers to adopting more quantitative methods led to long-standing mutual distrust among cultural geographers and physical geographers who happily adopted and happily describe themselves as quantitative geographers.<sup>26</sup>

#### Cultural Geography's Commitment to be Out of Step; Avoidance of Being "Slaves to Fashion"

The course of Yi Fu Tuan's career in geography, spanning 50 years, is particularly informative when he speaks of fad and fashion within geography and the importance of cultural geography's resistance to the "fashionable" approaches.<sup>27</sup> Geography is rightly concerned with issues of social justice and quantitative approaches; however, geographers should also take care to discuss issues that are not at the height of fashion and not at the top of society's present agenda. He discusses Western society's propensity to conceptualize in terms of dyads (such as "nature versus nurture" or "quantitative versus qualitative") with the implication that perhaps there are other ways to categorize knowledge. Tuan's advice to

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<sup>25</sup> Kuhn, *The Structure of Scientific Revolutions*.

<sup>26</sup> Yi-Fu Tuan, "Cultural Geography: Glances Backward and Forward," *Annals of the Association of American Geographers* 94, no. 4 (2008): 729–33, doi:10.1111/j.1467-8306.2004.00427.x.

<sup>27</sup> Ibid.

geographers is to understand that the job of cultural geographers is to be distinct in their work from the work of the more quantitative areas of geography and to come up with ideas which today may be viewed as “out of step” but, in the longer view of history, may be viewed as ideas that help people see themselves and their world in a slightly different light.<sup>28</sup>

#### Geography’s problematic interpretation of Kuhn; Hybrid Studies, Boundary Projects

Mei-Po Kwan nicely summarizes the quantitative versus qualitative rift in geography and offers an epistemological approach that allows geographers to move past the canonical positions of the quantitative/qualitative camps. First, she suggests that geography’s interpretation of Kuhn’s “The Structure of Scientific Revolutions” is a major obstacle to resolving the qualitative versus quantitative method debate. Kuhn’s conception (and geography’s interpretation) of scientific progress is that one paradigm completely replaces the existing one and a clean break must occur with the preexisting paradigm. Kwan suggests that this succession does not fit in a discipline like geography where multiple perspectives and methods coexist. She suggests that geography has backed itself into a corner and that perhaps geographers should re-examine and reassess the possibilities of how these perceived opposing viewpoints can inform and strengthen one another.<sup>29</sup> Progress in geography is more likely to occur when individuals of different perspective collaborate and adopt an attitude of “cosmopolitan tolerance”. Kwan proposes a way for geography to progress towards a unified method in the form of research that challenges the boundaries of the quantitative versus qualitative rift. Kwan refers to this mindset as practicing around “hybrid studies” or “boundary projects”. Most of these boundary projects occur in

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<sup>28</sup> Ibid.

<sup>29</sup> M. P. Kwan, “Beyond Difference: From Canonical Geography to Hybrid Geographies,” *Annals of the Association of American Geographers* 94, no. 4 (2004): 756–763.



QGIS and address issues informed by critical geographies and/or the use of GIS to understand the lived experiences of individuals in various cultural contexts.<sup>30</sup>

Responding to Murphy's call for methodological unification, and to Kwan's call for a methodological "cosmopolitan tolerance", feminist and GIS geographers have explored opportunities within the realm of boundary studies and hybrid projects. Their work culminates in Qualitative Geographic Information Systems (QGIS), a geographic method which shows promise of one way towards the goal of a unified method for geography.

### Feminist Geography

At its inception, feminist geography concerned itself with improving women's lives by understanding the sources, dynamics, and spatiality of women's oppression and by documenting strategies of resistance. Feminist geography's three main lines of research discussed gender as difference, gender as a social relation, and gender as a social construction. Although feminist geography began with a focus and concern with gender-related issues, its focus today has wider applications. The cosmopolitan tolerance exercised in QGIS is possible due its basis in feminist geography. Therefore, this section begins with a brief outline of feminist geography and how relates to the development of QGIS.

Prior to the formulation of a feminist theoretical framework, geography operated under a masculinist epistemology. The masculinist epistemology is based on a universalist understanding of the world. Universalism is a belief that there exists an omniscient viewpoint from which knowing the world can be

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<sup>30</sup> Ibid.

viewed in its totality. This view of knowing assumes that the researcher can objectively discover facts about how things work. These facts exist awaiting discovery by the objective researcher. Consideration of class, race, political persuasion, gender and sexuality is avoided as it biases the process of discovery.

Feminist geography challenges the masculinist view of science as objective, neutral and value free; rather, it views science as always having positionality and producing situated knowledge. Situated knowledge, unlike universalist knowledge, is an acceptance that knowledge is related to a time and a place and is incomplete. The knowledge acquired by feminist geographers is reflexive; in which the relationship between cause and effect is bidirectional. Feminist geography's reflexivity is an act of self-reference where examination of a phenomenon refers to and affects the researcher who is carrying out the examination.<sup>31</sup> Feminist geographers who utilize GIS technology do not accept the historical presumption that GIS technology is immutably connected to a positivist/masculinist epistemology.<sup>32</sup> Feminist geography is important to the evolution of QGIS because it challenges the masculinist epistemology of conventional GIS and recognizes the importance and value of understanding geographical space from points of view outside of the dominant power structure.<sup>33</sup>

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<sup>31</sup> Lucinda M. Hall, "Research Guides: Human Geography: Feminist Geography," accessed May 1, 2017, [http://researchguides.dartmouth.edu/human\\_geography/feminist](http://researchguides.dartmouth.edu/human_geography/feminist); Kim England, "Producing Feminist Geographies: Theory, Methodologies and Research Strategies," in *Approaches to Human Geography* (Sage Publications, Incorporated, 2014), 296–321.

<sup>32</sup> S. Elwood, "Critical Issues in Participatory GIS: Deconstructions, Reconstructions, and New Research Directions," *Transactions in GIS* 10, no. 5 (2006): 693–708.

<sup>33</sup> N. Castree, R. Kitchin, and A. Rogers, "Castree, N., Kitchin, R., & Rogers, A. (2013). 'Feminist geography.' In A Dictionary of Human Geography. : Oxford University Press. Retrieved 14 Mar. 2017," in *A Dictionary of Human Geography* (Oxford University Press, 2013).

The feminist geographers draw on learning about geographical space from a point of view that often is counter to the view of those in power. They stress that there are “other ways of knowing”, a type of knowing that comes from exploring everyday experience and from groups that are not in power and do not set policy. Gathering information from these groups informs geographers of different issues than would be seen in an analytical/spatial approach. It is concerned with taking an activist approach toward social justice and the research methods are often participatory.<sup>34</sup> Because there is no overall objective method of producing knowledge and arriving at a single "truth" is impossible, feminist geographers are open to using multiple methods of acquiring knowledge. The research method chosen for a study is dependent on what method is best suited for the research questions. Therefore, it is acceptable to use multiple methods within a research study as the weaknesses of one method are accentuated by another.

### GIS and Neogeography

Michael Goodchild, who coined the term “GIS” in 1992, discusses the extraordinary potential of GIScience—highlighting the challenge of moving beyond the analysis of static maps and datasets and into a more dynamic GIS process and speaks to the challenge of geography’s taking advantage of technological advances.<sup>35</sup> Goodchild outlines the history of mapmaking and introduces some technological advances that took GIS out of the realm of static map and dataset analysis into the dynamic realm of “new geography” This “new geography”, dubbed “neogeography” by Turner, became possible through the development of two new technologies.<sup>36</sup> Neogeography is the result of the development of Web 2.0 and the wide availability of a tool

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<sup>34</sup> Kwan, “Feminist Visualization.”

<sup>35</sup> M. F Goodchild, “Challenges in Geographical Information Science,” *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Science* 467, no. 2133 (2011): 2431–2443.

<sup>36</sup> Andrew Turner J., *Introduction to Neogeography* (O’Reilly Media, 2006),.

which Goodchild refers to as the "digital earth" (the rest of us know it as Google Earth).<sup>37</sup> Web 2.0 is a set of internet software that facilitates bi-directional collaboration in which users share and view information with central websites and each other. Web 2.0 made sharing geographical (and other) information practical.<sup>38</sup> The second technological development, a freely accessible virtual model of earth facilitated the visualization and sharing of geographical information. The roots of Google Earth begin with US Vice President Al Gore who, in 1998, spoke of the development of a digital globe program within the US government. He described a 3-dimensional virtual earth in "which a child of the future could explore the earth and fly through as if on a magic carpet".<sup>39</sup> The Gore speech inspired several efforts to develop a virtual globe. The Keyhole Company created one of the first versions of this digital globe program and it named EarthViewer. EarthViewer was acquired by Google in 2005 and was made freely available to the public, thus beginning neogeography. Shortly after the debut of Google Earth, other neogeographies contributed to the democratization of GIS by allowing participation of individual users and groups in the production of geographic knowledge. Examples of this type of participatory GIS (PGIS) include, MapQuest, Flickr, Twitter and OpenStreetMap (OSM).<sup>40</sup> Each of these technologies use GIS, GPS and user generated knowledge of geography.

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<sup>37</sup> Goodchild, "Challenges in Geographical Information Science"; B. Warf and D. Sui, "From GIS to Neogeography: Ontological Implications and Theories of Truth," *Annals of GIS* 16, no. 4 (2010): 197–209.

<sup>38</sup> Tim O'Reilly, "What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software," *International Journal of Digital Economics*, no. 65 (2007): 17–37.

<sup>39</sup> John A. Agnew and David N. Livingstone, *The SAGE Handbook of Geographical Knowledge* (SAGE, 2011).

<sup>40</sup> C. E. Dunn, "Participatory GIS—a People's GIS?," *Progress in Human Geography* 31, no. 5 (2007): 616–637; Turner, *Introduction to Neogeography*; Michael F. Goodchild, "Citizens as Sensors: The World of Volunteered Geography," *GeoJournal* 69, no. 4 (November 20, 2007): 211–21, doi:10.1007/s10708-007-9111-y.

OpenStreetMap, created by Steve Coast in 2004, is a freely accessible digital map of the world available to anyone with access to a computer and the internet.<sup>41</sup> It is an example of “crowdsourced” or volunteer geographic information. In the aftermath of the 2010 Haiti earthquake relief effort, the traditional GIS establishment was unable to produce maps to assist relief efforts in a timely fashion. Non-expert volunteers, working from the ground level and entering data using GPS enabled portable devices, created the map sets used for relief efforts. Although these maps were not entirely accurate nor authoritative, they became the de facto authoritative source used for recovery efforts in the aftermath of the Haiti earthquake of 2010.<sup>42</sup>

Neogeography differs from traditional GIS in several important ways.<sup>43</sup> Epistemologically, neogeography draws upon the agenda of feminist geography, challenging the masculinist assumption that knowledge is objective and exists, waiting to be found, independent of the bias and the positionality of the objective researcher. It gives GIS leave from academia and entry into the realm of enthusiastic GIS non-experts. The tools and data of neogeography are easily accessible through the Internet and therefore available to non-expert users. Knowledge production in conventional GIS depends on the correspondence theory. Correspondence theory assumes that knowledge production is a technical process in which discovery of truth occurs from a rational examination of physical facts. Knowledge production in conventional GIS is a technical process, not a social process in which the observer contributes to truth and knowledge production.

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<sup>41</sup> M. Haklay and P. Weber, “OpenStreetMap: User-Generated Street Maps,” *IEEE Pervasive Computing* 7, no. 4 (October 2008): 12–18, doi:10.1109/MPRV.2008.80.

<sup>42</sup> Robert Soden and Leysia Palen, “From Crowdsourced Mapping to Community Mapping: The Post-Earthquake Work of OpenStreetMap Haiti,” in *COOP 2014 - Proceedings of the 11th International Conference on the Design of Cooperative Systems, 27-30 May 2014, Nice (France)* (Springer, Cham, 2014), 311–26, doi:10.1007/978-3-319-06498-7\_19; Robert Soden and Leysia Palen, “From Crowdsourced Mapping to Community Mapping: The Post-Earthquake Work of OpenStreetMap Haiti,” in *COOP 2014 - Proceedings of the 11th International Conference on the Design of Cooperative Systems, 27-30 May 2014, Nice (France)* (Springer, Cham, 2014), 311–26, doi:10.1007/978-3-319-06498-7\_19.

<sup>43</sup> Turner, *Introduction to Neogeography*.

Neogeography's approach to knowledge production acknowledges the possibility of alternative theories of truth. Knowledge is produced from the "bottom-up" rather than from the "top down" as it does in traditional GIS.<sup>44</sup>

The most important finding from my survey of the literature on neogeography is in the shift of power within GIS. Because of Web 2.0, free accessibility to the "digital globe," and other freely accessible mapping tools, voices from other than "the man" have the power of mapping as a communication tool. Rather than being quantitative, law based and expert-centric, neogeography produces geographies that have user-centered meanings. Unlike the correspondence model of truth, the truth uncovered in neogeography is a truth created through individual meaning. This ability to mix and match multiple layers of data upon a base map shows the possibilities given by neogeography and opens the possibility of expanding GIS from a purely quantitative tool into a tool that can tell a story of a person or of a group.<sup>45</sup> Neogeography uses the theoretical framework of the feminist geographer's "multiple ways of knowing" and brings to light heretofore "hidden geographies". This democratization of mapmaking changes the balance of power and knowledge production in mapmaking.<sup>46</sup> With the beginnings of neogeography it is no longer true that "whosoever wins the war, writes the history, makes the maps".<sup>47</sup>

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<sup>44</sup> Sébastien Caquard, "Cartography II Collective Cartographies in the Social Media Era," *Progress in Human Geography* 38, no. 1 (February 1, 2014): 141–50, doi:10.1177/0309132513514005; Sébastien Caquard, "Cartography I Mapping Narrative Cartography," *Progress in Human Geography* 37, no. 1 (February 1, 2013): 135–44, doi:10.1177/0309132511423796; Caquard, "Cartography II Collective Cartographies in the Social Media Era."

<sup>45</sup> Warf and Sui, "From GIS to Neogeography." *Annals of GIS* Volume 16:4 (2010); 197-209

<sup>46</sup> Turner, *Introduction to Neogeography*.

<sup>47</sup> Dusiewicz, Brother Frank CR, Aphorism about power structure, history and map making (personal communication).

## Emergence of Qualitative GIS

The epistemological freedoms developed from within the neogeography movement set precedent toward boundary studies which I see as a natural progression toward the development of QGIS. QGIS research examines possibilities for integrating the quantitative methods of traditional GIS with qualitative techniques. Explorations integrating GIS (traditionally viewed as a quantitative) with qualitative data have included combining multiple forms of media, such as embedded mental maps, audio, video, photographs or sketch maps within a GIS system. The QGIS studies are those hybrid projects and boundary studies Kwan speaks of when discussing unifying methods in geography.<sup>48</sup> Combining qualitative data with GIS, a tool traditionally viewed as quantitative, begs the question, “How can you mix spatial/analytical technique with cultural/qualitative technique?” GIS, since its inception, has been viewed as an analytical tool reserved for those geographers who work in the realm of quantitative analysis. How can one theoretically and methodologically justify using GIS, a tool assumed amenable only for quantitative analysis, in research asking qualitative questions?

Pavlovskaya, in *Qualitative GIS: A Mixed Methods Approach*, examines and deconstructs the notion that GIS is a quantitative tool.<sup>49</sup> The dominant discourse within GIS continues to maintain it is a quantitative tool. The primary users are corporate, military, and state interests. A single corporate developer dominates the GIS software market. In the context of its conventional use, GIS represents power to most audiences. In the academic world a GIS department results in funding, jobs and student enrollments. The images produced by GIS are visually stunning and convey authority and the power to convince. GIS puts forth the impression of scientific method and quantitative analysis. Adding to this

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<sup>48</sup> Kwan, “Beyond Difference.”

<sup>49</sup> Marianna Pavlovskaya, “Non-Quantitative GIS,” *Qualitative GIS: A Mixed Methods Approach*, 2009, 13–37; Marianna Pavlovskaya, “Theorizing with GIS: A Tool for Critical Geographies?,” *Environment and Planning A* 38, no. 11 (2006): 2003 – 2020, doi:10.1068/a37326.

science-based quantitative impression is the context of the technology-rich environment displayed in the GIS lab. Because of this context, GIS has the power to alienate and marginalize workers whose epistemological roots originate in other research methods. For example, from the point of view of cultural geographers, it is not difficult to imagine GIS as a research method which reduces places and people to digital “dots” and aids those in power to make decisions without involving local communities.

As a result of its placement and use by corporate, military and state interests GIS is firmly associated with quantitative methods, despite the fact its origins are mainly non-quantitative. The original uses of GIS include land use planning, census administration, remote sensing and mapping. These fields require specialized knowledge, however, the specialized knowledge required is not the same as the knowledge required for quantitative analysis. The linkage between GIS software and computers is promulgated the notion that GIS, as a result of being computer-based, is a quantitative endeavor. The fallacy of this notion is proven by considering software such as Microsoft Word; few would assert that this word processing software is quantitative in nature only by virtue of the fact that it is computer-based.<sup>50</sup>

The most common functionalities of GIS software are not quantitative. Most GIS users access techniques such as overlay of two layers, calculating distance between two points, determining neighboring points or summarizing data within a new set of geographic boundaries. These useful functionalities are in fact more visual and quantitative and require spatial processing more than quantitative analysis. Spatial analysis requires a spatial imagination (understanding of combining map layers and overlays), logical thinking (combining layers meeting selected criteria) and an intuitive grasp

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<sup>50</sup> Marianna Pavlovskaya, “Non-Quantitative GIS,” *Qualitative GIS: A Mixed Methods Approach*, 2009, 13–37.



of visual analysis. The development of the algorithms that duplicate this human generated analysis *are* quantitative. Much of the utility of GIS is the ability to organize large amounts of data in a database and to visualize it by geographic location. This functionality is viewed by many as quantitative, however, organizing data into clusters of geographical meaning is not a quantitative function.<sup>51</sup>

In summary, the visualization function of GIS is the most important qualitative feature GIS provides. GIS produces a map that is an authoritative communication tool that attractively and visually presents the facts. The database underlying the visual presentation of the map is brought to life and unveils the world to whoever chooses to gaze upon it.<sup>52</sup> Recognition of this fact opens the possibility of using GIS to collect both quantitative and qualitative data.<sup>53</sup>

QGIS modifies conventional GIS to serve the purposes of collecting subjective/qualitative data from individuals in their daily living situations and creating geographic visualizations of this data. QGIS combines both quantitative and qualitative data to obtain a more nuanced and contextual view of individual's and group's experiences within a geographic space that goes beyond and accentuates the oftentimes overgeneralized census data.<sup>54</sup> These new capabilities allow digital representation of more "ground level" qualitative data.; new capabilities of GIS now allow. Qualitative data analysis programs such as Atlas.TI and NVivo can incorporate georeferenced collections of data such as audio clips, video

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<sup>51</sup> Ibid.

<sup>52</sup> Pavlovskaya, "Theorizing with GIS."

<sup>53</sup> Cope and Elwood, *Qualitative GIS*.

<sup>54</sup> Kwan, "Feminist Visualization."

clips, digital photos, and transcripts of interviews combined with georeferenced sketch map data (such as the data I will be analyzing in this thesis project).<sup>55</sup>

The acceptance within the QGIS community that GIS is amenable and capable of capturing multiple and nontraditional types of data has led to the use of GIS with qualitative data in multiple interesting ways.

Among these boundary studies are the use of GIS and qualitative understanding of the lived experiences of individuals in the various cultural contexts and the use of linking social and spatial techniques for feminist community based action research.<sup>56</sup> Kwan and Ding combined narrative analysis of activity diaries with visualization of the diaries on 3D maps<sup>57</sup>. Jones and Evans created spatial representations of interviews while moving through space.<sup>58</sup> Knigge and Cope (2006) combined computer assisted qualitative data analysis (CAQDAS) with GIS mapping to analyze multiple points of view in the analysis of community gardens.<sup>59</sup>

### Hand drawn Maps as used in QGIS

Hand-drawn maps have a long tradition in modern geography and there is a resurgence of their use within the subdiscipline of QGIS in the last decade. However, the theoretical framework for the use of

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<sup>55</sup> Nigel Fielding and César A. Cisneros-Puebla, "CAQDAS-GIS Convergence Toward a New Integrated Mixed Method Research Practice?," *Journal of Mixed Methods Research* 3, no. 4 (October 1, 2009): 349–70, doi:10.1177/1558689809344973.

<sup>56</sup> Scott Bell and Maureen Reed, "Adapting to the Machine: Integrating GIS into Qualitative Research," *Cartographica: The International Journal for Geographic Information and Geovisualization* 39, no. 1 (March 1, 2004): 55–66, doi:10.3138/Y413-1G62-6H6G-0L3Q.

<sup>57</sup> Kwan and Ding, "Geo-Narrative."

<sup>58</sup> Phil Jones and James Evans, "The Spatial Transcript: Analysing Mobilities through Qualitative GIS," *Area* 44, no. 1 (March 2012): 92–99, doi:10.1111/j.1475-4762.2011.01058.x.

<sup>59</sup> LaDona Knigge and Meghan Cope, "Grounded Visualization: Integrating the Analysis of Qualitative and Quantitative Data through Grounded Theory and Visualization," *Environment and Planning A* 38, no. 11 (2006): 2021–37, doi:10.1068/a37327.

hand drawn maps is distinct and different from other hand mapping techniques used in the past. The literature encompassing multiple disciplines refers to hand drawn maps as mental maps, sketch maps, cognitive maps, perceptual maps, abstract maps, topological representations and environmental images.<sup>60</sup> The terms describing hand-drawn maps are referenced, sometimes, without explanation of the implied theoretical underpinnings of their use. Therefore, the term "sketch maps", as used to describe hand drawn maps within this study, requires an examination of the history, evolution and underlying theoretical frameworks of hand-drawn maps as used in geography. To define the term sketch maps, I will compare the use of hand drawn maps within the subdiscipline of behavioral geography and QGIS.

**Mental maps** are paper-and-pencil free-form spatial drawings on blank paper. Cartographically, they are imprecise because they are not georeferenced. Mental map exercises tend to be the primary research instrument in a study. Without a grid reference system or base map, they are cartographically imprecise, but their broader purpose is to learn why people behave or think spatially the way they do—in relation to a person's environmental images or perceptions of place(s). Mental maps serve as a singular data source to capture the spatial cognition or place perception of the subject who is drawing the map.<sup>61</sup>

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<sup>60</sup> Boschmann and Cubbon, "Sketch Maps and Qualitative GIS," 2013.

<sup>61</sup> E. Eric Boschmann and Emily Cubbon, "Sketch Maps and Qualitative GIS: Using Cartographies of Individual Spatial Narratives in Geographic Research," *The Professional Geographer* 66, no. 2 (2014): 236–48, doi:10.1080/00330124.2013.781490.

Mental maps emerged as a technique to understand human behaviors based on peoples' perceptions of their spatial environment. Following the traditions of the behavioral geographers they seek to understand geographies of human behavior through the analysis of mental map data to develop a quantitative and logical set of general principals. These general principals are used to develop a model of human behaviors occurring in geographical spaces.<sup>62</sup> This behavioral model could then be applied to other geographies to predict and perhaps modify human behaviors. The underlying assumption of this theoretical framework is that humans carry within them a set of mental images, understandings, behaviors and reactions to geographical spaces and behave based upon their perception of the environment. It is therefore possible, through the quantitative analysis of these collected images, understandings and behaviors, to inductively develop a behavioral model that can be a generalized and applied to other similar cases.<sup>63</sup>

Examples of mental mapping studies under this theoretical framework include Lynch's book, "The Image of the City".<sup>64</sup> Lynch asked participants to make a drawing (map) of their city from memory. When compiled into a collective map, this information helped identify important components of the city environments around which participants structured their recollections of the city. Lynch's composite map analysis resulted in new theories of urban design. Gould and White created a rank order composite map of high-school student's preferred cities to move to, based upon their knowledge of these cities.<sup>65</sup>

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<sup>62</sup> R. M Kitchin, M. Blades, and R. G Golledge, "Relations between Psychology and Geography," *Environment and Behavior* 29, no. 4 (1997): 554–573.

<sup>63</sup> Ibid.

<sup>64</sup> Kevin Lynch, *The Image of the City* (Cambridge [Mass.]: Technology Press ; MIT Press ; Massachusetts Institute of Technology, 1960).

<sup>65</sup> P. R. Gould and R. R. White, "The Mental Maps of British School Leavers," *Regional Studies* 2, no. 2 (1968): 161–182.

Downs and Stea used mental mapping to develop understanding of individual's wayfinding skills.<sup>66</sup> Mattei and Ball-Rokeach mapped geographies of fear related to the 1965 and 1992 Los Angeles riots.<sup>67</sup> The approaches of the studies above use a spatial-analytical theoretical framework; however, these studies do tend concern themselves with issues in line with the feminist geographers. They are examining thoughts, feelings and perceptions about geography, but they are limiting their analysis by using only quantitative analysis methods. A deeper, more interesting view of the geographies within this research requires adopting a social/cultural theoretical framework-and, because GIS was used in this series of studies, perhaps the assumption of the researchers was that social/cultural issues simply did not fit into a spatial/analytical analysis. In actuality, addition of cultural considerations into a behaviorally based study had not yet entered the consciousness of geography just yet.

**Sketch maps** differ from mental maps in that they are cartographic representations of individual or group spatial experiences, commonly produced by marking, with pencils, locational markings onto paper base maps.<sup>68</sup> In QGIS, they are used for collecting spatially accurate data during a research interview or survey collection. Digitized sketch maps (originating from a paper version) are incorporated into systems that allow further analysis of the data. Incorporation of the data into a GIS or a computer assisted qualitative data analysis (CAQDAS) suite allows multiple methods data analysis. Digitized sketch map data can be arranged and analyzed by color, thematic codes, proximity, word frequency etc. within

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<sup>66</sup> R. M Downs and D. Stea, *Image & Environment: Cognitive Mapping and Spatial Behavior* (Chicago: Aldine Transaction, 2005).

<sup>67</sup> Sorin Matej, Sandra J Ball-Rokeach, and Jack Linchuan Qiu, "Fear and Misperception of Los Angeles Urban Space A Spatial-Statistical Study of Communication-Shaped Mental Maps," *Communication Research* 28, no. 4 (August 1, 2001): 429–63, doi:10.1177/009365001028004004.

<sup>68</sup> Boschmann and Cubbon, "Sketch Maps and Qualitative GIS," 2014.

GIS or CAQDAS. Because sketch maps capture georeferenced ground-level information from individuals, they often give information beyond what is available from the mapping of official statistics.

Epistemologically, sketch maps are based in feminist and critical geography in that they collect qualitative data and produce knowledge acquired from alternative data from non-dominant elements in the power structure. The break with the conventional, positivist framework of conventional GIS conceptually opens the possibility of incorporating qualitative data into GIS (as outlined by Pavlovskaya, above). As demonstrated by the QGIS literature, sketch maps use GIS in a new way facilitating collection of spatial data, along with details of everyday lives and allow visualization of socio-spatial processes.<sup>69</sup> Examples of studies using sketch maps incorporated into non-conventional GIS uses include Kwan and Ding's study of using GIS to create 3-D visualizations of from the geo-narratives of participant diaries.<sup>70</sup> Knigge and Cope explored meanings of community gardens in Buffalo using multiple data streams, both qualitative and quantitative in their research.<sup>71</sup>

Jung developed a software level program that allows incorporation of sketch maps, video and sound clips. This software incorporates a system for combining and coding related data streams and is a precursor of the geocoding feature in some of the CAQDAS software suites.<sup>72</sup>

Christopher Brennan Horley used paper and pencil sketch maps and semi structured interviews to map the creative spaces in the city of Darwin Australia. He asked creative class workers to draw spaces of

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<sup>69</sup> Ibid.

<sup>70</sup> Kwan and Ding, "Geo-Narrative."

<sup>71</sup> Knigge and Cope, "Grounded Visualization."

<sup>72</sup> J. K. Jung, "Computer-Aided Qualitative GIS: A Software-Level Integration of Qualitative Research and GIS," *Qualitative GIS: A Mixed Methods Approach*, 2009, 115–136.

creative activity as they experienced it. He then digitized the maps, imported them into a GIS program and created a three-dimensional map of creative spaces in the city by overlaying the sketch map data.<sup>73</sup>

#### How Medical Geographers Responded to the Challenge of Creating a Unified Methodology in Geography

The case study that I am using for this thesis is related to the body of literature in medical geography

and health geography. Therefore, I need to describe how medical geography evolved into health geography. Medical geography has is described as an exceedingly lonely discipline, and it is particularly striking how conservative medical geography was through the 1970's and 1980's.<sup>74</sup> This discipline has historically produced two streams of research - disease ecology and health services access research. Through the 1990s medical geographers became open to "outside influences" and began to look at research methodologies outside of medical geography and outside of geography itself.<sup>75</sup> In an assessment of where the research agenda for medical geography should go, Kearns and Moon suggested that rather than concentrate on the geography of disease, medical geographers should focus on the geography of health and be open to investigating cultural influences in the geography of health and become attuned to the effect of place on health.<sup>76</sup> Kearns and Moon also suggested that in addition to developing an appreciation for "health" and "place," health geographers should be open to the use of qualitative methods in addition to traditional quantitative analysis.<sup>77</sup>

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<sup>73</sup> Brennan-Horley, "Creative City Mapping: Experimental Applications of GIS for Cultural Planning and Auditing."

<sup>74</sup> Graham Bentham, Robin Haynes, and Andrew Lovett, "Introduction," *Social Science & Medicine* 33, no. 4 (January 1, 1991): ix-x, doi:10.1016/0277-9536(91)90313-2.

<sup>75</sup> Robin Kearns and Graham Moon, "From Medical to Health Geography: Novelty, Place and Theory after a Decade of Change," *Progress in Human Geography* 26, no. 5 (October 1, 2002): 605-25, doi:10.1191/0309132502ph389oa.

<sup>76</sup> Ibid.

<sup>77</sup> Ibid.

Medical geographers have responded to Murphy's centennial call to action, although from the tone of the literature on this topic it has done so grudgingly.<sup>78</sup> The new research agenda of health geographers is influenced by feminist geography in that there has been an appreciation for multiple viewpoints, especially of those who are not in the mainstream or dominant in the community.<sup>79</sup> Health geographers are taking a cue from critical geographers in adopting an activist agenda and much of the knowledge production seeks to influence healthcare policy makers and planners to better serve the needs of healthcare clients.<sup>80</sup> Dyck discusses several radical concepts (apparently, at least, to medical geography) including decentering the medical centric approach to medical geography, developing an appreciation for how place effects health, and focusing on subject centered experience.<sup>81</sup>

The concept of therapeutic places or therapeutic landscape (and appreciation of place) and how individuals, families, and communities perceive and use the therapeutic landscape demonstrates health geography's new interest in place and culture. The literature encompassing therapeutic landscapes gives recognition to the cultural components of health care resources and encompass more than only the formal healthcare resources available to practitioners.<sup>82</sup> One example of this approach to health geography is demonstrated in the work of Wilson, in her study of therapeutic landscapes of the emotional and spiritual landscapes among First Nations individuals in Canada. Wilson finds that cultural elements such as emotions, spirituality and place are part of the Anishinabek therapeutic landscape and

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<sup>78</sup> Mike Crang, "Qualitative Methods: Touchy, Feely, Look-See?," *Progress in Human Geography* 27, no. 4 (August 2003): 494–504.

<sup>79</sup> C. Milligan and J. Wiles, "Landscapes of Care," *Progress in Human Geography* 34, no. 6 (2010): 736–754.

<sup>80</sup> Hester Parr, "Medical Geography: Critical Medical and Health Geography?," *Progress in Human Geography* 28, no. 2 (April 1, 2004): 246–57, doi:10.1191/0309132504ph484pr.

<sup>81</sup> Dyck, "Using Qualitative Methods in Medical Geography."

<sup>82</sup> Milligan and Wiles, "Landscapes of Care."



linked to health; she notes that therapeutic landscapes among her study group do not enter into the awareness of their healthcare providers.<sup>83</sup>

#### A Local Example of Health Geography's New Agenda, Leading to my Exploration of Digital Sketch Maps

A very local example of this approach to health geography is demonstrated by Friedlob, Scholz, et. al. in their study of health neighborhoods in Whatcom County using mental maps.<sup>84</sup> This study of health neighborhoods evolved from co-author Scholz's participation within a larger healthcare study in Whatcom County. The goal of the larger project, "Stepping Stones: Bridging Healthcare Gaps" (The Care Transitions Project of Whatcom County) was to connect providers throughout the healthcare system in Whatcom County to enable safe and effective transition of patients, cut unnecessary hospital readmissions to PeaceHealth St. Joseph Medical Center and enable Whatcom County patients and their families to participate fully in their health and healthcare, particularly when leaving the hospital.<sup>85</sup> Richard Scholtz and his collection of mental maps about health neighborhoods informed me about methods and possibilities of using hand-drawn maps to understand "hidden geographies".<sup>86</sup>

The health neighborhood mapping study was conceived by Scholtz as he observed discussions about mapping of healthcare resources in Whatcom County. The purpose of this mapping project was to produce a navigable map for policymakers and practitioners to use in developing care plans and making

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<sup>83</sup> K. Wilson, "Therapeutic Landscapes and First Nations Peoples: An Exploration of Culture, Health and Place," *Health & Place* 9, no. 2 (2003): 83–93.

<sup>84</sup> Friedlob et al., "Patient Health Neighborhood Mapping Proposal: Actionable Research for Patient Centered Care and Patient Activation."

<sup>85</sup> Qualis Health, "The Stepping Stones Project: Final Report to the Community," accessed August 31, 2017, <http://medicare.qualishealth.org/sites/default/files/medicare.qualishealth.org/SteppingStonesFinalRptCmty.pdf>; "About the Stepping Stones Project | Qualis Health Medicare," accessed March 5, 2012, [http://www.qualishealthmedicare.org/about-us/results/stepping-stones-\(care-transitions-project-of-whatcom-county\)](http://www.qualishealthmedicare.org/about-us/results/stepping-stones-(care-transitions-project-of-whatcom-county)).

<sup>86</sup> Richard Scholtz, Interview with Richard Scholtz on his methods and learning from the Whatcom County Health Map exercise., March 2011.

health care access more efficient. As Scholtz observed the mapping process, he noticed an important omission; none of the policymakers or practitioners had considered mapping important healthcare resources from the point of view of their patients. Upon bringing this observation to the attention of the assembled group, Scholtz found himself volunteered to create a map of healthcare resources as viewed from the patients' point of view. Scholtz's study demonstrates the decentering of the medical-centric approach to medical geography by developing an appreciation for how place and culture affects health, and focusing on subject centered experience, and the discovery of hidden geographies.<sup>87</sup>

#### [A Not-So-Local Example of Health Geography's New Agenda, Leading to my Exploration of Digital Sketch Maps](#)

Christopher Brennan Horley's thesis work inspired me to pursue the study of sketch maps and mixed methods within geography.<sup>88</sup> Brennan-Horley's investigation of creative spaces was commissioned by the city of Darwin, Australia to assist with planning of city spaces for the city's creative class. City planners were aware that there was a substantial population of individuals within the creative class, but information about the spaces the creative class went to for inspiration did not exist in the public domain. To discover these hidden geographies, Brennan Horley utilized hand-drawn maps, much as Scholz did, to create a map of these inspirational places. The data collection protocol consisted of using a convenience sample of creative class individuals drawing inspirational places in the city as while interviewed by a researcher. These maps were then digitized, analyzed and collated to create a three-dimensional map of these heretofore hidden geographies. Unlike Scholz, who used mental maps to collect his data, Brennan-Horley used sketch maps, making it possible to create his three-dimensional map of hidden geographies of creative spaces.

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<sup>87</sup> Scholtz, "Mapping Your Health Neighborhood."

<sup>88</sup> Chris Brennan-Horley et al., "GIS, Ethnography, and Cultural Research: Putting Maps Back into Ethnographic Mapping," *The Information Society* 26, no. 2 (February 18, 2010): 92–103, doi:10.1080/01972240903562712.

### Observations and Inspirations Taken from the Neighborhood Health Maps and Creative Spaces Study

My review of the Brennan Horley creative spaces study and the Scholz neighborhood health maps study

led me to the following observations: the goal of the Scholz study could not lead to a navigable map of healthcare resources because none of the mental maps were georeferenced. However, my review of the sketch maps themselves and the recorded interview data led me to believe a navigable map of healthcare resources is possible if sketch maps replaced mental maps in the protocol. The Brennan Horley study of creative spaces combined a semi structured interview with collection of geo-referenced sketch maps which, of course, did produce a navigable map of creative spaces. Both studies collected interview data providing an opportunity for a more nuanced qualitative data analysis, as is possible using CAQDAS applications. I also noted that both studies collected hand drawn mental and sketch maps using paper and pencil. Collection of maps with paper and pencil struck me as odd, given my exposure to possibilities within mapping applications on GIS and mobile smart devices. I thought perhaps the studies began before technologies allowing markups on maps with geo-referencing were readily available. However, after reading Cubbon's literature review about hand-drawn maps, I discovered that most researchers using hand-drawn maps collect their data using paper and pencil.<sup>89</sup> These two studies, which I consider my "golden studies" (Brennan-Horley's creative spaces and Scholtz's neighborhood health maps) brought my attention to some work in the field of QGIS that has not been thoroughly explored and led to synthesis of the case study I present in chapter 3.<sup>90</sup> I will briefly revisit the health neighborhoods and creative spaces studies in my methods chapter to provide some additional detail which influenced the design of my case study, a hybrid of the best features of both the creative spaces and health neighborhood studies.

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<sup>89</sup> Boschmann and Cubbon, "Sketch Maps and Qualitative GIS," 2014.

<sup>90</sup> Brennan-Horley, "Creative City Mapping: Experimental Applications of GIS for Cultural Planning and Auditing"; Scholtz, "Mapping Your Health Neighborhood."

My research questions were guided in response to this trepidation and by Murphy's research agenda encouraging geographers to utilize advances in technology and to explore unifying methods within geography. Because the literature shows that tools available for collecting sketch maps digitally are approaching ubiquity and that few researchers have explored using digital sketch map collections the case study I performed allows me to comment on the following questions:

1. ***"How does exploration of digital sketch mapping and CAQDAS contribute to the research agenda goal to unify methodologies within geography?"***
2. ***"What are the utilities and merits of a digital sketch mapping application to be used for collecting information about hidden geographies?"***

In the next chapters I detail my method of incorporating sketch map data into CAQDAS and the results of my analysis of multiple fonts of data along with my assessment of the current state of this technology and suggestions on how future researchers should proceed with the use of digital sketch maps.

## Chapter 3 Methods

### Overview

One research agenda for geography as a discipline is to create a unified method to understand behaviors in geographic spaces.<sup>91</sup> The literature within the subdiscipline of QGIS demonstrates promising results toward achieving this goal.<sup>92</sup> Computer Assisted Qualitative Data Analysis (CAQDAS), as used by the QGIS subdiscipline, allows collection and analysis of data, both quantitative and qualitative in character, such as geo-coded locations, interview text, photographs, audio clips and video clips. As noted in chapter 2, few researchers have explored the utilities and merits of digital sketch maps used for collecting information about hidden geographies and there is sparse mention about explorations of digital sketch mapping. My contribution to this line of research is to assess the merits and utility of using digital sketch maps and CAQDAS for the discovery of hidden geographies and to comment on how these methods contribute to the research agenda of developing a unified method in geography.

In this chapter, I compare and contrast the methods within the creative spaces and health neighborhood studies to focus on openings for further exploration and how these openings influenced my case study design and tools selection for analysis.<sup>93</sup> I discuss how my golden studies influence the data collection process and selection of tools used to capture and prepare the multiple data streams for analysis. I

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<sup>91</sup> Murphy, "Centennial Forum."

<sup>92</sup> Joan Miquel Verd, "An Application of Qualitative Geographic Information Systems (GIS) in the Field of Urban Sociology Using ATLAS.Ti: Uses and Reflections | Verd | Forum Qualitative Sozialforschung / Forum: Qualitative Social Research," accessed October 23, 2014, <http://www.qualitative-research.net/index.php/fqs/article/view/1847/3373>; Fielding and Cisneros-Puebla, "CAQDAS-GIS Convergence Toward a New Integrated Mixed Method Research Practice?"; César Cisneros-Puebla, "Multi-Site Ethnography With Geospatial Data - Google Earth And ATLAS.Ti" (ATLAS.ti Library, 2009), [http://downloads.atlasti.com/library/Cisneros\\_2009-03\\_17.pdf](http://downloads.atlasti.com/library/Cisneros_2009-03_17.pdf); Kwan and Ding, "Geo-Narrative."

<sup>93</sup> Brennan-Horley, "Creative City Mapping: Experimental Applications of GIS for Cultural Planning and Auditing"; Scholtz, Interview with Richard Scholtz on his methods and learning from the Whatcom County Health Map exercise.

describe the case study and discuss methods and tools used to capture and prepare data for analysis. Finally, I give an example of the analysis as it is applied to the case study.

### Revisiting the Golden Studies as Guidance for Selecting the Best Tools for Collection and Analysis

My “golden studies”, the Brennan-Horley creative spaces and the Scholz neighborhood health maps

studies are described in chapter two. Some added information is required to shed light on how these two studies influenced the development of my case study protocol and selection of the toolset I chose for collection and analysis. Richard Scholtz was kind enough to share his health neighborhood study expertise and data with me during the exploratory phase of this project.<sup>94</sup> Together we reviewed the methods and results of the health neighborhoods mapping study in Whatcom County.<sup>95</sup> Participants in the health neighborhoods mapping study received open-ended instructions that described examples of components within a health neighborhood and instructions to draw a map of their own health neighborhood using pencils on a blank sheet of paper. Upon completion of the mapping task researchers asked the participant to explain the sketch map and captured audio of this interview.

The data resulting from collecting these mental maps is a collection of over 100 hand-drawn sketch maps describing (through pictures, labeling of pictures and recorded interview data) each participant’s health neighborhood.<sup>96</sup> Scholz did find information about hidden geographies in his data, however, he wanted to produce a navigable map of the spaces participants described. After reviewing the data, I

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<sup>94</sup> Scholtz, Interview with Richard Scholtz on his methods and learning from the Whatcom County Health Map exercise.

<sup>95</sup> Ibid.

<sup>96</sup> Scholtz, “Mapping Your Health Neighborhood.”

also found myself wishing we could find a method of producing a geographically correct map of the of the hidden geographies within health neighborhoods described in Scholz's study.

My desire to find a method of creating a geographically accurate map of health neighborhoods led me to perform a pilot study in my GIS course at Western Washington University.<sup>97</sup> I examined a selection of the maps and attempted to map the locations labeled on the mental maps into Google Earth. Not surprisingly, I found that using labeled locations from mental maps without the benefit of a base map was at best an interesting exercise producing inaccurate geographic data.

I found more interesting information in my informal thematic analysis of the mental map content. The map type and label analysis found that participants drew three types of maps which I classified as "*self-centric*", "*chronological*", and "*mappable in geographic space*". Themes within the map labels included "*home*", "*family*", "*spiritual*", "*occupational*", "*recreational*" and "*medical*". Most of the participants did make mention of medical facilities or practitioners, but none of them made these a central part of their maps. Although I was only able to listen to a few of the interview audio recordings (while meeting with Scholz) of participant interviews I noted that these also contained dense data with potential for a more nuanced analysis of hidden geographies. This analysis made me aware that the mental map data embodies content that has potential for a more formal analysis and visualization georeferenced map (a sketch map).

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<sup>97</sup> George Juszynski, "Projects - Portfolio of Projects Pilot Project for Master's Thesis: Health Neighborhood Maps Analysis," *Neighborhood Health Maps- Pilot Project- Executive Summary*, accessed January 30, 2013, <https://sites.google.com/site/portfolioofprojects/work-samples/projects>.

The Brennan Horley study of creative spaces also used interview data and hand-drawn maps to discover hidden geographies in Darwin, Australia. The hand-drawn maps in this study were produced with colored pencils to draw responses to interview questions over a paper base map of the city. The researcher worked individually with each participant as they responded to a question by drawing locations on the base map and responding verbally. The interview data was later transcribed into text. The sketch maps were then scanned and digitized into a file type that could be imported into GIS software for analysis. The collection of individual sketch map layers was overlaid to create a composite map of creative spaces in Darwin.<sup>98</sup>

Brennan-Horley's creative spaces study answered the question of how to create a navigable map of hidden geographies. Brennan-Horley had participants draw locations on a paper base map, a sketch map, thus producing thus producing a georeferenced map, while Scholz used the mental map technique in which participants draw locations (and other things) on a blank sheet of paper. The creative spaces study also collected interview data, and again, it occurred to me that there is an opening to perform a more systematic and thorough analysis of the themes and concepts contained within the interview data associated with sketch mapping process.

My review of the golden studies led to several openings in developing my case study and influenced choice of tools, so that I could create a hybrid of the best techniques of both golden studies. The health neighborhood and creative space studies collect multiple types and streams of data. The interview and

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<sup>98</sup> Brennan-Horley, "Creative City Mapping: Experimental Applications of GIS for Cultural Planning and Auditing."



mapping data contain visual, auditory, textual and geographic content. CAQDAS software is particularly adept at assimilating and relating multiple streams of data to one another. The ability of CAQDAS to relate and connect different types of data allows a deeper and more nuanced analysis. Since neither of the studies explore analysis with CAQDAS, I saw this as an opening to explore the utility of CAQDAS software in finding hidden geographies

### Three Tools Selected for Collection and Analysis (Atlas.TI, SketchMapper and Camtasia Studio 8)

The literature provided me with answers about analyzing the multiple data streams in a systematic way.

The studies I found in QGIS pointed me in the direction of using a computer assisted qualitative data analysis program. Multiple studies (reviewed in chapter 2) used a CAQDAS application to capture and analyze hidden geographies. Some of the CAQDAS applications offered a relatively new feature, the ability to geocode the data from within the interviews. I reviewed features of multiple computer assisted qualitative data analysis programs (CAQDAS). Many CAQDAS programs exist and have developed maturity in their ability to capture qualitative and quantitative fonts of information. My primary criterion and challenge for choosing a CAQDAS program was to find one that can capture the qualitative and quantitative data contained within the process of capturing sketch maps. After an extensive search comparing the features of these programs, I found Atlas.TI – which made the claim that capture of spatial data, such as the data within a sketch map, could be assimilated and related to other data types.<sup>99</sup>

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<sup>99</sup> *Geo-Coding with ATLAS.ti*, 2013, [https://www.youtube.com/watch?v=1oJ\\_N0nKJfY&feature=youtube\\_gdata\\_player](https://www.youtube.com/watch?v=1oJ_N0nKJfY&feature=youtube_gdata_player).

In my review of the golden studies, I noted that the main concern of both is to develop an understanding of participants' ground-level perceptions of the space that they live in, and the desire to uncover hidden geographies. The studies collect hand drawn maps using pencil and paper along with some form of interview about the maps. Among the final desired deliverables is a geographic product in the form of a map. The desired map is geographically accurate and gives a useful visual representation and interpretation of the discovered hidden geographies. My observation is that Murphy's goal of using advances in technology to digitally **collect** sketch maps has not been fully examined and utilized.<sup>100</sup> Most of the QGIS studies in the literature, which discuss sketch maps, use colored pencils to make markups on a paper base map.<sup>101</sup> Despite the phenomenon of neogeography, which brings the tools of GIS to anyone with a computer and Internet connection, and that 60% of Americans carry a potentially excellent sketch mapping tool in their pockets (smart phones), very few geographers have explored digital sketch map collection.<sup>102</sup> Some geographers have discussed this technology with trepidation, warning that geographers should not be seduced by the "wow factor" provided by such a tool.<sup>103</sup>

I presumed, given my exposure to the available technology to capture, assimilate and analyze multiple types of data, that CAQDAS applications or GIS applications would have the ability to capture sketch maps digitally (rather than on paper). It occurred to me that a digital tool for collecting sketch maps would indeed be useful. My thought was to use a digital sketch map collection tool on a touchscreen device that would be as easy to use as pencil and paper in my case study. I imagined my case study

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<sup>100</sup> Jung, "Computer-Aided Qualitative GIS"; Kwan and Ding, "Geo-Narrative."

<sup>101</sup> Boschmann and Cubbon, "Sketch Maps and Qualitative GIS," 2014.

<sup>102</sup> Lee Rainie, "Smartphone Ownership Update: September 2012," *Pew Research Center: Internet, Science & Tech*, September 11, 2012, <http://www.pewinternet.org/2012/09/11/smartphone-ownership-update-september-2012/>.

<sup>103</sup> Stuart C. Aitken and Mei-Po Kwan, "GIS as Qualitative Research: Knowledge, Participatory Politics and Cartographies of Affect," *The SAGE Handbook of Qualitative Geography*, 2010, 287–304.

participants drawing their maps and telling their story while the sketch map program captures the visual process of mapping and audio of the interviewing. Towards this end, I researched tools that would allow me to collect sketch maps on a touchscreen, capture audiovisual data from interviews with participants and allow playback of the mapping process time-locked with the audio of the interview data. I was quite surprised (and alarmed) to find that although technology was available to analyze sketch maps there was scarcely a mention of collecting sketch maps using digital devices. I found, in fact, that very few geographers had explored use of digital devices to collect sketch maps.

I spent an anxious summer learning to use ArcGIS Flexviewer to develop a sketch mapping application and was very nearly successful in creating a useful tool for collecting digital sketch maps. The application I created did everything I desired--except it did not geo-reference markups over the base map in a form that could importable into a GIS program! Shortly after my wasted summer, I consulted with my friend and colleague, Jacob Lesser, who is well-known for his legendary talents and programming skills in GIS. Jacob, whose geographic interests lie very much on the quantitative side of the field, was amused by my story of failed application development. Intrigued by the challenge of my requirements for a sketch mapping application and Jacob assisted me in developing an application we dubbed "SketchMapper", and therefore, SketchMapper is the tool I chose for digital sketch map collection.

Given that SketchMapper is the main data collection tool for capturing sketch maps in my case study and is a unique contribution towards unifying methods in geography, it is proper to discuss its features and operation in the methods chapter. The software user interface displays a set of five icons (upper right-hand side of screen in figure 1) that enable drawing functions used to make markups over the base

map. Figure 2 is a function table which the researcher uses to explain use of the pencil, hues, eraser, annotations and map icons of SketchMapper to the participant. The underlying base map tiles within SketchMapper provide coverage of the entire planet. Figure 3 displays user markups and the ability to display small and large-scale views of the sketch map. The middle figure is a small-scale view (zoomed-out view) and the circled marks point to large scale views (zoomed-in view) of each.

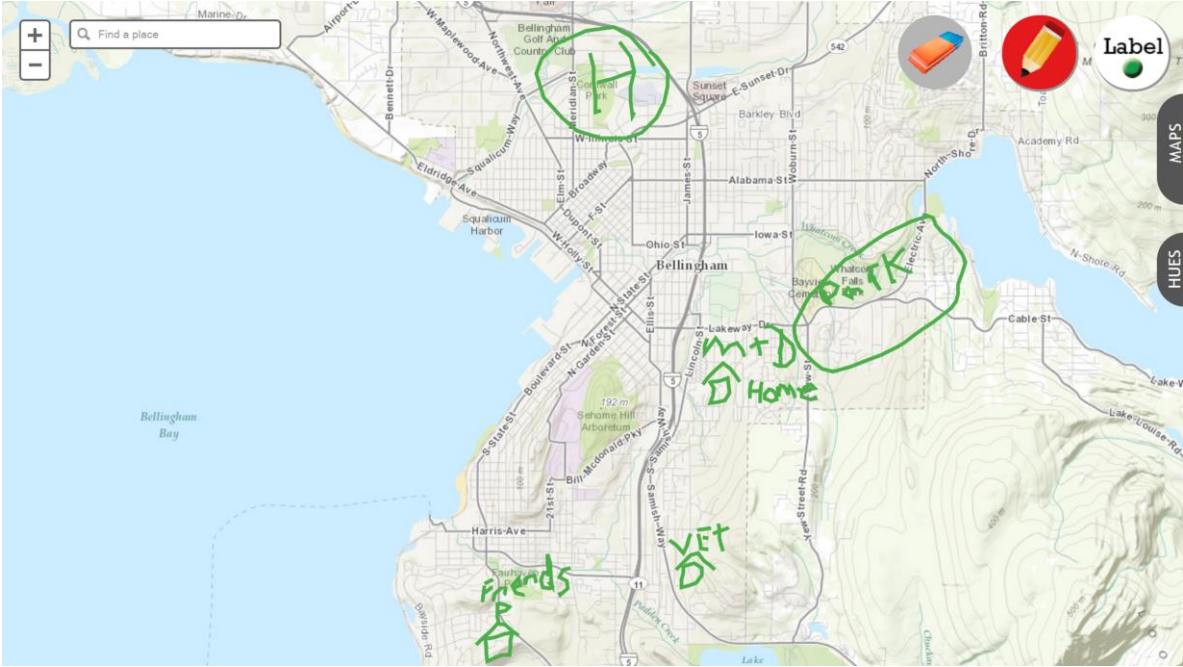

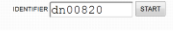
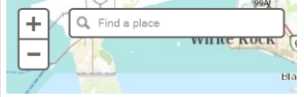
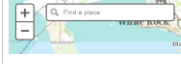






Figure 1 Screen-shot of SketchMapper user interface; participant makes markups on the sketch map using a finger, stylus or mouse to on the touchscreen.

	Mouse	Finger or stylus		
Begin a new mapping session	Lt click in the Identifier field, enter a identifier code with keyboard	Touch the Identifier field, enter a identifier code with keyboard		
Review a previous mapping session	Lt click in the Identifier field, enter a identifier code (try dn00820) with keyboard and the session is loaded onto the screen	Touch the Identifier field, enter a identifier code (try dn00820) with keyboard and the session is loaded onto the screen		
Zooming on map	Roll the scroll wheel in either direction	Tap the + or- button on the upper left of the screen. 		
Panning the map	Click and drag the map with the left mouse button	Place the stylus on the screen and drag the map in the direction desired		
Drawing on the map	Click on the pencil icon and hold the left mouse button while moving the mouse to make a shape or line	Touch the pencil icon and draw on the screen.		
Change color of drawing tool	Click on HUES icon on the middle right side of screen, choose color.	Touch on HUES icon on the middle right side of screen, choose color.		
Label an area	Left click the Label Icon and click the are where the label is to appear. Keyboard the label text into the field.	Touch the Label Icon and click the are where the label is to appear. Keyboard the label text into the field.		
Erase a shape	If the pencil icon is engaged, turn it off by clicking. Lt click the eraser Icon. Select the shape to be erased with a lt click, which results in the shaped becoming highlighted. Lt click the eraser icon.	If the pencil icon is engaged, turn it off by clicking. Lt click the eraser Icon. Select the shape to be erased with a lt click, which results in the shaped becoming highlighted. Lt click the eraser icon.		

*Figure 2 SketchMapper Part 2 Functions*

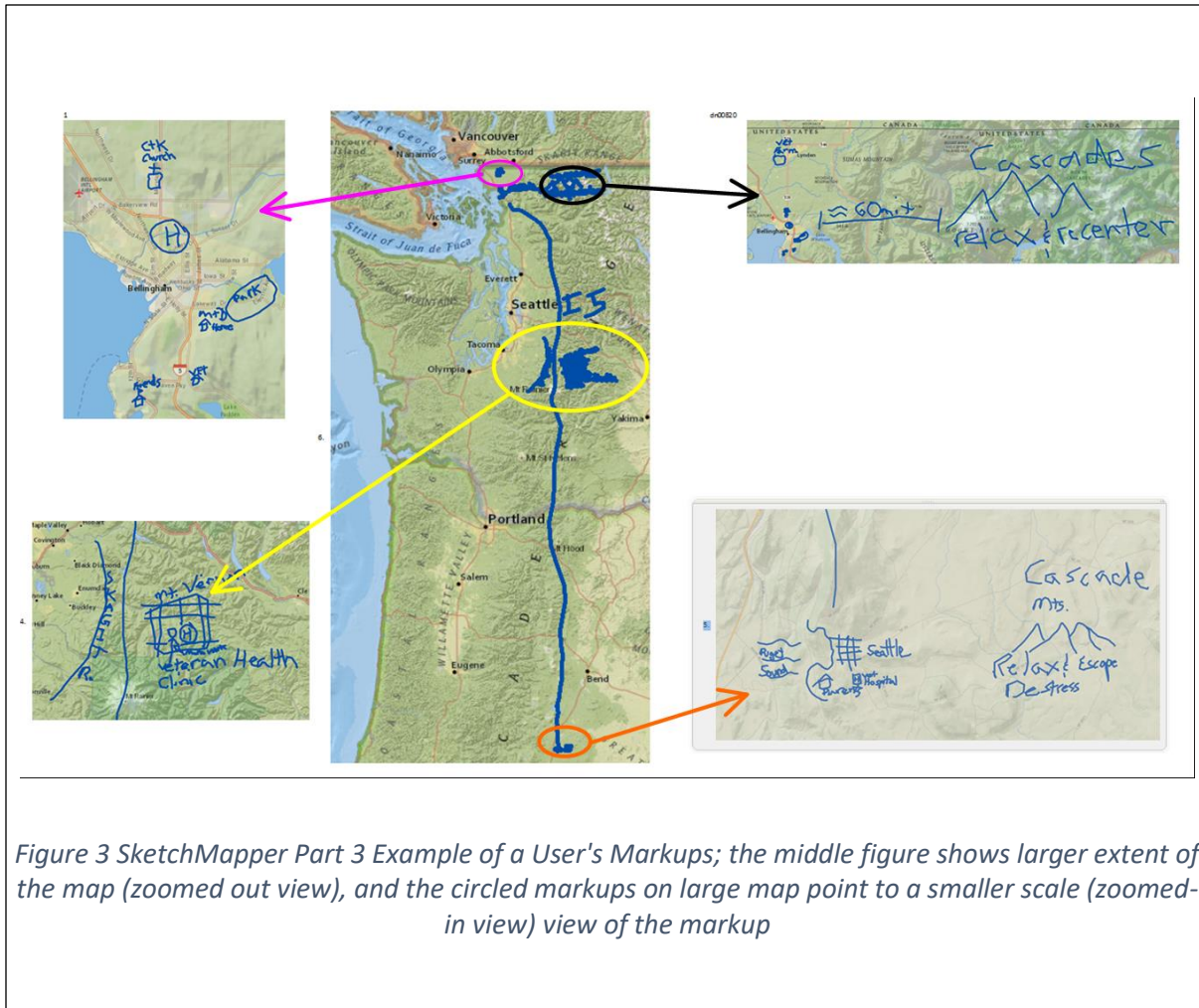
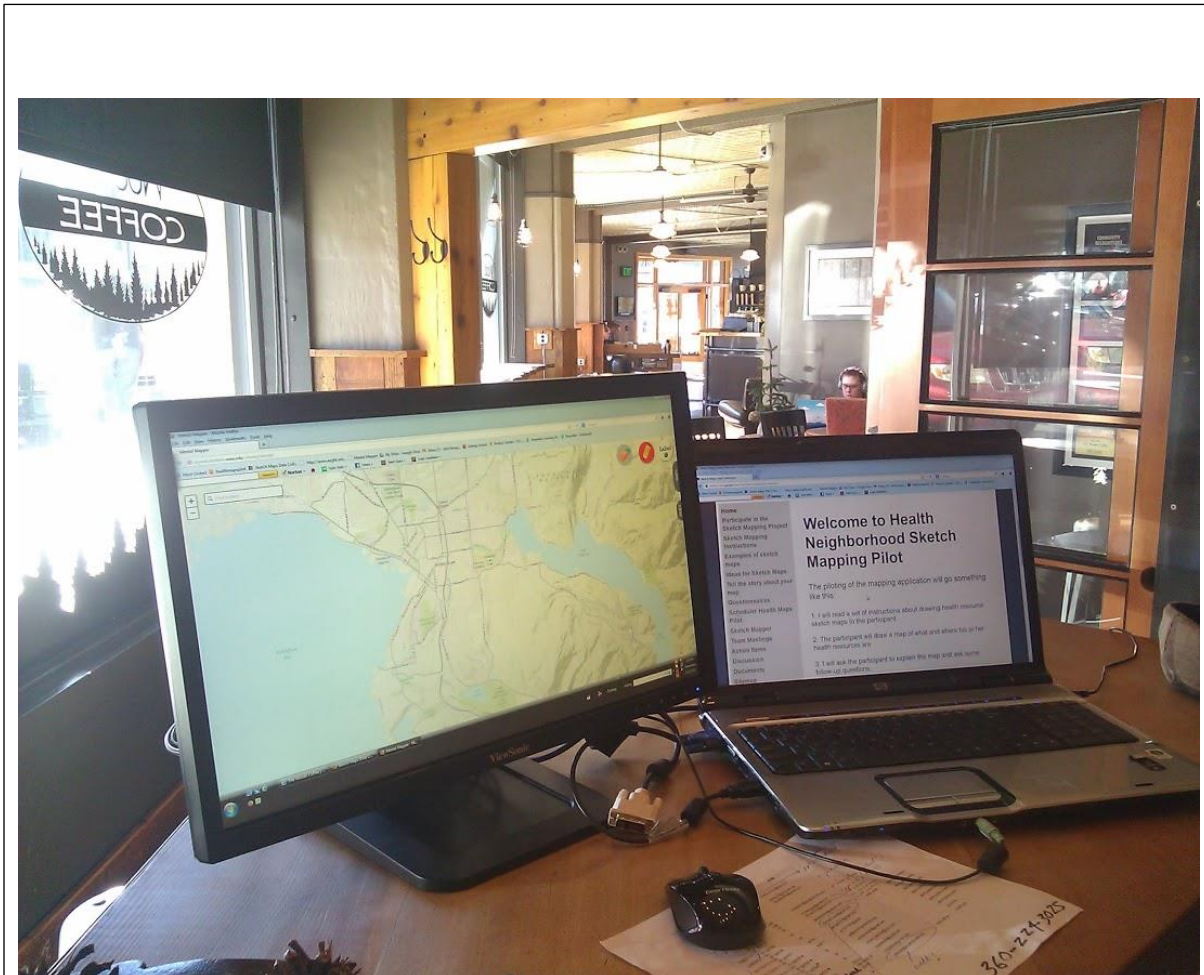


Figure 3 SketchMapper Part 3 Example of a User's Markups; the middle figure shows larger extent of the map (zoomed out view), and the circled markups on large map point to a smaller scale (zoomed-in view) view of the markup

Participants draw their sketch maps on a 22-inch touchscreen using a finger, stylus or mouse to navigate and draw markups on the base map. The hardware portion of the toolkit consists of a laptop PC, a Hewlett Packard Pavilion DV 9700 notebook PC with an AMD Turion 64 X2 mobile technology TL 60 2.00 GHz processor, 3 GB RAM and Windows Vista operating system. This laptop computer was chosen for its low cost, availability and its ability to record audio and video and to support addition of a second touchscreen monitor (see figure 4). The laptop computer has ample data storage capability and connected either via Ethernet or wireless connection to the sketch mapping software map server at the Huxley College of the Environment. The ability for wireless connection to the map server and other Internet-based software allows collection of sketch mapping sessions to occur in the field. The 22-inch

touchscreen connects to a laptop computer, whose screen displays instructions for the participant and protocol scripts for the researcher. Each sketch map along with its georeferences markups is saved to the map server as a shape file (\*.SHP) whose name corresponds to the participant number. A live instance of SketchMapper can be examined by following this link in a web browser: <http://myweb.students.wvu.edu/~lesserj/George/>.



*Figure 4 SketchMapper Data Collection Station; the SketchMapper application is displayed on the touchscreen (left) and informational prompts for the interviewer and participant on the smaller screen.*

Since one of my stated goals is to assess the utility and merits of digital sketch map collection, I thought it would be useful to have the ability to playback a screen-capture of the audiovisual content of space



and the participant's interaction with the SketchMapper during mapping session and interview to assess usability of the application. Camtasia Studio 8 is the video editing software package chosen to prepare the collected audiovisual data for import and subsequent analysis in the CAQDAS program (Atlas.TI). I used Camtasia to enhance the audio and video quality of SketchMapper's screen capture and to add index marks and captions used to aid navigation through the sketch map session during Atlas.TI analysis. The audiovisual screen capture also served to make a textual transcript of the sketch mapping session and served as an "interlocutor" in the CAQDAS program facilitating coding and linking of the multiple data streams collected in sketch mapping sessions.

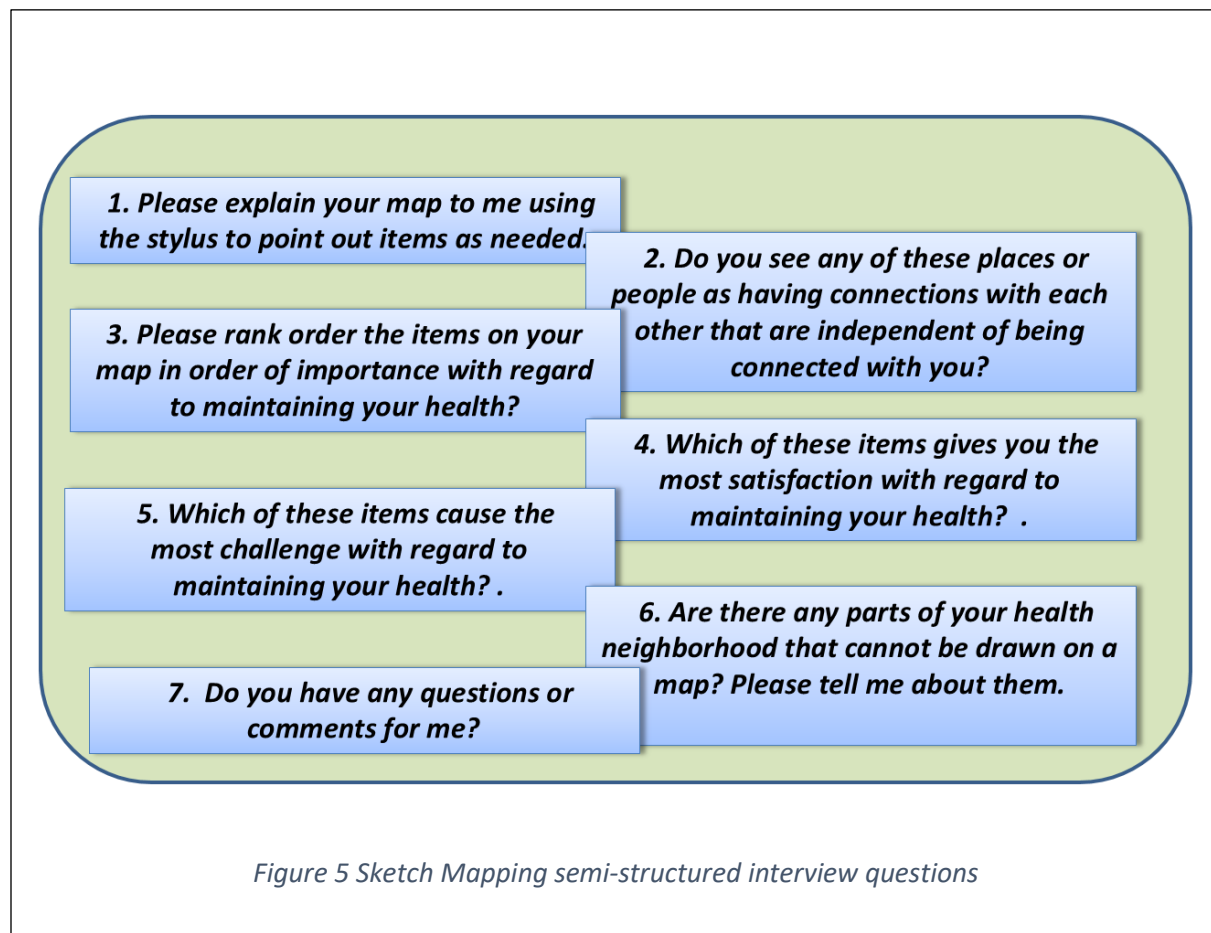
#### Description of the Case Study

My case study explores using CAQDAS and digital sketch mapping to collect data about hidden geographies within the health neighborhoods of student veterans attending Western Washington University. Daniel Nessly, an influential and well-known member of WWU's student veteran community, facilitated participant recruitment through his connections to local and regional veteran's groups. The case study group consists of 13 student veterans. The age range of participants is between 25 and 39, 4 females and 9 males, whose reported education level indicated at least completion of undergraduate studies and whose self-identified ethnicity is described as White, European. The institutional review board at Western Washington University reviewed and approved the study protocol and all participants completed an informed consent agreement prior to study participation (Appendices 4 and 5 show these documents). The data collection occurred between 2012 and 2014 in the computer lab at Western Washington University.

#### Sketch Map Collection Protocol

The student veteran health neighborhood sketch mapping session consists of the following steps:

The participant arrives to the sketch mapping session after completing demographics and informed consent (see appendix 4). The researcher reads the study instructions explaining the idea of a health neighborhood and gives a brief demonstration of how to use the sketch mapper software (see appendix 3, Sketch mapping instructions). The researcher leaves the room and the participant sketch maps using the SketchMapper application on the data collection station (see figure 4) for 10 minutes. The participant receives added time to complete the sketch map if needed. Upon completion of sketch mapping the researcher asks the participant six questions in a semi structured interview (see figure 5 and Appendix 2, Semi Structured Interview Questions) The participant is debriefed and dismissed upon completing the sketch mapping session. Most sessions were completed in under an hour.



### [reprocessing of Collected Data for Analysis in Atlas.TI](#)

The sketch mapping session produces three data streams (data files) that are prepared for analysis before they are imported into Atlas.TI. The three data files produced are the audiovisual file, which is a video of sketch mapper screen as the map is being produced by the participant, a text file, a transcript of the interview data occurring during the sketch map session and a georeferenced shape file, containing the georeferenced markups made on the sketch map. After some preprocessing of the audiovisual, text and georeferenced shape files are imported into Atlas.TI and serve as, in the jargon of Atlas TI, as the primary documents of analysis.

Pre-processing of the audiovisual capture file with Camtasia Studio 8 to adds visual cues in the form of text balloons and captions of the interview text. These serve as navigational aids indexing when transitions (such as a new interview question) in the sketch mapping session occur. For example, a text balloon labeled "question 4" appears at the beginning of where the researcher discusses question 4 with the participant. The text balloons allow the playback pausing at the beginning or end of a question when the audiovisual file is fast forwarded or reversed during Atlas.TI analysis. Captions of the transcribed text superimposed over the video facilitated the coding process in Atlas.TI. This video is saved as an MP4 file, and imported into Atlas.TI as the **first primary document**.

The audio within the audiovisual recording of the sketch mapping session is preprocessed with Camtasia Studio to enhance the audio quality when needed and to produce the textual transcript file used for coding in Atlas.TI. The content of the **transcript file** (saved as a\*.TXT file) is a record of all verbal interactions occurring during the sketch mapping session and imported into Atlas.TI as the **second primary document**.

The SketchMapper application produces this georeferenced a georeferenced shapefile (\*.SHP file); it contains the markups and annotations of a participant's sketch map. The georeferenced shapefile is preprocessed with ArcGIS Desktop to create a clean geographic representation (a map) that clearly displays markups and annotations of each sketch map. The shape file is converted into a Keyhole Markup Language file (\*.KML file). The \*.KML file conversion is required for Atlas.TI to display the sketch map within an instance of Google Earth. This file is imported into Atlas.TI as the **last of three primary documents**.

#### [Associating Primary Documents in Atlas.TI](#)

The three primary document types, audiovisual, text and geodocs files, when first imported into Atlas.TI have no relation to one another. The three file types must be related to one another in a bidirectional fashion before coding and analysis of the files can occur in Atlas.TI. The end goal of file association (see figure 6), shows the Atlas.TI coding display. The display shows three columns labeled "transcript of sketch mapping session" "video of sketch mapping session" and "coding margin". The dual arrow labeled "synchronized" indicates that when the audiovisual file is played back, the text in the transcript scrolls in correspondence to the content of the audio and vice versa. The association editor tool in Atlas.TI makes the initial connection between the text and audiovisual files. The audiovisual playback is viewed beside the text content and the contents are time-locked by placing the words heard in the audiovisual file between *anchors* in the text file at intervals of about 30 seconds so that when the file is played back the anchor text is highlighted synchronized to the audio and visual content. Anchors are time markers linking the video content to the text file (red dots shown in the text file in figure 6).

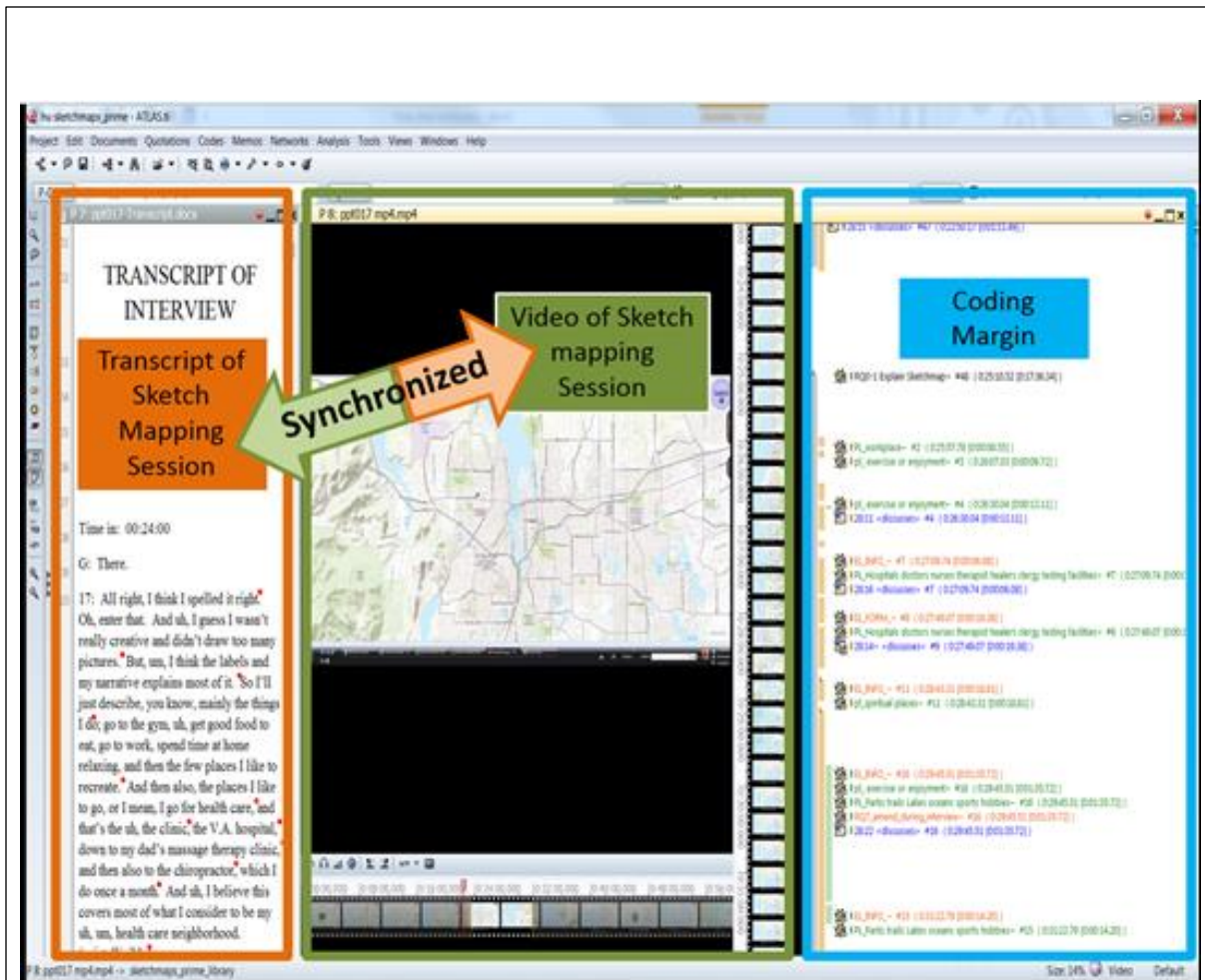


Figure 6 Synchronization of text file content with audiovisual playback in the Atlas.TI coding screen.

The association between the audiovisual file and the geodocs file is less straightforward. The geodoc data is associated to the textual data by using the audiovisual playback file as an interlocutor to verify locations in the georeferenced SketchMapper file and linked to textual content by creating a “hyperlink” between the textual content and the geodoc content. The coding margin displays the names and locations within the transcript and video which are coded during the analysis.

## Data Analysis

My analysis of these primary documents in Atlas.TI occurs in three steps, following the tutorial provided by Dr. Susanne Frieze in *Qualitative Data Analysis with ATLAS. TI*.<sup>104</sup> The **first step of analysis** in Atlas.TI is coding the data. The **second step of analysis** is finding relations and intersections of the codes among the primary documents. The **third and final step of the analysis** is to review these connections, and synthesize observations and explanations about the phenomenon in question. I demonstrate an example of the analysis method using the data collected about Question 4 of the sketch mapping interview questions (see figure 5).

#### First Step in Atlas.TI- the Coding Process

The first step in performing a computer aided qualitative data analysis is reviewing and thematically coding the content of the primary documents. According to Frieze, the coding process is iterative and recursive. She suggests the first round of coding is based on a few basic questions, which she refers to as “coding research questions” (I refer to them as sketch map interview questions).<sup>105</sup> My set of *coding research questions* consisted of the six questions asked of each participant in the semi structured interview. The first-round of coding is iterative and recursive in the sense that as in the first round of coding occurs, ideas and connections are made for new codes. After the first-round of coding is complete, the results are reviewed, contemplated and the researcher synthesizes new connections and codes based on what was learned in the first-round. The second round of coding requires again reviewing the primary documents and looking for new themes and connections. This process may be repeated multiple times until the researcher begins to develop an idea of themes and connections within the data streams.

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<sup>104</sup> Susanne Frieze, *Qualitative Data Analysis with ATLAS. Ti* (SAGE, 2014).

<sup>105</sup> Ibid.

My coding for the semi-structured interview questions for the are as follows:

Question 1 (RQ1) asked the participant to explain their map to the researcher as they described and interacted with their sketch map. Question 2 (RQ2), “connections” is about connections that exist on the sketch map independently of the participant. The rank order question, question 3 (RQ3), is a ranking of the objects on the sketch map in order of their importance with respect to maintaining one’s health. Questions 4(RQ4) and 5 (RQ5) asked the participant to label and describe the location that gave them the most satisfaction and most challenge about maintaining their health. Question 6, “unmappable” (RQ6), asked the participant to discuss any non-geographic parts of their health neighborhood. The final question, question 7(RQ7), asked the participant whether they had any questions or comments about the sketch mapping session.

The first two coding rounds began with playing back each participant’s audio-visual files of sketch mapping sessions in the coding window of Atlas.TI. As I listened to each transcript, I coded the text file excerpts which referred to each coding research question (RQ1, RQ2, RQ3 etc.) and I created new codes for text transcript content I thought might be interesting to keep track of. I stopped coding after two rounds of this process and came up initially with 96 codes. I followed Friese’s advice to combine codes of similar meanings from the first coding rounds and therefore combined many of the initial 96 codes to a smaller list of 47 (see figure 7).

Code Info	Comment	Author
ADVICE_AQ	[no entry]	Super
ADVICE_FA	[no entry]	Super
ADVICE_FR	[no entry]	Super
ADVICE_INTERNET	[no entry]	Super
AIL_Described	[no entry]	Super
EL_FORM_	EL_FORM_ = elements of the therapeutic landscape that are formal. By formal I mean elements of the therapeutic landscape that would be on a resource list available to healthcare practitioners and are established healthcare institutions.	Super
EL_INFO_	EL_INFO_ = elements of the therapeutic landscape that are informal. By informal I mean elements of the therapeutic landscape that would not be on a resource list available to healthcare practitioners and are probably not established healthcare institutions.	Super
EMOT_NEG_	A person place or thing that elicits negative emotional content.	Super
EMOT_POS_	Person place or thing that elicits positive emotional content.	Super
INSIGHTS_	[no entry]	Super
PEOP_AQ_	People who are acquaintances.	Super
PEOP_FA	People who are family members.	Super
PEOP_FR_	People who are friends.	Super
pl_exercise or enjoyment	Places for exercise or enjoyment	Super
pl_city_	city mentioned	Super
pl_community events places	Places for community events.	Super
pl_country_	country mentioned	Super
PL_gardens	Places that are gardens.	Super
PL_healthcare decisions advisors	People places or things that are utilized in making health care decisions.	Super
pl_healthy food	Places where food is purchased, made or gathered.	Super
PL_home	The place identified as a home. More than one place can be chosen as home. It can be the place where one spends most of his or her time or another place such as parents or grandparents home.	Super
PL_Hospitals doctors nurses therapist healers clergy testing facilities	This is any place or institution that serves as a medical facility. It is more often a formal element of the health neighborhood or therapeutic landscape.	Super
PL_Parks trails Lakes oceans sports hobbies	Any place that is used for recreation.	Super
PL_peace of mind places	Places that serve to give peace of mind, mental health, spiritual health, etc.	Super
PL_playspace	Places that serve as places to play.	Super
pl_spiritual places	Places that serve to restore the spirits. May be a religious institution such as a church or synagogue etc. Or it may be some non-institutional space.	Super
PL_stores	[no entry]	Super
PL_supportive places	Places that serve to give emotional support, independent of religious institutions.	Super
PL_workplace	Places where work is performed for remuneration. Also places such as school where work is performed but not necessarily for remuneration.	Super
RQ0 start sketchmapping	RQ0 start sketchmapping This code is used to mark section during which the participant is drawing their sketch map.	Super
RQ0-1 Explain Sketchmap	RQ0-1 Explain Sketchmap this code is used in the position of the interview where the participant's last show and explain sketch map.	Super
RQ2_CONN_	RQ2-responses to the research question number two. Do you see connections among any of the places on your health neighborhood that are connected independently of you?	Super
RQ3_0	RQ3_0 entire RQ3 Rank Order question	Super
RQ3_1	RQ3 rank one	Super
RQ3_2	RQ3 rank number two	Super
RQ3_3	Our Q3 rank number three	Super
RQ3_4	RQ3 rank number four	Super
RQ3_5	RQ3 rank number five	Super
RQ3_6	RQ3 rank number six	Super
RQ3_7	RQ3 rank number seven RQ3 RQ3 RQ3 RQ3 RQ3	Super
RQ4_SATI_	Research question four -place chosen as giving the most satisfaction with regard to maintaining one's health.	Super
RQ5_CHAL_	RQ5 the place chosen that gives the most challenge with regard to maintaining one's health.	Super
RQ5_CHAL_REASON	This code relates to the quotations marking the text giving the reason it is regarded as having the most challenge.	Super
RQ6_UNMA_	RQ6 RQ6 persons, places or things that are not mappable.	Super
RQ7 _amend_during_interview	this code indicates the participant made an amendment to the map as a result of the discussion during the semi-structured interview.	Super
RQ7_QU_CO_	RQ7-any questions or comments about the sketch mapping session. Used especially for instances where a comment is made upon the sketch mapping interface or a question is asked about the protocol itself.	Super
UTIL_	Utility-if a person place or thing is mentioned as having a particular utility it is coded with this code.	Super

Figure 7 Codes generated in analysis of sketch maps



Upon completion of coding the text transcripts of the sketch mapping sessions, I reviewed the sketch map of each participant to link the codes from the text document to the geodoc markups on the map. For example, I linked interview segments coded RQ 4 to the sketch map location on the participant's sketch map. Linking of the transcript codes to the related geodoc locations completed the first step of my analysis.

### [Second Step in Atlas.TI- finding relations and intersections of the codes between the sketch maps and the transcripts](#)

The **second step of analysis** is finding relations and intersections of the codes among the primary documents. However, remembering that the coding process is iterative and recursive, I elected to step back and use the Word Cruncher tool in Atlas TI before I continued with the second step of the analysis process. The Word Cruncher tool can be directed to count words within any of the primary documents. I ran the Word Cruncher tool to count words in all the text documents. I did this because I thought it would direct me to words pointing at prominent themes among the discussions and interviews and to synthesize a "thematic primer" that would help guide my thought process in further coding and synthesis of ideas.

The Word Cruncher tool produced a spreadsheet of the most frequently used words which I compiled into a histogram (see figure 12). Among the top 30 most often used words, the four most frequently used terms in the study refer to health, time, thought and home. The most often mentioned places are Mount Vernon, Seattle, hospital, work, school, Bellingham, neighborhood, Whatcom and farm. The people most often mentioned in this study are family, friends, veterans and students.

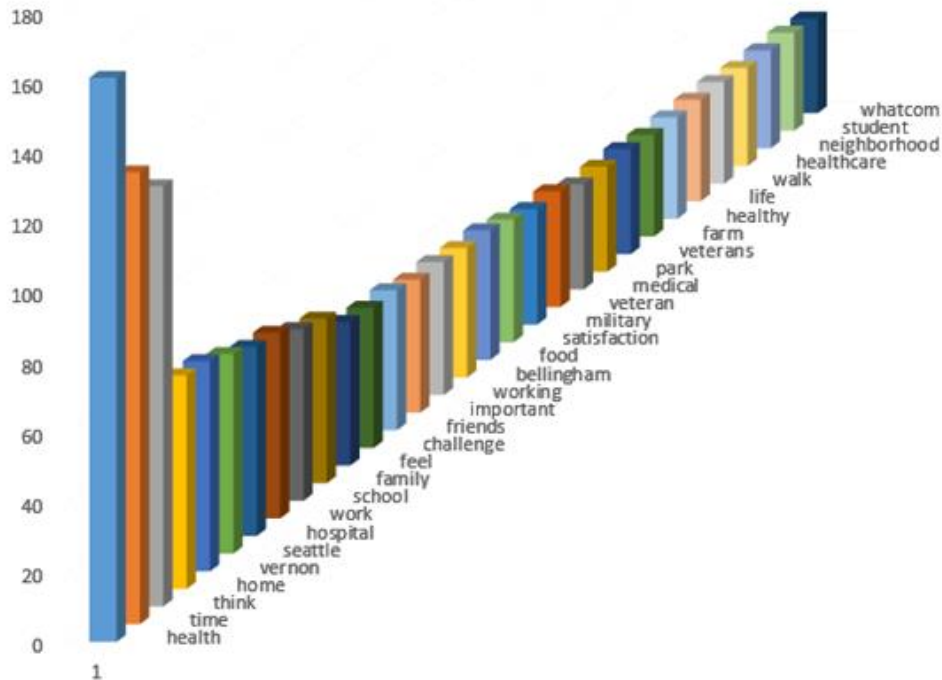


Figure 8 A histogram of top 30 most often used words occurring across all the primary text files. (results of the Atlas.TI word frequency tool)

Interestingly, and perhaps not surprisingly, terms referring to formal medical institutions and providers do not occur until after the 30th most frequently used term. "CBOC" (a medical facility), "clinic", "doctor" and "physician" occur in places 34, 39, 126 and 135 respectively. My initial assumption was that for a young and healthy population such as the one in the study that perhaps medical institutions and professionals should not be at the top of the most frequently used words to describe their health neighborhood.

The word frequency analysis of all the text documents led me to think about performing a visual inspection of all the sketch maps to get an idea of where participants made most of their geographical

placemarks and to look for any trends across the sketch map data. The majority of placemarks were made in Bellingham and as far south as Seattle, a range of about 100 miles. There were very few placemarks beyond Western Washington and very few north of Bellingham. There were a few outlying geographical references which were made by participants beyond this geographical range. Examples of these geographical references include the Midwest and Northeast in the United States, Europe and Asia.

Keeping in mind the results of the word frequency analysis and the visual inspection of places marked on sketch maps, I continued with step two of the analysis by looking for relations and intersections among the data in the text files and sketch map locations (geodocs) which I coded as "RQ\_SATI ". In my code book, "RQ4\_SATI "relates to the sketch map interview question number 4, "Which of these items gives you the most satisfaction with regard to maintaining your health I used the tool in Atlas TI named "Query Manager". I set the parameters in the query manager tool to search places coded as "RQ\_SATI "among only the sketch map primary documents for all participants. This query produced 22 locations among the sketch maps for the "RQ\_SATI "code (see figure 12).

Document filter:  
"GEODOCS"

22 Quotations found for query:  
"RQ4\_SATI\_"

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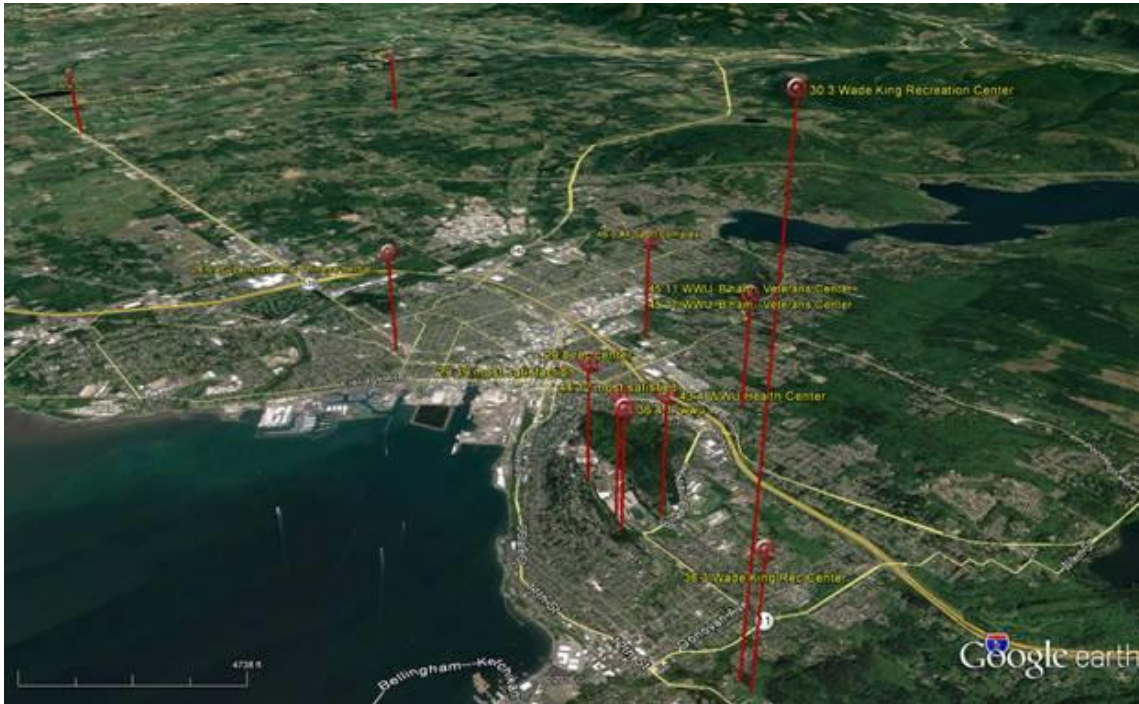
<>30:3 Wade King Recreation Center [48°42'48.99"N 122°29'50.77"W]  
<29:8 rec center [48°44'0.87"N 122°29'19.69"W]  
<48:4 cousin [38°42'0.15"N 22°51'46.95"E]  
<46:3 #4 Sport complex [48°44'58.56"N 122°27'26.24"W]  
~<>29:19 most satisfaction [48°44'0.87"N 122°29'19.69"W]  
<48:6 cousins [43°3'35.04"N 16°10'58.77"E]  
<48:8 cousins [46°3'45.47"N 11°8'10.13"E]  
<45:5 home [48°50'48.88"N 122°24'45.31"W]  
<48:9 dad is here [41°16'23.38"N 19°50'37.21"E]  
<36:4 1. wwU [48°43'39.43"N 122°29'30.76"W]  
<46:12 vet farm [48°52'3.07"N 122°29'8.92"W]  
<38:3 Wade King Rec Center [48°42'45.87"N 122°29'50.77"W]  
<48:5 cousins [43°31'10.38"N 16°31'24.84"E]  
<43:1 Momma's [47°41'10.18"N 122°21'6.45"W]  
<48:7 cousins [42°25'49.99"N 18°46'29.66"E]  
<43:4 WWU Health Center [48°43'37.29"N 122°29'13.59"W]  
<44:12 most satisfied [48°43'44.83"N 122°29'26.26"W]  
<28:6 acupuncture and Chinese herbal. [48°45'44.46"N 122°29'15.37"W]  
<47:13 Someone to talk to [36°46'20.30"N 119°46'28.89"W]  
~<47:12 Someone to talk to [47°7'15.44"N 122°33'25.12"W]  
<47:11 Someone to talk to [47°12'44.84"N 123°4'14.12"W]  
<45:11 WWU, B'ham., Veterans Center [48°44'2.20"N 122°27'46.68"W]

*Figure 9 Results of query manager search for sketch map locations coded as "RQ4\_SATI"*

The query tool result lists the primary document number (this indicates which participant marked a location), the phrase the participant used to name the location and the geographical coordinates of the location. I produced a new map in Atlas.TI of the locations for the "RQ4\_SATI" code and saved this document as a new geographical (geodoc) primary document in Atlas.TI(see figures 10 and 11?). I made a visual inspection of this map and noted whether any commonalities of place, utility of place or any other relation appeared among the locations.



Figure 10 Map of all locations coded "RQ4\_SATI"(the red symbols point to location listed in the query for "RQ4\_SATI" and indicate these locations are geographic codes in Atlas.TI., The yellow lettering is the label a participant applied to this location). The locations shown here are all "RQ4\_SATI" locations of all the participants.



*Figure 11 Another view of places coded as "RQ4\_SATI"*

This collection of RQ4 textual quotes was saved as a new primary document. I continued the analysis of locations coded for the satisfaction question using this new primary geodoc subset (containing only places coded with "RQ4\_SATI"). I again used the word cruncher tool to find the word frequencies in the text documents coded RQ4\_SATI (figure 15 shows these word frequency results as a word cloud). To complete the "RQ4\_SAT" I created a query which searched for segments within the textual documents marked as related to the map locations for this code. This query produced a report listing a location, the related text segment and the participant number of segment quoted.

health time western think home best farm unit feels  
buy parents outside rec community vet mind summer query cousin military feel  
myself location house weekends interesting sketchmaps program spend mental  
challenging close college friends head campus prime maine army characters decision helps  
atlasti involved work hard student users neighborhood park software country drive near edited  
vernon someone documents problems civic lives hiking beach mountain urgent talking length  
civilian fiv talked feeling move thinking transcripts university fact filter hospital exercising  
europe seattle thailand live sports aware understand bellingham textbank issue acupuncture  
difficult quotation clipped talk document walk sati exercise healthcare quotations person

*Figure 12 Results of the word cruncher tool, this time displayed as a word cloud rather than a spreadsheet. It provides less detail but is a helpful visual representation.*

### **Third step** of analysis in Atlas.TI -synthesize observations and explanations

The **third and final step of the analysis** is to review the connections among the textual and sketch map

documents and synthesize observations and explanations about the hidden geographies (if any)

uncovered by the analysis. The final step in the qualitative analysis is a review of the word analyses of

the code specific (in this example it is “RQ4\_SATI”) geographic and textual primary documents to decide

whether any common themes or new connections are apparent. The process of reviewing individual

code based summaries could (and should) lead to synthesis of new connections and overarching themes

within the entire body of the study. A final report summary is written commenting on whether the

locations in the RQ4 coded primary documents are formal or informal, and whether geographic or

conceptual similarities or patterns are observed. I discuss the results and findings of my exploration in

Chapter4.

## *Chapter 4 Results and Findings*

### Overview

In this chapter, I will summarize my findings about the collected data and my observations about my exploration of using CAQDAS and digital sketch mapping to find hidden geographies. I will discuss the findings and results on two levels. First, I will summarize my findings of the analysis completed in chapter 3. Second, I will summarize my thoughts about the merits and utilities of CAQDAS and sketch mapping for finding hidden geographies and whether their use contributes to the goal of unifying methodologies in geography

### Results and Findings of the Case Study Analysis

In chapter 3, I demonstrated a method of analysis to find hidden geographies using CAQDAS and digital sketch maps on the data within my case study. The analysis was carried out in three steps; coding the data, finding relations and intersections within the coded data and, after reviewing relations and intersections in the data analysis, synthesizing observations and explanations about the phenomenon in question (finding hidden geographies). In the paragraphs below, I share my findings after carrying out step 3.

### Summary of findings for code RQ4, "Most Satisfaction"

The geographic locations mentioned most frequently in relation to sketch map question 4 (coded RQ4\_SATI) were Western Washington University and places related to the concept of family. Every respondent marked geographical locations related to home and family connections, and these were associated with text segments such as "momma's", "cousins", "dad is here" and "And I've got, basically family... I mean, not blood family, but ...". Participants spoke of family mostly in terms of feeling



support, trust, community and also of a place that provided safe harbor for physical comfort, connection and identity.

The geographical and textual quotations to Western Washington University fall into two broad categories. The first broad category is places related to exercise. Wade King Recreational Center was mentioned by five of the twelve participants. Almost half of the participants derived satisfaction from a location where physical activity such as exercise occurs. The second broad category referencing Western Washington University is satisfaction that comes as a result of self-improvement or "bettering oneself". Those participants who mentioned bettering oneself placed high value on their academic activity at the University.

#### [Summary of findings for code RQ5, "Most Challenge"](#)

Sketch mapping interview question number five (coded RQ5) asked the question, "Which of these places gives you the most challenge with regard to maintaining your health?" The most frequently used words to describe places that presenting the most challenge with regard to maintaining one's health referred to both formal medical facilities and the cities where these are located. Among the 12 most commonly used words were Seattle, hospital, (Mt.) Vernon, pills, doctor, feel, medical, appointment and CBOC. There are 18 individual geographic quotations in three clusters mentioned by the participants. The three geographic clusters are in around Bellingham, Mount Vernon and Seattle. The Bellingham quotations do not appear to have any commonalities. The Mount Vernon quotations are about the CBOC, an outpatient facility that serves the veteran population. The majority of geographical quotations around Seattle refer to the VA Medical Center and also outlying specialty clinics serving the veteran population.

Challenges discussed by the participants include the logistics of receiving care in terms of distance, in communication with medical offices, and a lack of guidance in finding the proper medical resources. Most participants expressed dismay with a perceived VA medical culture described as lacking respect, "feeling...not quite welcome", a lack of concern and human connection from hospital staff towards their patients. A few individuals mentioned feeling they had earned more respect for their military service than they received from their health care system. These things were consistent in describing both medical facilities in Seattle and in Mount Vernon. The challenges discussed for Bellingham did not appear to have any thematic commonalities. There were mentions of downtown Bellingham contributing to poor maintenance of health because of the food and alcohol choices available, challenges with family support with health concerns, and challenges with getting information useful to navigate the VA medical system.

One of the big questions within the thesis is whether the sketch mapping technique would find hidden geographies that student veterans identify as part of their health neighborhood. The operational definition of "informal places" are those places that healthcare practitioners do not have in their list of health resources and can be recommended to their patients.<sup>106</sup> My finding is that this research question did uncover informal places or hidden geographies within the places that were coded for RQ4."

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<sup>106</sup> Scholtz, Interview with Richard Scholtz on his methods and learning from the Whatcom County Health Map exercise.

## Does the use of CAQDAS And Digital Sketch Maps Make any Contribution to Unifying Methodologies in Geography?

One goal of this thesis is to explore and comment on how use of CAQDAS and digital sketch map collection contribute to unifying methods in geography,, as put forth by Murphy in his centenary address of the AAG.<sup>107</sup> An interesting finding of this exploration is that although geographers (as I learned anecdotally in discussions and demonstrations of the SketchMapper application at the 2014 AAG meeting) have expressed the desire to collect digital sketch maps, apparently not many geographers have made the effort or perhaps lacked the resources to develop software which collects sketch maps digitally. My case study analysis and research of this technology demonstrates that QGIS and digital sketch map collection is a powerful tool available to cultural geographers. My colleagues' interest in this technology indicates (that it would be used more frequently if made available in a user-friendly package.

Another interesting point to consider is that, as I stated earlier in chapter 2, the conventional use of GIS programs is geared toward more corporate, municipal and military users. The maker of the premium GIS application (ArcGIS Desktop) is a corporation (ESRI) which primarily serves these interests. Although thousands of GIS "toolsets" exist to answer questions posed by military and corporate users, there is not one toolset within the premium GIS program that performs the function of the SketchMapper application.

In my own case studies, I came to value the ability to map anything that was said in relation to the sketch maps. I found that the value of the participant-driven drawing of the sketch maps is that it motivated the participants to tell the story of their health neighborhoods in as much detail as possible.

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<sup>107</sup> Murphy, "Centennial Forum."

During the sketch map interview, I sensed the participants enthusiasm in pointing out items on their map, and adding new items, as they explained their map. It was also quite easy to steer the conversation to get more information about a participant's geography. There was something about the mapping process that I sensed made participants feel open to providing more information than they would from a simple survey. I would say that this is one of the factors that this method contributes towards unifying methods in geography. I, as a primarily qualitative geographer, felt that I had unlocked a secret to learning about hidden geographies from sketch maps. I also feel that creating a map of the data for presentation and persuasion makes me feel more confident about the analysis of my results and adds to my ability to persuade my audience.

CAQDAS in geography is not a new method, however, the ability to add the dimension of hand-drawn maps that are georeferenced into CAQDAS is in fact unique. The ability to add a locational component to a qualitative geography based analysis adds a certain element of power to the analysis because it is the tool used by those in power. Therefore, at least for qualitative geographers, the ability to display results along with analysis of findings would, at least in the eyes of geographers using GIS for non-qualitative studies, make results more understandable and credible. Development of a tool which gives qualitative geographers the ability to use digital sketch maps in their mixed methods research makes a contribution toward unifying methodologies in geography.

### What are the merits and utilities of digital sketch maps in CAQDAS in finding hidden geographies?

First among the many merits and utilities of digital sketch maps and CAQDAS to find hidden geographies

is a simple matter of practicality. Using a digital sketch mapping application allows the researcher to skip the step of digitizing paper and pencil maps prior to importing into a GIS program. Second, participants find it captivating to telling the story of their health neighborhood using a map. Third the technique of drawing one's life story on the screen and then telling the interviewer about it instills a certain enthusiasm in the participants. Fourth, digital sketch mapping opens possibilities towards democratizing the technology of GIS and bringing a tool of power to the individual.

In chapter 2 I referred to some trepidation about the "wow factor" of incorporating digital into CAQDAS analysis in QGIS research and understood this trepidation as warning to tread carefully into adding a technology like digital sketch maps perhaps over fears of usability.<sup>108</sup>

With regard to usability of digital sketch mapping for participants, it was my goal to find a digital sketch mapping solution that would be as easy to use as the traditional paper and pencil method of creating sketch maps. My assessment of how well this goal was met is based upon my observations of individuals creating sketch maps with the SketchMapper application. My first indicator of success was an occasion of serendipitous pilot testing by my seven-year-old son. I stepped away from the computer leaving the SketchMapper application open. Returning 20 minutes later I found that my son had created his own markups over a base map of Whatcom County. He drew, using his finger on the touchscreen, a set of markups and annotations on the map. His only point of confusion with using the features of the SketchMapper was using the erase icon.

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<sup>108</sup> Aitken and Kwan, "GIS as Qualitative Research."

My observation about ease of use of this application for participants is that after a brief demonstration of how to use the sketch mapper application very few of the individuals in this case study had a difficulty using the features. It was interesting to see the different styles of interaction with the sketch mapping task among different individuals. Some users took a very traditional approach to making markups on the maps, making an effort to make their markups emulate professionally produce cartographical products. Other users found it entertaining and liberating to draw pictures, smiley faces, lines, circles and so on to tell the story.

My population of users are mostly student veterans in their early 20s. I realize that a group of veterans must have had some level of cartographic training in their backgrounds and it is possible that the ease-of-use they showed in SketchMapper had to do with their background training. I would also posit that it's possible the public's exposure to smart phones with mapping applications could also account for the ease of use seen with my participants. I would venture to guess from a very small sample of users that any concerns about seduction by the "wow factor" of digital sketch maps is no longer an issue.<sup>109</sup>

#### Usability (for Researchers) of Digital Sketch Maps and CAQDAS in Mixed Methods Analysis

My decision to choose Atlas.TI for my mixed methods analysis of health neighborhoods was influenced by the claim that Atlas.TI has the new ability to incorporate georeferenced documents into computer assisted qualitative data analysis. After reading the sparse literature of others using Google Earth incorporated into Atlas.TI, I made the commitment to perform my analysis using Atlas.TI.<sup>110</sup> I was in fact, seduced by the wow factor of this claim. The greatest challenge I faced with in this case study is

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<sup>109</sup> Ibid.

<sup>110</sup> "BiDirectional Geocoding in Atlas.Ti 7," accessed November 14, 2012, [http://www.atlasti.com/uploads/media/newfeatures6\\_geo\\_01.pdf](http://www.atlasti.com/uploads/media/newfeatures6_geo_01.pdf); Fielding and Cisneros-Puebla, "CAQDAS-GIS Convergence Toward a New Integrated Mixed Method Research Practice?"

was incorporating georeferenced documents to work in concert with the features of Google Earth and Atlas. TI. I found that the interface between Atlas.TI and Google Earth was a very tenuous one indeed. Depending on the day or the method in which I created my files, it sometimes worked and sometimes did not work. The documentation for using georeferenced documents in Atlas.TI was not terribly clear. The few studies I found using georeferenced documents in Atlas.TI did not offer enough detail for me to easily incorporate my data into the analysis. My searches through the Atlas.TI forums yielded very little indication of use or interest in combining geography in their mixed methods research.

Another disheartening development that happened amid my data analysis was that the makers of Google Earth made sweeping changes to their API (Application Program Interface). These API changes in Google Earth resulted in making the new Google Earth impossible to interface with Atlas.TI. However, after a week or two of email exchanges with Atlas.TI support in Berlin, Atlas.TI support provided me with a workaround to this problem. Despite the workaround I received from Atlas.TI support, I continued to have difficulties with making the connection between Atlas.TI and Google Earth. I eventually found a way to get my data into Atlas.TI and to make the connection between the two programs more stable, but I'm unable to understand what I did to make it work. I suppose these are the joys of working with a brand-new feature and software.

## *Chapter 5 Discussions Conclusions*

### Discussion

The purpose of the study was to explore the use of digital sketch mapping and CAQDAS to answer these research questions: 1. "How does exploration of digital sketch mapping and CAQDAS contribute to the research agenda goal to unify methodologies within geography?" and

2. "What are the utilities and merits of a digital sketch mapping application to be used for collecting information about hidden geographies?"

To find the answer these two questions I developed a case study in which I used digital sketch mapping and CAQDAS to discover the hidden geographies within the health neighborhood sketch maps of a group of student veterans attending Western Washington University.

Carrying out this study I found that bringing digital sketch mapping and CAQDAS into a study type which typically uses qualitative methods does contribute to the goal of unifying methodologies in geography. My case study shows that it is possible to mix qualitative methods with GIS methods to produce useful information about hidden geographies. Among the utilities and merits of using a digital sketch mapping application and CAQDAS is ability to georeference findings within a qualitative study, ease of use of the digital sketch mapping application for participants and the ability to create powerful and persuasive geographic visualizations of study results.

### Recommendations

I would encourage future researchers to develop methods of digital sketch map collection that are more intuitive and better incorporated into CAQDAS programs such as Atlas.TI. Smoother interaction between CAQDAS and GIS applications would certainly hasten the unification of methods. Another potential line of sketch map research would be investigating sketch map use on mobile devices in the field. Yet another interesting possibility for digital sketch mapping and CAQDAS would be to couple a



mobile device with the ability for the participant to make sketch maps and contemporaneously couple a participant's physiological reactions to the surrounding environment.

The development of this software is an important contribution to the QGIS research agenda because, until the creation of SketchMapper, there was no easy method to collect georeferenced sketch maps for direct import into a GIS and CAQDAS program for spatial analysis.

### Conclusions

This thesis project contributed to current knowledge about the merits and utility of using digital sketch mapping and CAQDAS by proving that it is possible to develop an application to collect digital sketch maps which captures the contents of participants sketch maps into a georeferenced format for spatial analysis in a GIS program. It shows that GIS data can be incorporated into CAQDAS to add a geographical component to qualitative mixed method studies. It contributes to the research agenda of unifying methodologies by demonstrating possibilities for adding maps to qualitative analysis and by highlighting some of the problems of this technology in its current state. Finally results of the case study analysis pointed to multiple avenues of research and development that would further the research agendas of unifying methodologies in geography.

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## *Appendices*

### Appendix 1 Data Collection Procedure

#### ***Stepwise Procedure for Sketch Mapping Session:***

1. Introduction to procedure. Give participant a summary sheet of the study and how to contact the researcher for results when study is complete. Complete the demographics form.

2. Brief tutorial on how to use the sketch map software and touchscreen interface

3. Read the instructions to participant:

See “Sketch Mapping Instructions” in Appendix 3

Offer to help the participant with the technical aspects of sketch mapping if needed.

Allow 10-15 minutes for mapping.

4. Semi structured interview:

See “Semi Structured Interview Schedule” in Appendix 2

5. Apply the short version of the PAM

6. Debrief the participant. Ask the participant if there are any questions or concerns. Explain the procedure for getting a copy of the final results when the project is concluded.

Thank the participant for helping with the study and dismiss.

## Appendix 2 Semi-Structured Interview Schedule

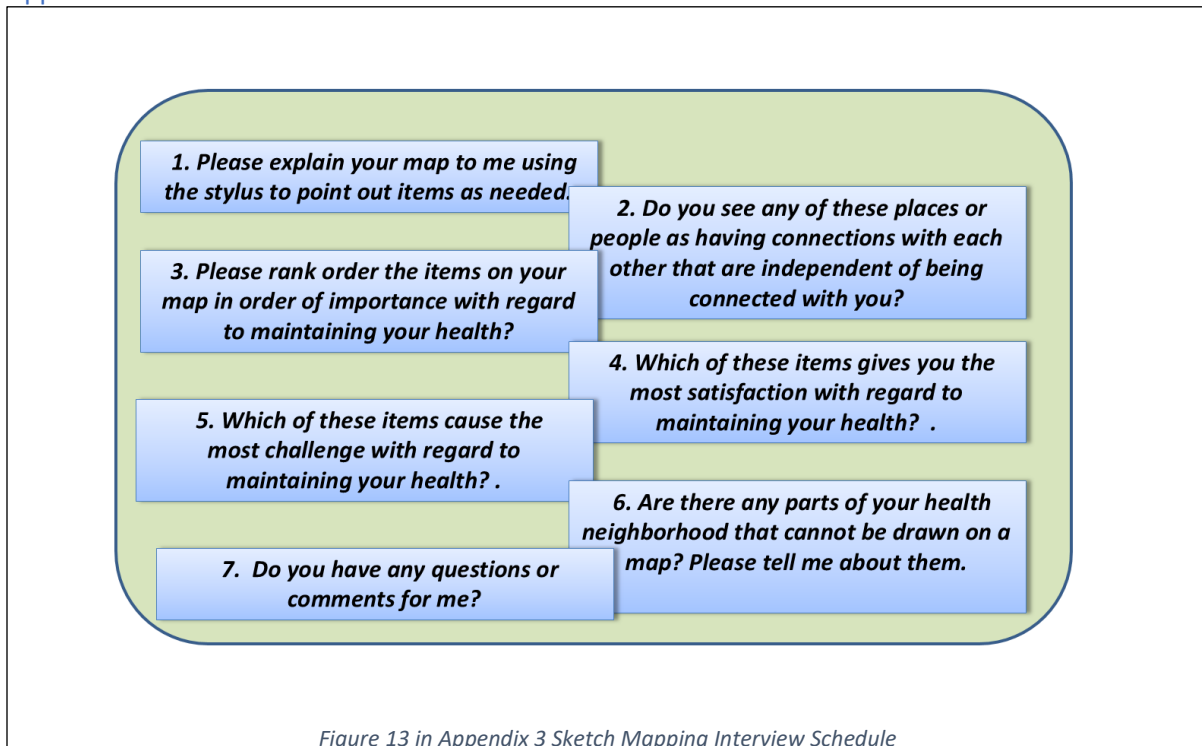


Figure 13 in Appendix 3 Sketch Mapping Interview Schedule

### Appendix 3 Sketch Mapping Instructions

Read the instructions to participant and give this prompting sheet to the participant to use during the course of sketch mapping:

“I am interested in trying to learn how people understand their individual “health neighborhood.” You could help me by drawing a map of yours. For this map, start by drawing the location of yourself and then put the other people, services and information sources that are important to you and your health. Of course, your “health neighborhood” is bigger than the neighborhood in which you live. There is no need for all of the details. You can think of this as similar to drawing a simple map of the physical neighborhood in which you live: you wouldn’t put in all the streets, just your house and the landmarks and places that you go regularly or are meaningful to you.”

help with drawing on the map or finding a place you may ask me.”

“To help me understand what is in your health neighborhood I would like you to draw on the map anything or anyone that is important for your health. Some ideas of people places and things to consider as you draw your health neighborhood map:”

a. Where are the places that you go to improve and maintain your health?

i. Hospitals, doctors, nurses, therapists, healers, clergy, testing facilities etc.

Are there places in your health neighborhood you view as being part of the formal medical resources?

Are there places in your health neighborhood you view as being outside of the formal medical resources?



## Appendix 4 Informed Consent Form

[Questionnaires >](#)

### Informed Consent Form

#### Informed Consent for Sketch Map Study

##### Purpose and Benefit:

Researchers have been interested in the use of sketch mapping and interviews to document health care resources in a more comprehensive way. The purpose of this study is to learn about:

- using a computerized interface to draw sketch maps about a person's health neighborhood.
- whether this technique will give information about health neighborhoods that has not been available from other methods and will help the community find health care resources

The results of this study will advance our understanding of whether sketch map drawing and interviews gives us useful information about geographical spaces and health care resources that are not well documented (4)

##### I UNDERSTAND THAT:

- This experiment will involve listening to instructions given by the researcher about how to draw a sketch map of my health neighborhood on a computer screen and then drawing my sketch map. The researcher will then ask me to participate in an audio taped interview during which I am asked to explain my map and answer a few follow up questions about the map. The final task of the session will be to fill out a brief survey about using health care resources. My participation will involve approximately 30 minutes.
- There are no anticipated risks or discomfort associated with participation. One possible benefit to me may be a better understanding of my attitudes and understanding of health care resources in my community. My participation may also serve to help my community better understand the availability of health care resources.
- My participation is voluntary, I may choose not to answer certain questions or withdraw from participation at any time without penalty.
- All information is confidential. My signed consent form will be kept in a locked cabinet separate from the questionnaires and audio file. Only the primary researchers will listen to and code the audio file. This file will be destroyed at the end of the study.

My name will not be associated with any of my responses at any time.

- My signature on this form does not waive my legal rights of protection.
- This experiment is conducted by George Juszynski, a WWU graduate student under the supervision of Dr. David Rossiter. Any questions that you have about the experiment or your participation may be directed to him at 650-3603.

If you have any questions about your participation or your rights as a research participant, you can contact the WWU Human Protections Administrator (HPA), (360) 650-3220.

If during or after participation in this study you suffer from any adverse effects as a result of participation, please notify the researcher directing the study or the WWU Human Protections Administrator.

ELECTRONIC CONSENT: Please select your choice below. Clicking on the "agree" button below indicates that:

- you have read the above information
- you voluntarily agree to participate
- you are at least 18 years of age

\* Required

\*

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

- agree
- disagree

Participant Number: \*

Never submit passwords through Google Forms.

## Confirmation of Protocol Review and Approval to Proceed

Subject	<b>research protocol approved</b>
From	<a href="#">Janai Symons</a>
To	George Juszynski
Sent	Wednesday, March 13, 2013 12:32 PM

I have reviewed your protocol and you are approved to go forward with your research. I will send you an approval memo when I can, but you are free to go forward with data collection whenever you want.

*Janai Symons*

Janai Symons, J.D., M.L.I.S.  
Research Compliance Officer  
Western Washington University  
(360) 650-3082

*Figure 14 Protocol Approval WWU Office or Research*

## George Juszynski

2826 Alderwood Avenue Bellingham, Washington • 360.224.3025 • [george.juszynski@bellevuecollege.edu](mailto:george.juszynski@bellevuecollege.edu)

**WESTERN WASHINGTON UNIVERSITY-HUXLEY COLLEGE OF THE ENVIRONMENT, CANDIDATE, MASTER OF SCIENCE DEGREE EXPECTED SPRING 2017** Geography/GIS/Urban Planning, with specialization in health geography.

**WESTERN WASHINGTON UNIVERSITY-HUXLEY COLLEGE OF THE ENVIRONMENT, BACHELOR OF SCIENCE, 2010** Environmental Studies-Urban Planning Emphasis

**ILLINOIS STATE UNIVERSITY, BACHELOR OF SCIENCE, 1986** in basic medical sciences and physiological psychology including over 35 semester hours of science coursework in physics, chemistry, organic chemistry, general biology, human anatomy, comparative vertebrate anatomy, statistics, and calculus.

### **BELLEVUE COLLEGE**

1st year tenure track instructor candidate. Fall quarter 2017; taught NDT 201 Theory I, Long-Term Monitoring and the associated laboratory, NDT 220 Skills I. Observed and assisted with lecture and laboratory for NDT 100, Biomedical Electronics and the associated laboratory section. Winter quarter 2017; taught lecture and laboratory for NDT 201, Theory II and NDT 221, Introduction to Polysomnography. Assisted in Laboratory sections of NDT 130.

### **ST. PAULS ACADEMY**

Science instructor for seventh grade life science and eighth grade physical science.

### **WESTERN WASHINGTON UNIVERSITY: BIOLOGY DEPARTMENT TEACHING ASSISTANT**

Taught eighteen sections of Biology 101 laboratory (over a period of 18 months) with a total of ~75 undergraduate students per section. Facilitated laboratory activities and field trips, demonstrated use of laboratory equipment, evaluated laboratory assignments and quizzes. Developed an instructional website on Canvas which included a detailed syllabus of activities, slide sets for each weekly lecture, quiz bank for online administration of quizzes, instructional videos, and online submission and grading of laboratory assignments. Collected soil, air, water, soil and other and biological specimens for analysis. Maintained accurate and organized records of lectures, activities and student performance evaluations.

[Biology 101 Lab Canvas Website](#) [Instructional Video 1](#) [Instructional Video 2](#)

### **WESTERN WASHINGTON UNIVERSITY: INSTRUCTOR; ODYSSEY OF SCIENCE AND ARTS PROGRAM**

[Western Washington University's Odyssey of Science and Arts](#) program inspires youth in grades K-12 through a broad range of programming from scientific exploration in specialized labs to recreational activities on Lake Whatcom. Planned and taught two Odyssey of Science and Arts enrichment courses; Science Club and Earth Quest: Geocaching. Designed activities that stimulate growth in science and geographical literacy, critical thinking, spatial reasoning, language, social and motor skills.

### **WHATCOM COUNCIL OF GOVERNMENTS: BICYCLE SAFETY INSTRUCTOR**

The mission of the [Whatcom Council of Governments EverybodyBIKE Program](#) is to increase the use of bicycles in Whatcom County as an efficient form of transportation for short daily trips. EverybodyBIKE is a bicycle education program that offers free bike rides, events and classes for all ages. The bicycle safety instructor engaged and educated community members about bicycle maintenance and repair, taught methods of traffic safety skills and bicycle commuting at various outreach events and coordinated group bicycle rides as part of the Summer Rides events series.

### **WESTERN WASHINGTON UNIVERSITY: URBAN PLANNING STUDIO SERIES**

The urban planning studio is a yearlong series of courses that provide the experience of researching, conceptualizing, designing and implementation of a mixed use, pedestrian and transport friendly urban village neighborhood in the city of Bellingham, WA. The completed project was presented at a seminar series for members of the city planning department Bellingham City Hall.

[Fairhaven Transit Oriented Community Project Page](#)

### **WESTERN WASHINGTON UNIVERSITY: GEOGRAPHIC INFORMATION SCIENCE SERIES**

This yearlong series of courses provided the student with exposure to major geographic information science (GIS) concepts. Several software and hardware packages were used in the weekly laboratory assignments including ArcGIS desktop, Flexviewer, Google Earth and GPS receivers. The capstone project was an extended GIS analysis that was of interest for the individual student. The completed project was an investigation of cognitive maps created by participants who were asked to create a map of their Healthcare Neighborhood.

[GIS Portfolio](#)

### **CLINICAL NEUROPHYSIOLOGY PRACTITIONER AND MANAGER**

Provided leadership and inspiration for the staff of a medium sized medical practice (~20 FTE's) while managing the daily operations of the clinic. Developed educational materials and in-services for medical support staff and patients. Organized, delegated and coordinated the activities of staff members. Assured adequate patient access to care based on organizational standards. Developed, implemented and maintained policies and procedures in compliance with federal and regional regulations. Maintained liaison with physicians, research personnel and staff to resolve problems and to offer advice concerning clinical and technical procedures. Organized and facilitated patient and family support groups. Solicited for and obtained FDA phase III clinical drug trial projects for the organization. Performed diagnostic neurophysiology exams- polysomnograms, electroencephalograms and intraoperative evoked potentials.

### **CLINICAL TRIAL STUDY COORDINATOR AT ROCKY MOUNTAIN SLEEP**

Recruited, educated and screened appropriate subjects for FDA Phase III clinical trials of sleep medications. Coordinated scheduling of subject visits and data collection. Supervised data collection of polysomnograms (overnight sleep laboratory physiological recordings) Completed and maintained source documents and case

report forms. Maintained study drug dispensation and accountability. Interfaced with clinical research organization and site monitor.

#### PRESENTATIONS

Juszynski, George (2013, April). Analysis of Cognitive Maps: Clients' Perceptions of the Health Care Service Delivery Space in Whatcom County. Poster session presented at the meeting of the Association of American Geographers Los Angeles, California

Juszynski, George (2014, April). A Digital Sketch Mapping Tool to Capture Personal and Collective Geographies of a Therapeutic Landscape. Short paper presented at the meeting of the Association of American Geographers, Tampa, Florida

Juszynski, George (2015, April). Case Study of Therapeutic Landscapes Using QGIS and Sketch Maps. Short paper presented at the meeting of the Association of American Geographers Chicago, Illinois

Fluent in English and Polish.

Association of American Geographers  
Northwest GIS User Group

#### NEURODIAGNOSTIC YEARS (1991-2009)

PEACEHEALTH MEDICAL GROUP/MADRONA MEDICAL GROUP Practice Manager- Sleep Disorders Center, Pulmonology, Asthma-Allergy Major accomplishments- CPAP DME Startup, AASM reaccreditation, development of databases for monitoring patient flow (turnaround for scoring and interpreting), interrater reliability, record review, QA assessments. Development of new sleep center in Alaska. Trained for and received certificate in Lean Management from Evergreen Team Concepts. Responsible and accountable for all operational activities across three medical practice groups consisting of 7 physicians and 20 clinical staff.

NORWALK HOSPITAL Supervisor Sleep Center/EEG Organize, delegate and coordinate the activities of twelve staff members of the Sleep Disorders and EEG Services. Plan and schedule work for the group to ensure proper distribution of assignments as well as adequate manning, space and facilities for subsequent performance of duties. Follow protocols established by the Director in accordance with American Academy of Sleep Medicine regulatory requirements. Assist in the maintenance and preparation of AASM accreditation. Develop and implement departmental policy and procedures to solve specific operating problems and improve patient care. Evaluate and recommend new techniques and technologies. Facilitate facility renovations and new construction project, including review of architectural design and building requirements. Maintain liaison with physicians, research personnel and staff to resolve problems, to offer advice concerning technical procedures, techniques and equipment and to maintain conformance with specific operational standards

PARKVIEW SLEEP CENTER Program Coordinator Managed daily activities of nine staff members in a 4 bed AASM accredited sleep center. Marketed sleep center to physician's offices via a lunch and learn format, attended health fairs, nursing orientations and gave presentations about sleep disorders to the public and sleep center staff. Coordinated the A.W.A.K.E. group. Served as liaison between medical director and sleep technologists. Maintained QA and competency activities for JCAHO and AASM accreditation. Provided training for new technologists. Maintained budget for sleep center and made recommendations for yearly budget.

ROCKY MT. SLEEP Clinical Trial Study Coordinator Attended pre-study training sessions for clinical trials. Recruited and screened appropriate subjects for study. Coordinated scheduling of subject visits and data collection. Completed and maintained source documents and case report forms. Maintained study drug dispensation and accountability. Interfaced with clinical research organization and site monitor.

#### JAGIELLONIAN UNIVERSITY

Student (mostly of life in post-communist era Poland) at the Jagiellonian University in Krakow, Poland.

LUTHERAN GENERAL HOSPITAL. Clinical Supervisor Served as clinical supervisor of neurophysiology section for END technicians in Sleep Disorders, EEG, EP and IOM. (intraoperative monitoring). Prepared sleep lab for ASDA accreditation. Developed the intraoperative monitoring system in the early days of IOM. Developed a system for training technical staff, evaluation practice guidelines and quality standards. Documented staff competency in technical and clinical protocols. Implemented a CPAP patient education and support program. Expanded intraoperative monitoring services to include neurosurgeries in addition to existing program for monitoring vascular procedures.

#### UNIVERSITY OF CHICAGO CLINICAL NEUROPHYSIOLOGY SERVICE

This was my first job in clinical neurophysiology after finishing my degree at Illinois state University. Under the supervision of Dr. Jean-Paul Spire M.D. I learned how to perform EEGs, long-term epilepsy monitoring, evoked potentials and sleep disorder studies.

EDUCATION, HONORS AND TEACHING EXPERIENCE: Bachelor of Science in psychology; Illinois State University,

Matriculated 1986. Illinois State University Honors Program (1982 to 1985) Illinois State University Faculty

Colleague Program (1982 to 1985) Psi Chi (National Honor Society of Psychology (top 10% of all psychology majors

1982-1985). PROFESSIONAL ACTIVITIES: *RPSGT registry # 471/~7000, completed June 1990.*

*APT Professional Development Committee (Curriculum and Syllabus Development), 2002-2003.* Participated in the development of a curriculum and a syllabus of a two-year associate s degree program for polysomnographic technologists. [http://www.aptweb.org/pdf/APT\\_PSG\\_Curriculum\\_Outline.pdf](http://www.aptweb.org/pdf/APT_PSG_Curriculum_Outline.pdf)

*BRPT Exam Question Writing Sessions, September 2004 and May 2005.* Description of exam writing session: BRPT has directed the Exam Development Committee (EDC) and the Item Writing Committee to increase item writing efforts to increase the item bank. As more high-quality items are added, BRPT becomes closer to computer-based testing. BRPT held extremely successful simultaneous item writing meetings in September 2004 and May 2005, during which more than 300 items were written.

*BRPT Recertification/CEU and Educational Program Pathway Task Force, January 2005* Goals of Taskforce: To review, research and make recommendations regarding revising the current RPSGT Recertification/CEU program to

include changing the recertification time frame and providing multiple pathways for recertification. To research and make recommendations regarding an alternative educational program pathway option for eligibility to sit for the RPSGT examination. Committee for Accreditation of Polysomnography, May 2005 Goals of Committee: To promote polysomnographic technology as a recognized allied health profession, establish high standards of education and professionalism through training and certification and to ensure an adequate supply of well-trained technologists to meet current and expected needs of the field of sleep medicine

#### PRESENTATIONS:

How s Your Sleep?

Introduction to Parkview Medical Sleep Disorders Center

Sleep Apnea Recording and Scoring Leg Movements Guidelines for Performing MSLT/MWT Signal Conditioning:  
Sensitivity and Filters

#### PUBLICATIONS:

Massie, C.A., Puerkal, C., Juszynski, G., Rubinstein, W., & Weber, B. (1994). CPAP treatment for obstructive sleep apnea: Patient education and compliance. *Sleep Research*. 23, 286

Massie, C.A., & Daniels, R., & Juszynski, G. (1995) Leg actigraphy: Preliminary normative data. *Sleep Research*. 24, 284

Massie, C.A., & Daniels, R., Puerkal, C., Juszynski, G., Rubinstein, W., & Weber, B. (1995) Relationships among psychological symptom status, coping styles and daytime sleepiness in patients with obstructive sleep apnea. *Sleep Research*. 24, 170