BIRD’S EYE VANCOUVER: MAPPING TIME, CULTURE AND BIOSPHERE

by

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THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

In the
School of Interactive Arts and Technology
Faculty of Communication, Art and Technology

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SIMON FRASER UNIVERSITY
Fall 2011

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ABSTRACT

Cities are now the dominant form of human habitation. How they are managed and developed will have global sustainability consequences. In the design and planning of cities, maps are a tool for cataloguing and organizing infrastructure, but they are less often used in a creative or strategic capacity. Two forces that have a significant impact on the development of cities—their ecological context, and their culture—tend to be invisible on maps. This study investigates ways of mapping these forces using the affordances of digital media, particularly 3D computer graphics, to support new ways of mapping the dynamic space that surrounds the infrastructure of cities. This new mapping is informed by artistic and cartographic traditions of visualizing space, and brings a representation of time to the map form.

Key words: urban visualization, 3D mapping, sustainability, digital media, urban mapping, data visualization
DEDICATION

For D.M.O.
ACKNOWLEDGEMENTS

I would like to thank my senior supervisor Dr. Diane Gromala for helping me to experience the research process as an integral and productive part of my practice, and for her insight, understanding and support along the way.

I also thank my supervisory committee Dr. Chris Shaw and Dr. Tom Calvert for their thoughtful feedback and encouragement. Thank you to the SIAT community, particularly Jim Bizzocchi, Thecla Schiphorst and Lyn Bartram for their involvement and generosity as faculty; my interim supervisor Ron Wakkary for getting me started; and Russell Taylor for opening the door.

I would also like to acknowledge my design colleagues at Metro Vancouver, and my manager there, Heather Schoemaker, for supporting my studies with good humour in the midst of busy times.

I would like to thank my family and friends for their encouragement, and finally, a special thanks to my partner Debora O for her patience and love throughout the process.
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CHAPTER 1 INTRODUCTION

Cities are the dense settlement hubs of a social species. The focus on visualizing urban infrastructure, while necessary, is nonetheless an examination of the physical hive minus the colony. In this project I explore ways of mapping the space that surrounds a city’s infrastructure and terrain. This space is usually invisible on maps, yet it is alive and dynamic; it is the space of biosphere and human culture. Urban maps tend to ignore this space, focusing instead on infrastructure, but this space becomes apparent in emergency situations when, in the sudden absence of workable infrastructure, other mappings proliferate.

Several months ago, the world’s fifth strongest recorded earthquake hit eastern Japan, triggering a tsunami that obliterated the coastal settlements in its path. After the tsunami, it was immediately important to map both the changing environmental status and the newly emerging social support networks, which included survivor updates and shelter locations. People turned to online networks such as Yahoo and Google to populate these collective mappings. While these maps played instrumental roles in the aftermath of disaster, outside of crisis, mapping the environmental and cultural contexts of urban space is a way to support a broader understanding of how cities function.

1.1 Context—Sustaining cities

As cities become the dominant form of human habitation, they must transition from being what ecologists once characterized as “the human equivalent of cattle feedlots” (Rees, 1997, p. 73) to becoming a sustainable form of human settlement. The challenge of housing people in greater densities, as well as coping with diminishing resources and the early effects of global warming, puts
pressure on cities to move from a paradigm of unlimited growth to a paradigm of sustainable development.

In Bird’s Eye Vancouver, I have chosen to explore mappings of place through an examination of two dynamic localized forces: culture and ecology. These elements mark the specificities of place, but are also integral parts of two global systems—the economy and the biosphere. As the cultural development of a city is sometimes regarded as one of the strongest predictors of its future economic development (Florida, 2002), more civic policy-makers are considering cultural development in light of potential economic returns (Lowry & McCann, 2010). Cities have also been called the “defining ecological phenomenon of the twenty-first century” (Newman & Jennings, 2008, p. 3) due to their responsibility for housing the majority of the world’s population. The sustainable design of cities may determine our global ecological prospects.

1.2 Mapping as a creative and strategic design tool

Maps are not just a utilitarian form for describing spatial layout. Because of their conceptual and interpretive versatility as a signifying process (Ware, 2004), and because of their alignment with fundamental cognitive processes such as visual argument and mental models (Winn, 1991) maps can support multi-dimensional consideration of complex systems such as cities.

One of the most powerful functions of maps within the design process is the ability to present spatial context in terms of what was, what might have been, and what could be. Landscape architect James Corner describes maps as a creative form that designers and planners can use for “intervening in spatial and social processes”. Mapping, he writes, “is perhaps the most formative and creative act of any design process, first disclosing and then staging the conditions for the emergence of new realities” (1999, p. 216). Another landscape architect, Kathryn
Moore, describes design as a system for “making propositions, presenting a vision for the future. Central to the discipline is the forward thinking, the anticipatory and predictive nature of its practice. On this basis, anyone who has a responsibility for the landscape [is]…effecting, predicting or managing spatial change” (Moore, 2010, p. 198).

How cities are mapped shapes how they can be understood. The Spatial Information Design Lab at Columbia University, for example, makes maps using criminal justice data to produce visualizations such as the Million Dollar Block (Columbia University, 2005), which maps data about neighbourhood blocks in Brooklyn that have enough residents in prison that the incarceration costs add up to a million dollars. The practice of mapping different kinds of data sets with geographical analysis is opening up new views of the city.

Planners are also broadening their approach to mapping, looking at ways of using social networking and internet-based GIS (Geographical Information Systems) applications to manage collaborative urban maps that include residents as stakeholders (Rantanen, 2007). These recent mapping projects focus on data management, however, and the use of mapping as a design tool is still a less common occurrence. Corner has argued “Most designers and planners consider mapping a rather unimaginative, analytical practice, at least compared to the presumed ‘inventiveness’ of the designing activities that occur after all the relevant maps have been made…critical experimentation with new and alternative forms of mapping remains largely under-developed if not significantly repressed” (1999, p. 216).
1.3 Contribution

In my current work as designer and mapmaker for Metro Vancouver, I am involved in the public communication of regional sustainability initiatives. My previous industry experience is in filmmaking, animation and game design. As a result, I see the potential synergy of combining mapping techniques with digital media as a way of articulating the complexity of sustainability issues both for policymakers and for public review.

In this thesis, I explore how the affordances of digital media, particularly 3D computer graphics (CG), can support new ways of mapping the dynamic space that surrounds the infrastructure of cities. In designing a new map of Vancouver’s False Creek, I focus on how the interaction of cartographic form and digital media produces new options for representing the city. *Bird’s Eye Vancouver* is an experimental map that explores the portrayal of ecological and cultural properties of space.
CHAPTER 2 BACKGROUND

2.1 Mapping as a way of describing place

Geographers define space as a generalizable concept that holds to mathematical laws (Cresswell, 2004), but they consider place a humanistic concept that grounds knowledge of the world in the experience of particular localities. Tim Cresswell likens the difference between space and place to that of a continuum between abstraction and experience (2004).

Although cartographic technology supports increasingly sophisticated tools for visualizing the quantitative properties of space, mapping began as a description of place. Art has long been the medium for depicting the experiential qualities of place as seen through culture and history. Early societies shared detailed understandings of place through song, painting, story, epic poetry, and 3D navigational forms. Maps were frequently pictorial, and served as both an archive of historic events and as a record of spatial surroundings (Winn, 1991). The pictorial maps of the Aztecs included drawings of the Emperor and his court, along with depictions of historical events in spatial relationship to landscape features. Paths connecting the images and marking routes were shown by drawings of human footprints (C. Laffon & M. Laffon, 2009). This dual function that mingled pictorial representation of history with navigational information suggests an understanding of place that fundamentally links orientation and navigation of space to an awareness of historic context.

As cartography supplanted pictorial mapping with refined techniques for accurately representing scale, position and distance, the multi-dimensional qualities of maps began to be cast off. The Aztec maps, which did not conform to European cartographic styles were later ‘systematically’ destroyed by the
Spanish (C. Laffon & M. Laffon, 2009). Lucia Nuti describes how different visual cultures represent space and notes that the shift from pictorial vision to measurement was part of a "desire to overcome the limits and subjectivity of sense knowledge… a general move towards the expulsion of pictorial language from every kind of map" (1999, p. 108). The tension over whether maps are properly a site of artistic and interpretive vision or a representation of charted space did not resolve with the invention of Cartesian spatial representation. Nuti argues that in maps, “the relationship between the abstract and the concrete, the mathematical and the visual, the exact and the lifelike…is still both present and problematic” (1999, p. 108).

2.1.1 Visualizing the built-world: Abstraction vs. Representation

If early mapping was largely pictorial, involving drawings of people, buildings and footprints, the cartographic map could be seen as representational. Using icon and line to accurately record landmarks, shores and roads, representational maps intend to be faithful depictions of physical terrain. The abstract map can be seen as organizing spatial data by a logic other than physical location, such as spatial relationship or sequence. This trajectory towards abstraction is evident in urban mapping. I begin with describing two ways of mapping the city that led to the dominance of infrastructure mapping through abstraction at the expense of a more experiential understanding of the city.

City Mapping: Two maps from the 1930’s

London offers two enduring examples of urban mapping. In one map, the London A-Z Map, city streets are catalogued and represented in their full tangled reality. In the other map of the London Underground, the existing organic knot is simplified into an idealized grid completely abstracted from the physical place it represents. Created in the 1930’s, both maps are still being used, continuing to
serve their respective functions 80 years later, and together form two essential ways of understanding the city—one through comprehensive representation, the other through abstraction and reduction (figure 1). Although the abstract map was an exemplar of urban visualization for the balance of the 20th century, designers are now showing a renewed interest in the representational map as a way to support pedestrian wayfinding.

The *London A-Z Map* was created by Phyllis Pearsall, an artist whose father had run a map-making company. In 1935 there was no up-to-date map of the streets of London. Using military maps from 1919, Pearsall set out to painstakingly verify and update the map, adding street numbers and indexing 23,000 streets by hand. Much of her work involved travelling by bus and on foot to the far reaches of London, and so her map was born of direct experience of the city streets. She began this life-long project at age 29 and persisted in spite of being dismissed by cartographers and map publishers, finally resorting to self-publishing her atlas (Pearsall & Company, 1990). The *London A-Z* was the first comprehensive map
of London in the age of modern transportation, and today is considered a classic
guide to the city streets. The persistence of this map with very little change in
presentation over nearly 80 years is a testament to the usability of the design.

As Pearsall was gathering data for her map, another significant map of London
was created. In this second map, technology shaped a much different way of
understanding and moving through the city. The technology of underground
transportation created a network of nodes and vectors beneath the city streets.
Freed of representational and orientational demands above ground, Harry Beck’s
map of the London Underground focussed on facilitating movement through the
city as a negotiation of these nodes and vectors. With a simplified reference to
the Thames River as the only link to physical terrain, the map became a design
classic, and benchmark of abstraction in the realm of public mapping. This map
has since influenced the design of subway maps around the world, shaping how
people see cities while simultaneously removing all reference to local space.
These node/vector maps present a reassuring sense of order and logic in their
portrayals of cities that is often contrary to the tangled networks of tracks they
represent. In spite of being almost entirely devoid of reference to locality, these
schematic maps create an iconic representation of a city—Tokyo encircled by its
green Yamanote line; New York with its vertical coloured grid.

A contemporary return to representational mapping

While abstraction in mapping aids the navigation of nodes and vectors, it
does not reflect the reality of moving through actual streets. London streets
evolved over hundreds of years, first navigated on foot, then by horse and then
automobile. Unlike Paris, which was re-drawn and physically gutted (in part for
streamlined mobility) by Baron Haussmann in the second half of the 19th century,
London retains its organic maze. Now choked with automobile congestion,
London has had to implement user-fees to reduce traffic in the central area. In a
bid to encourage a more walkable London, the Mayor’s office recently initiated a project to develop on-the-street maps to facilitate the experience of walking through the city.

*Legible London* is a design initiative to build on the representational map of London in ways that support cognitive understandings of place and orientation (Transport for London, 2006). The project invokes American urban planner Kevin Lynch’s concept of urban legibility. Lynch developed the idea of the ‘legible city’, stressing the importance of being able to identify the natural and built world characteristics of a city as parts of a cohesive and harmonious whole. Legibility affects perception and navigability of a city as it supports the mental models of cognitive mapping that orient us to place (Lynch, 1992).

The designers of *Legible London* created a way-finding system that capitalizes on the brain’s affinity for spatial memory to help pedestrians build up mental maps of localities (figure 2). By offering representational prompts, including drawings of 3D buildings on predominantly 2D maps, the designers aimed to
strengthen the relationship between the map and the physical experience of place. The project showed that pictorial mapping has a role in helping residents and visitors form more embodied understandings of place.

2.1.2 From database to medium in digital cartography

In the past, maps on paper had to act as an archive of disparate forms of information, orchestrating navigational, descriptive and rhetorical elements in harmonious ways that did not disrupt each other. The database function of digital cartography archives data in layers, allowing maps to present specialized interfaces showing only the data required at one time (Wilford, 1981).

Although pictorial representation was initially cast aside in the shift from the printed map to the digital map, visual and experiential forms of data are beginning to find expression in digital cartography. In some ways, digital cartography is undergoing a transformation that echoes the development of the computer. In their book *Windows and Mirrors*, Diane Gromala and J. David Bolter describe the development of the computer, in part, as an evolution from information processor to expressive medium. As the computer developed greater representational capacity (beginning with the in-line image tag) it also developed capacity to become a media form in itself (2003). In section 4.2, I describe a series of animatics I created to test some of the possibilities of map as media form, and discuss the implications of those in section 5.4.2.

In the following sections I look at ways geographic technology has been used to incorporate visual, experiential and pictorial data, both in Google Maps which is a widely used public map database, and in GIS, which is the prominent geospatial application in the academic and civic sectors.
Experiencing Google Maps

Google Maps allow users to place themselves in the symbolic space of the map. Starting out as a map database for route planning, Google Maps have expanded to include successively more descriptive and pictorial data. Street View is a feature that uses photography to depict a view from within the map. By dragging a walking man icon onto the map, the user moves from an abstract representation of city streets to a photographic ground-level representation of them (figure 3). The user can then move interactively down the street, rotating views by 360 degrees, and choosing to turn and travel down any street along the way. Mash-ups of Street View offer alternative ways of experiencing this new pictorial space. One user, Aki Mimoto, is cycling across Australia by integrating a stationary bicycle with the application (personal communication, August 2009).

Another popular feature of Google Maps allows users to upload personal photographs tagged to a location in the map database. Uploaded photos often emphasize cultural and environmental aspects of place. Some reference little-known historic facts (a photo of an otherwise non-descript house is tagged “Jimi Hendrix House Vancouver”); others depict unusual weather and tactile
experience (such as vacation photos of beaches and food). This integration of pictorial and cartographic representation on a map is reminiscent of the Aztec maps, which were able to describe a multi-dimensional context for localized space that included both a symbolic interface and a pictorial historic narrative. Pursuing multi-dimensional representation in a 3D map led to design issues which I discuss in section 5.1.

**Creative GIS**

Cities now depend on GIS databases. In civic engineering departments urban mapping primarily consists of data collection and location plotting through GIS. Urban planners use GIS maps to chart land-use boundaries, while operations and utilities planners catalogue infrastructure assets through these databases. When GIS technology was introduced, geographers hoped that greater access to civic data might encourage more public participation in democratic process, but the tool has not quite lived up to this ideal—GIS has been criticized for its inability to accommodate qualitative data such as “non-Euclidian…vernacular representations of space and information” (Miller, 2006, p. 189). Nonetheless, researchers are finding ways to incorporate creative, historic and speculative data into the GIS framework.

GIS databases are beginning to be used for geo-referencing many forms of cultural data. One project creates a particularly visual interface based on a carefully constructed appropriation of ecological data. *Mannahatta* (Sanderson, 2009) is a web project that uses GIS technology, cinematic 3D rendering and biodiversity data to imagine the terrain and ecology of New York 300 years in the past, as it was before it was settled by Europeans (figure 4). In this project, landscape ecologist Eric Sanderson used a detailed pictorial map from 1872 that showed landforms, streams and trees as a basis for recreating this landscape in the GIS application. He then extrapolated ecological details, building a plausible
ecosystem atop the street grid of present day Manhattan. Viewers can select an intersection and render a 3D CGI view of that space as it might have been 300 years ago. The project creates awareness of a previously existing ecosystem in the concentrated urban space of New York City where few traces of that ecosystem are evident. Geo-referencing speculative data based on a 139-year-old drawing, and then using that data to inform high-resolution CG renderings, pushes GIS from quantitative database into the realm of expressive medium. This reconstructive approach is highly suited to subjects where existing data is historically limited. I considered other ways of representing incomplete data sets (while still maintaining historic integrity) in my investigation of population data (section 4.2, Animatic 5).

The GPS Fuzzy Map

Another geographical tool has been put to use by artists in a way that pushes it beyond its intended empirical function. GPS, the Global Positioning System developed by the US military, uses satellites to determine exact position points on the ground. Like GIS, this system is finding many new applications. One
example involves the creation of ‘fuzzy maps’ based on the movement of volunteers through Amsterdam over a period of several weeks. Artist Esther Polak wanted to create a map that would visualize people’s mental maps of the city through tracings of their movements (Polak, 2002). The volunteers carried backpacks with GPS transmitters as they went about their lives. In the exhibition, *Amsterdam RealTime*, the map traces out the individual paths like an automated Etch-a-Sketch, and what emerges is a composite that forms a recognizable map of Amsterdam. The heavy tracings show the degree to which urban movement is circumscribed by infrastructure, while the faint lines reveal tracings of personalized routes and detours. As the outcome of the collective mobilities of a city’s residents, *Amsterdam RealTime* offers an example of a map created entirely by the movement of people in a city.

As artists and biologists push cartographic technology to map the city in new ways, urban theorists are calling for other dimensions of the city, beyond infrastructure, to be mapped. Landscape architects speak of including mappings of wind and sun, and legislative conditions (Corner, 1999, p. 214), while urban ecologists foresee mapping textiles, chemistry and literature (“Ethnoecology Database,” 2002).

### 2.2 Conceptualizing Place: other ways of understanding the city

One of the core principles of sustainable urban design is designing for place. In their book *Cities as Sustainable Ecosystems*, Peter Newman and Isabella Jennings argue that understanding the social, cultural and historic dimensions of place provides a “solid basis for designing sustainable solutions” for cities. They consider designing with respect for the specifics of local space, including local stories as much as terrain features, “one of the most powerful concepts” of their approach to sustainability (2008, p. 155).
This section provides background on three views of cities that locate the urban experience in the specificities of place. The first view looks at a shift in urban planning from a focus on infrastructure, to a prioritizing of the social dynamics that are shaped by infrastructure. The second view looks at how ecologists shifted their concept of ecosystem to one that encompasses the city. The third view considers Vancouver’s Aboriginal forbearers who have a long-term complex relationship to place. This relationship is central to an understanding of the specificities of Vancouver as it has the weight of historic longevity.

2.2.1 New Urbanism

In the mid 20th century, Robert Moses was a powerful civic bureaucrat who was considered New York’s ‘master builder’ and a major influence on the design of American cities. As a strong proponent of “highways and towers” (Goldberger, 1981), Moses had an authoritarian approach to urban planning which prioritized infrastructure design for the automobile, at the expense of local neighbourhoods.

Jane Jacobs was a resident of a Manhattan neighbourhood slated for one of Moses’ freeways. Jacobs questioned why the sidewalks were being narrowed to provide wider streets for cars, and initiated protests at city hall. Her observations and analysis of the dynamics of the urban sidewalk led to a book-length critique that transformed urban planning. The Death and Life of Great American Cities is an examination of the city as a dynamic entity built on complex interactions between residents and the physical structure of the built world. These dynamics are a product of the physicality of place: the width of sidewalks, the length of blocks, the placement of windows. Jacobs played a key role in helping to save the Manhattan neighbourhoods of Soho and Greenwich Village from being demolished for freeways, but a still larger contribution was her notion that the vitality of a city is shaped by the behavioural dynamics of its residents. These
dynamics, Jacobs argued, ultimately determine in a large part whether a city prospers or fails (Jacobs, 1961).

‘Vancouverism’ is a recent concept in planning discourse, based on a contemporary Vancouver building style that seats a tall narrow residential tower atop a townhouse or storefront podium (Boddy, 2005). The podium concept draws on Jacobs’s ideas of fostering the social dynamics of the street through short blocks, storefronts, and pedestrian space. Vancouverism also supports Jacobs’s notion of the value of diversity in cities, through a protection of mixed uses of buildings and regard for diversity of residents through a mix of rental and affordable housing.

The narrow towers of the Vancouver model have their origins in Hong Kong. After clearing the industrial land around False Creek for Expo ’86, the province sold a 240-acre swath of downtown land to a single Hong Kong developer, Li Ka Shing. In Hong Kong, building codes of the 1960’s led to the development of high-density narrow residential towers that allowed for access to air and light, with a premium being a view of the harbour. In Vancouver, planners rejected the developer’s initial plan, as it called for a series of island towers that effectively privatized the city’s waterfront. The revised plan introduced the podium structure and extended a public seawall around the full length of False Creek (Vaughan, 2011). This development along the north shore of False Creek helped establish the concept of Vancouverism (Boddy, 2005).

Vancouverism is further known for its emphasis on preserving a sense of environmental context. A key component of the concept is the use of building height as a bargaining tool for creating public amenities. Planners trade height allowances for developer-funded parks, schools, day-care centres and theatres. As planners trade off height and density restrictions, they follow strict regulations for protecting mountain views. A series of view cones protect view corridors in
the city. Architect Christa Min argues “the city’s scale allows a visual clarity and
imageability of its relationship to the natural surroundings…it can be argued that
nowhere does high-density urbanism exist in such close contact with nature as it
does in Vancouver…Vancouver is remarkable on global terms precisely because
of this intermingling of nature and urbanity” (Min, 2008, p. 87). As Vancouverism
becomes a model that is influencing city building in many parts of the world
(Boddy, 2005), discussion amongst architects and planners is increasingly
focusing on the dynamics in the space surrounding buildings as much as on the
buildings themselves.

2.2.2 Urban ecosystem model

Urban dwellers commonly associate natural surroundings with recreational
and aesthetic benefits, but the stakes for preserving urban ecosystems
and their surrounding bioregions are much higher. As centres of resource
consumption and waste generation, cities can have a significant impact on their
surroundings. Ecologists speak of ‘ecosystem services’ as a way of bringing
attention to life-supporting environmental systems such as air and water
filtration, soil regeneration, and drainage that are essential to urban life (Bolund
& Hunhammar, 1999). These systems are vulnerable to human damage and
are costly to try to replicate through technology. With the majority of the world’s
population now living in cities (United Nations Secretariat, 2009), urban mistakes
are magnified on a global scale.

The relationship between city and environment changes with circumstances.
In the Middle Ages, a German proverb proclaims “city air sets a man free”. City
dwellers at that time escaped the physical toil that serfs experienced in the
countryside (Tuan, 1974). After the industrial revolution, however, cities choked
with pollution from factories and domestic coal burning seemed more of a
threat to nature than an answer to it. By the 1970's, ecologists were focused on preserving natural environments and E.P. Odum described cities as “parasites in the biosphere” (Odum, 1971 in Bolund & Hunhammar, 1999, p. 294). More recently, rather than considering cities in opposition to nature, ecologists have begun to regard cities as ecosystems themselves.

The urban ecosystem model is a way of thinking about the city as a complex amalgam of environmental and human forces that behaves like a ‘natural’ ecosystem with keystone species that dominate the resource use of the system; that is defined by interactions over time and in a specific location; and that relies on feedback loops for regulation and balance (Rees, 1997); (Pickett & Cadenasso, 2002). The urban ecosystem model can be used to develop more sustainable management practices and to guide future development through land, energy and behaviour analysis (Berkes, Folke, & Colding, 2000). As the majority of the human population now lives in cities, the hope is that cities can not only adopt more sustainable practices, but can become an efficient, ecologically sustainable form of settlement.

Both ecologists and geographers emphasize the importance of studying the interactions that occur in a given location. ‘Place’ and ‘ecosystem’ are defined by qualities of interactions, in the case of geography, between culture and nature (Cresswell, 2004), and in the case of ecology, between biotic and abiotic components (the living vs. the physical or environmental components) (Pickett & Cadenasso, 2002). City dwellers, who spend much of their time in indoor spaces, sometimes have a diminished sense of their environmental context,

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1 William Rees, a proponent of the view of cities as urban ecosystems, but far less optimistic about its outcomes, developed the concept of the ecological footprint to show that the land base cities are dependant on actually extends far beyond the city limits. He now speaks of a global human ecosystem in which cities are “dense nodes of energy/material consumption”, no longer just affecting local environments, but co-opting “the entire ecosphere for its own purposes” (1997, p. 65).
harbouring a misconception that humans have achieved an independence from ‘the environment’. Acts of procuring food and water are mediated by technological and mechanical systems of transport, further distancing the city dweller from the experience of place. Environmental scientist, and long time resident of Vancouver, David Suzuki speaks of a need to rediscover home as a way of fostering a caretaking relationship to the environment we live in (Gunnarsson, 2011). Perhaps a way to do that is to consider long-term residents’ understandings of home.

2.2.3 Aboriginal Forbearers

Residents of Kyoto recently celebrated their city’s 1200th year anniversary. Some residents of Vancouver have ties to their city’s region that go back well over 3000 years. In contrast, the City of Vancouver has just now marked its 125th anniversary. Vancouver’s recent inhabitants could look to their Aboriginal forbearers to gain a longer-term perspective on their city. When Musqueam Elder Larry Grant is called on to formally welcome Vancouverites to events on Musqueam territory, he often mentions two of his relatives who likewise welcomed the first explorer ships over 200 years ago (Global Indigeneities – Views from Near and Far, 2010).

Many of the historic events that shaped the incorporation of the city of Vancouver are within two generations of memory. Chief Bill Williams of the Squamish Nation used to live in the village of Senakw at the mouth of False Creek with his grandmother who was born there in 1875. He relates her description of that time: “In the late 1800’s, my grandmother told me, things were changing all over the place. People were coming in at that time. They kept to themselves. They didn’t know very much about the land whatsoever” (Williams, 2011).

The colonizers brought with them a very different understanding of land. Many
of their fortunes were made from land speculation. The commoditization of land and resources brought notions of ownership that were in opposition to Aboriginal understandings of land usage (Swann, 2011, p. 196). The British colonizers disenfranchised local people, corralling them in small reserves, cut off from the land that sustained them (Carlson & Xwelixweltel, 2006). In spite of this, some Aboriginal residents still hold traditional relationships to land and place. Wes Nahane of the Squamish Nation describes his perspective: “I myself don’t claim any land is mine. I’m not here to own land, I’m here to look after it. I believe that’s what we are here to do. To look after the land we have in our area” (Nahanee, 2011).

Connections to the specificities of place and home can create a ‘field of care’ (Tuan, 1977). While newcomers to Vancouver create these connections season by season, and year by year, speakers of Coast Salish languages have a field of care embedded in their language. The Coast Salish language of Halkomelem is founded on connection to place; the language structure relies on knowing the speaker’s physical orientation to local water channels. The Musqueam dialect of the language is called the ‘down-river dialect’ and uses verb constructions that change depending on whether the speaker is moving upstream or downstream. Linguist Patricia Shaw, current director of the First Nations language program at the University of British Columbia, explains:

“You can’t just say, ‘She went home,’” explains Shaw. “You have to [ask yourself], ‘was she farther away from the water and going home, or was she coming home in the direction away from the water? Was she walking parallel to the flow of the water downstream? Was she walking parallel upstream?’” (Zandberg, 2007).

Structuring language on an orientation to water grounds the conceptual process
of language in an embodied awareness of place. As a body of water, False Creek
offered its original residents a means of transportation and access to land, as
well as a sheltered place for settlement and fishing. The water provided a deep
sense of orientation, as is reflected in the structure of the Musqueam language.
After the European colonizers arrived by sea, Vancouver became a centre for
resource commodification, greatly facilitated by proximity to water. Unfortunately,
the sense of connection to that water was lost, and the next 100 years of
industrial use led to pollution that still renders False Creek unfit for fishing or
swimming. The first industry in False Creek was logging; its shores were lined
with sawmills that shaped the raw logs brought in over the water. Later industry
on False Creek included metal works and shipbuilding yards that capitalized on
access to water for industrial processes. When False Creek eventually shifted
towards urban residential use, the water defined its value again through the
commodification of land where proximity to water enhanced liveability through
access to fresh air, open space, and partially restored natural habitat and wildlife.

2.3 Picturing Place: traditions of bird’s eye view

2.3.1 Bird’s eye view maps

Historically, the urban pictorial map often took the form of the bird’s eye view.
Geographers and theorists have criticized bird’s eye view maps for their spatial
distortions, for supporting imperialist politics, and for their singular privileging of a
god’s eye view (Thompson & International, 2009). The contemporary use of bird’s
eye view maps suggests a different understanding.

On a cartographic level, studies on the perception of 3D maps have found that
users can consistently and accurately judge distances and elevations in spite of
distortions that 3D perspectives introduce to maps (Willett). The National Park
Service in the US has found that the bird’s eye view map is an aid to navigating through elevation change, and is increasingly using 3D maps at trailheads (Schobesberger, 2007). On trails they have found that 3D maps provide a better understanding of distance, topography and environment.

On a political level, the bird’s eye view maps that once supported colonial expropriation of land can now offer evidence of that expropriation in land claims cases. Early maps of Vancouver helped legitimize the process of land pre-emption (the way of making a claim of land ownership) by recording the changing territories and owners. Land pre-emptions were allowed at a rate of 160 acres per man, but when the Colonial government became alarmed at the high rate of participation of Aboriginals in land pre-emptions, pre-emptions were restricted to Whites only and Aboriginal people were allocated reserves chosen by the government at a rate of 5 acres per person.

Additionally, bird’s eye view maps of early Vancouver sometimes used the authority of the cartographic form to blur the line between representing existing development and planned development. Like other frontier towns fuelled by land speculation, Vancouver maps showed roads and infrastructure that did not yet exist as an incentive to spur more investment and development (Hayes, 2006). This sort of misrepresentation, particularly in the pictorial form of bird’s eye view led to much criticism of maps as tools of colonial land expropriation and speculation.

Lastly, on a critical level, the notion of bird’s eye view as a privileging of a singular unchallenged authority is being questioned as contemporary use of the view changes. As access to that view becomes democratized through air travel, David Matless writes that

the aerial view here is not a god’s-eye view, a position of anonymous,
remote and objectifying power, but a specific human position produced through new kinds of travel…This is less what Donna Haraway refers to as a totalizing visual ‘god-trick’, a ‘conquering gaze from nowhere’, than a sky-situated knowledge (Matless, 1999, p. 212).

As the view from the air becomes a part of human experience, the bird’s eye view map distils a familiar, dynamic experience from the plane window. In the case of False Creek, the tall condominium towers that edge the creek are a testament to an even more familiar ‘sky-situated knowledge’. For residents of those towers, the condo-eye view is the gaze from home (figure 5).

Engagement with bird’s eye view often begins in childhood when spatial literacy develops through play with physical models. The dollhouse and the train set lay a material foundation for understanding a view from above. The game board and now the interactive 3D game bring a level of abstraction into the exploration of bird’s eye space. This playful engagement with bird’s eye view suggests that there is pleasure in overview and in the sense of spatial mastery that the view promotes.
Lucia Nuti writes of “the ancient human dream of flying above the earth and having such an all-embracing view from above as only God could attain” and traces the quest for this visual representation through the Renaissance (Nuti, 1999, p. 101). Nuti examines different approaches to the totalizing image of the city, culminating in the perspective plan of the Italians, which was the fullest realization of the totalizing view and privileged a single ‘mode of knowledge’. In contrast, the Flemish used multiple composite views, which offered ‘alternative possibilities of knowledge’. Combining a perspective plan and a profile view, the Flemish mappings created a hybrid image where “finally the separated worlds of vision and abstraction are combined. The town of the eye and the town of the measuring instrument appear alongside each other on the same sheet” (Nuti, 1999, p. 105).

This hybrid image is a way of acknowledging the limitations of the totalizing view, and Nuti describes how the frame of the map can disrupt the view as well. A map that is wider than the field of view that can be taken in by a single glance, requires the viewer to move. Nuti describes the extended maps (which reached lengths of over 11 metres in the depiction of Istanbul in 1559) as filmic in the sense that they demanded “a series of pauses by the observer if the individual moments are to be appreciated” (1999). While Nuti focuses on European traditions of representing the city, Asian art offers examples of other ways of representing urban spatial experience.

2.3.2 The Rakuchu Rakugai Screen

The Japanese folding screen is a decorative form that flourished in the 16th century. The Rakuchu Rakugai are painted screens that specifically depict the cultural life of Kyoto, the former capital city of Japan (figure 6). Commissioned by aristocrats and warlords, the Rakuchu Rakugai contained a panorama of the city
that was painted on a pair of 6-panel folding screens, which could be configured in different ways to modify indoor space. From a distance, the screens’ gold painted clouds created a pattern that reflected light into the dark rooms of the house. Closer up, the gold clouds frame bird’s eye view scenes of the cultural life of the city including festivals, shopping streets and important sites such as temples. Each screen might contain images of over 2,000 people going about their daily lives in different sectors of the city (T. Loulanski & V. Loulanski, 2011).

In a formal sense, these screens acted as large-scale maps. They included recognizable infrastructure and terrain, and patrons were known to study the paintings in order to seek out scenes in their explorations of the city (T. Loulanski & V. Loulanski, 2011). The folding screen format, however, disrupts the totalizing effect of the map view.

Compositionally, a large portion of the screens surface area is obscured by gold cloud. This creates a tension between the underlying pictorial elements, and the gold reflective surface. Gromala and Bolter describe the oscillation between

Figure 6  An example of a Rakuchu Rakugai composition, showing areas obscured by gold cloud.
transparent and reflective surfaces in art as a way of being able to be drawn into the illusion of the image, while at the same time being reminded of the surface of the object, reminded that it is a constructed object with constructed meanings (2003). The Rakuchu Rakugai screens, with their oscillation between an illusionary world and a literally reflective surface, combine a representation of pictorial space with a material intervention into the physical space in which the screen resides.

It is striking that while the screens use a bird’s eye perspective, and have a map-like function; clouds obscure much of their surface area. This purposeful challenge to the mapping convention of detailed overview creates a different kind of image. Perhaps in support of the historical and cultural emphasis of the screens, the map-like form takes a more narrative than comprehensive approach to its subject. That is, rather than presenting a comprehensive overview of the city’s cultural life, the artists chose to reveal selected scenes, engaging the viewer in a directed and episodic rhythm that is not generally available if the entire surface area is covered in the same degree of detail as in Google Earth for

Figure 7  Composition sketch based on the Kangxi Scroll 3. From Wang Hui; Kangxi Emperor’s Southern Inspection Tour Scroll 3; The Metropolitan Museum of Art; 1691-1698. http://www.mcah.columbia.edu/nanxuntu/html/scroll_k3.html; 7 September 2011.
example. The *Rakuchu Rakugai* screens offer a narrative approach to presenting what can sometimes be subjective and incomplete historic data.

### 2.3.3 The Kangxi Scroll

Like the long maps of Istanbul that Lucia Nuti describes, Chinese scrolls present multiple views of space through passage along a continuous and extended horizontal frame. In China in the 17th century, scrolls were a popular art form that often depicted epic journeys (figure 7). One scroll, *The Kangxi Emperor’s Southern Inspection Tour (1691-1698)*, *scroll seven*, chronicles the activities along a river as the Emperor passes by. To follow the narrative progression, the viewer must roll and unroll the ends of the 72-foot scroll, revealing one portion at a time. This physical act slows down and directs the eye into a narrative sequence that depicts the preparations for the Emperor as well as daily life on the river. Artist David Hockney describes how the scroll also uses multiple perspectives to guide the movement of the eye. At one point a bridge crosses a river into a village. The buildings at the entrance of the village use the perspective of a viewer standing on the bridge. The buildings farther into the village, where the road turns a corner, use the perspective of a viewer standing at that intersection—ninety degrees to the original bridge perspective (Haas, 1998). The combination of requiring the viewer to physically advance the image, and the multiple perspectives staged along a path encourage an active participation in the unfolding narrative of place. Unlike contemporary montage, which allows instantaneous leaps through space, the Chinese scroll engages the viewer in an unfolding of space through linear time. The scroll is a form of time-based map, where the physical manipulation of the form creates a journey, a progression through time and space. I discuss the implications of this for an animated bird’s eye view in section 5.4.3.
CHAPTER 3 METHOD

Valuing and structuring creative exploration in problem solving

Designers, clients and researchers, all have a stake in understanding the design process—that is, the process of moving from problem area to design artifact. I have found Daniel Fallman’s design research triangle to be a relevant model, as it suggests that design is optimally made up of three activities: design practice, design exploration and design studies, which involve processes of making, transcending, and reflecting. Each of these activity areas represents a different perspective with its own traditions and expectations. The model is unusual for its inclusion of an exploratory perspective along side the more frequently cited realms of industry and academia. I will describe the particulars of my project in terms of Fallman’s three perspectives, and then extend the model with Richard Buchanan’s concept of four emerging spheres of design. Finally, I briefly discuss other relevant methods, to underscore why the design research triangle was the most appropriate model for my research.

3.1 Design Research Triangle

Developed at the Umeå Institute of Design in Sweden, the Design Research Triangle is a design research model that articulates a discipline-specific structure, and supports individuals in long-term research projects such as a PhD thesis. A key element of the model is the practice of moving between the activity areas to gain insight from multiple perspectives (Fallman, 2008). The model is highly suited to my particular project because of its emphasis on Design Exploration, an activity that engages with societal issues and seeks to transcend existing solutions.
3.1.1 A three point triangle

Fallman suggests that interaction design has three external interfaces: with industry, academia and society. These three areas have key roles informing the practice of interaction design from their unique perspectives and traditions. Fallman argues that it is fundamental to the discipline of design research that a practitioner works within all three activity areas. The three points of the triangle allow access to different modalities (figure 8).

Design Studies

The aim of design studies is to understand and describe, contributing to disciplinary knowledge through analysis and research. The design studies area offers practitioners a way to participate in a research community. A designer working in this area can access the traditions and understandings of other disciplines. This area supports systematic inquiry and methods for legitimizing knowledge based on intellectual tradition.
Design Practice

The aim of design practice is to gain new knowledge through the making of artifacts. Design practice is grounded in tacit knowledge. By working in this realm while engaged with a research question developed in the design studies sector, a practitioner can reflect and articulate an engaged knowledge that is otherwise difficult to access (Fallman, 2008).

Design Exploration

Design exploration differs from design practice in that it is less concerned with solving a particular problem or filling an identifiable need. Instead of beginning with a focused brief that details the problem and the criteria for its solution, design exploration begins with a critical examination of a problem area and seeks to develop a view of what is possible or ideal. While successful design often challenges the orthodoxy of current approaches, what distinguishes projects aligned with design exploration is a more fundamental paradigm shift. For example, the iMac was a significant design milestone in the development of the personal computer, but it did not challenge the paradigm of desktop computing. The iPhone and iPad are other Apple products that do create a paradigm shift by changing our relationship to personal computing.

While the first two areas in the model are concerned with creation and understanding, the impetus of this third area is change. Because design exploration has an interpretive and experimental focus, and works to transcend current paradigms, Fallman suggests that it is aligned with contemporary art and the humanities. This association necessitates a discussion of the role of aesthetics, which Fallman sees as essential to the practice of interaction design. This view is shared by Sara Diamond, who further articulates the importance of aesthetics in data visualization, arguing that “aesthetics are fundamental, not
additive” to the field (2010). Aesthetics structure experiences in perceptual ways, she notes, and “sensory perception—most often visual, but sometimes sonic or tactile—is the only means to perceive many contemporary data sets” (2010).

All three sectors (industry, academia and society) support the inclusion of design exploration as an integral part of the design process. For example, within industry, the high-profile design firm Ideo champions a three-part process that mirrors the design research triangle (Brown, 2009). Their more linear model uses the language of industry, describing a stage akin to design studies as an inspiration stage—the gathering of wide-ranging sources of insight. Following this is the ideation stage, which corresponds to design exploration in its search for new approaches, novel synthesis of previously unconnected sources and a transcendent approach to defining problems. Ideo considers ideation a prototyping stage. For them, prototyping can range from sketching, to ‘body-storming’ (gathering intuitive responses to physical enactment). The last stage of their process is implementation, where ideas are manifested in some form. This stage corresponds to design practice.

In academia, the design of novel technologies has always been a part of the discovery and documenting of new phenomena. Fallman argues that the field of Human-Computer Interaction (HCI) in particular often uses the creation of an artifact as a vehicle for materializing new approaches (Fallman, 2008, p. 18). In the design studies sector, the widespread use of prototyping affirms the inclusion of design exploration in the model.

Finally, the design exploration sector itself contributes to the recognition of exploration as a key element of the design process. Cradle to Cradle, an influential book on sustainable design, is a product of this sector of the model. The book challenges the linear model which creates industrial products that
quickly transform to waste (Braungart, 2002). The book offers many examples of the transcendent thinking typical of exploratory design. In one case, the authors describe the limitations of trying to design a more sustainable car when one could take the more transcendent approach of designing transportation. This sort of re-definition of the problem does not always work in the pragmatic field of design practice. In contrast, design exploration specifically encourages looking at problems from new perspectives so as to radically challenge existing practices.

Most projects grounded within this activity area are self-initiated. A conscious choice is made to use design process as a means of engagement with social issues. This area inspires proactive critique through the envisioning of transcendent alternatives to existing situations (Fallman, 2008).

3.2 The model applied

My application of the design research triangle was an attempt to explain and articulate my working process in such a way as to make it generalizable in terms of discovered best practices and insights of value to others or to my own future projects. Here, I describe my process with reference to the three nodes of the triangle, and summarize how the dynamics of the method affected the project outcomes.

The model requires movement between three different activities. While the model is highly structured in terms of what occurs in these activity areas, movement between them is not systematized. The dynamics are meant to be responsive to the particular stages and needs of a project. The lines forming the triangle are intended to become a well-worn track, tracing a path between the activity areas. Fallman emphasizes that movement between the points entails a change in perspective, which is helpful for generating fresh insights. The model uses arrows and loops to depict tensions between the points, allowing the user to diagram
and discuss these tensions as they arise in a project.

The model also requires a means for integrating the results from the different activities. For me, the process of integrating results was rooted in design exploration. Activity in this area centred on reflection. Reflection created the rationale for further decision-making, which then propelled action and movement between the nodes.

A common entry point to the triangle is through design studies. From an interface with academia, the researcher is encouraged to participate in design practice to gain access to tacit knowledge through action rather than just observation. As a designer doing research, I enter the triangle from the design practice node. The value of the model for me then was to have access to disciplinary knowledge through design studies, and to have the opportunity to make decisions based on reflection and experimentation within the design exploration node. I used design practice activity to test ideas through animatics.

To help integrate findings from design practice and design studies, I developed a series of visual notebooks for collecting and developing ideas and storyboarding visual concepts. The notebooks were a pre-cursor to the digital stage, a site for organizing thought, image, written word and concept on the visual field of the page. I found the development of the notebooks to be my primary activity within the design exploration node; the notebooks offered a structured way to analyze material from the other two nodes of the model. The most productive associations and insights in the project came from working with the notebooks, and at times it was difficult to remember to stop in order to test and complete the ideas in the design practice and design studies activity areas, where the outcomes could be more concretely examined. These outcomes took the form of written analysis and animatics.
The sketch and the storyboard are basic development tools of design and time-based media. In animation, an animatic is a form of rapid prototyping that extends the storyboard by integrating a series of still images with an audio track. It is used to test composition, timing and effectiveness of the scene. I used the three-part process of sketch, storyboard and animatic to test concepts and views (see appendix for examples). Some ideas along the way could be discarded at the storyboard stage, and others I tested in animatic form.

3.2.1 Working in the design practice node

Working in the design practice node involved an orchestration of 3D and 2D software in shaping a new hybrid form. The design practice node required a direct engagement with data, shaping a visual representation of data interpretation. In this respect the work borrowed visual conventions from a number of established visual fields ranging from Japanese landscape painting, animation, information design, cinematography and 3D graphics. The original intent was to create a CG environment that was influenced by other forms, but remained wholly within the medium of 3D. Instead, research and experimentation led to a greater hybridization of form.

The outcome of design practice is the series of animatics that I created to evaluate ideas, which were the basis of my findings.

3.2.2 Working in Design Studies

The design studies area offered a connection to the research community of SIAT along with ready access to books and journals through the university library. Exposure to phenomenological and new media discourses as well as visual perception science and computer science provided grounding in the languages and epistemologies of a variety of relevant disciplines. Beyond this
foundation, the project required a review of the literature in information design, urban visualization, theories of place, spatial theory, experimental cartography and mapping in contemporary art. This interdisciplinary approach provided the impetus for the collection of disparate data forms used in the design practice area, and supported the hybridizing approach taken in the design exploration realm.

The chief outcome of this point on the triangle is, necessarily, the written thesis, which includes the contextualization of the project through the thesis structure of research questions; a review of prior work; the application of a design research method; and a discussion of findings.

3.2.3 Working in Design Exploration

The design exploration area allowed for a lengthy immersion in problem finding. Buchanan laments the lack of time given to discovery in education, where problem solving is sometimes seen as more important than problem finding: “Time and silence are needed by the student to open imaginative space for finding the problems that are most important for their creative work” (Buchanan, 2007).

Mihaly Csikszentmihalyi writes that finding a problem is not a stepping-stone to a solution, but is in itself the most productive part of creative thinking (1997). It requires imagination and insight to discover new paths of inquiry. Not just a stage one passes through, Csikszentmihalyi and Jacob W. Getzels describe problem finding as the activity of “functioning effectively in a discovered problem situation” (1976, p. 82).

The primary investigations in this area were formal, aesthetic and interpretive, and included a consideration of hybrid media forms, aesthetic innovation in non-
technological media and artistic traditions, and the visual synthesis of multiple historic narratives. The primary outcome in this area is the development of a hybrid map form. The choice of data and the interpretation of that data influenced the production of mediated visual findings within this new form.

3.2.4 The dynamics of the model

Transitions between the design studies and exploration areas were quite seamless, but I found the most difficult transitions to be between design studies and practice. This is because these two activities seem to be the most different from each other. In this project, design practice involved a significant amount of technical problem solving due to working with 3D software, and proceeded at a very slow pace filled with procedural detail and trial and error. In contrast, design studies involved research that ranged across disciplines and through history, promoting broad exploration and discovery.

Both activities were rewarding, but required different kinds of attention and sense of time. The research work could fit into large or small blocks of time, and was especially suited to mornings, but the technical work required open-ended time that often stretched into the night. It was difficult to alternate on a daily basis between the two ways of working, but even working in longer blocks of time held challenges in the transitions. I felt resistance to having to switch modes and the new activity invariably felt distant and inaccessible at first.

The design exploration sector acted as the glue holding the project together. It held the motivation and focus for the project, providing a starting point for developing research questions, a context for reflection, and vision for design decision-making. Because it involved thinking and sketching it was much easier to transition, without even realizing it, between design exploration and practice, and design exploration and studies.
3.2.5 Validating results

The triangle offers a way to check three different kinds of findings from the three perspectives. The written thesis is a form that can be evaluated by the research community. The animatics can be evaluated on design criteria by designers, users, and content experts. The multidisciplinary scope of the project means a range of stakeholders from urban planners to residents to information designers and artists might have an informed response to the animatics.

From the key standpoint of design exploration, however, it is less clear how results could be evaluated and by whom. The goals of projects originating in this sector are not based on user needs or trying to understand existing phenomena. Rather, the intent is often to provoke response and present new apprehensions, aligning as Fallman suggests with the aims of contemporary art and the interpretive mandate of the humanities. He further suggests that evaluating design exploration work may be the role of design journals and design critiques, but that this is not yet as established as it is for related disciplines such as architecture. The aesthetic emphasis of this sector further complicates evaluation, as there are few quantitative measures.

Results from design exploration include development sketches—rough diagrams, as well as digital sketches, animatics and motion tests. From the start I expected that the main contribution of this project would arise from the design exploration sector. My goal was the development of a form that synthesized an understanding of mapping, cities and digital media. This resulted in the development of a form for mapping ambient space that surrounds the built world.
3.3 Adding to the model

3.3.1 New movements in design—a disciplinary grouping

Looking at the disciplinary contexts for design work can further extend the model. Buchanan suggests that contemporary design is moving in four distinct directions. First, there is a closer alignment with technology through science and engineering; then there is movement towards a deeper understanding of human behaviour through alignment with psychology and anthropology; thirdly there is alignment with business through understandings of collective behaviour and economics; and finally there is an alignment with the humanities which manifests as an engagement with communication, information and narrative (Buchanan, 2007). Design plays a different role in each of these areas. This categorization is a useful way of thinking about design in terms of how it integrates into four very different contexts. It acknowledges the differing discourses, audiences, values and criteria of each alignment. For my research, Buchanan’s grouping suggests an alignment with the humanities, and clarifies a relationship to that discipline’s engagement with interpretation, communication and narrative.

3.3.2 Design and multidisciplinary practice

In industry, design has a tradition of multidisciplinary engagement through its diverse range of clients and applications. In academia, design also has broad relevance because its fluency in visual language engages it directly with issues of representation and meaning. Gromala argues that design offers a valuable perspective to multidisciplinary practice. Academia is being challenged to incorporate multidisciplinary outlooks as it adopts new technologies, and designers can offer a critical perspective that can shape how technology is incorporated into a discipline. Through an engagement with cultural, historical
and critical discourses of representation and media, designers can help clarify the role of new technologies as they are being developed (Gromala, 2001).

Gromala notes that design is not contributing as much as it could, as it is not yet understood as a legitimate discipline. The question of how designers can collaborate with other disciplines is a significant one. Gromala describes the prerequisite for multidisciplinary inclusion as the articulation of the design knowledge base, and the clarification of methods for legitimizing that knowledge (2001). Practicing a design research method supports a cumulative effort to help design knowledge be recognized and utilized in multidisciplinary teams.

### 3.4 Other relevant methods

While the design research triangle served as the model for my design process, a couple of other methods have relevance for this project, particularly with respect to the approach to subject matter of the project (the history of a place).

Ethnography looks for, and interprets, patterns in social groups. If one were to imagine an ethnography of place, where patterns of interaction were studied in a locality rather than a social group, the resulting structure might look something like the ecosystem model. The ecosystem model studies how the living and the physical or environmental elements interact in a given place over time. Ethnographers consider cultural patterns in the context of environment (Creswell, 2007).

In my attempt at mapping the culture of a place rather than a social group, the ethnographic processes of data gathering and analysis have relevance. Looking for patterns in complex interactions and behaviour, and using description and interpretation as an approach to data analysis, mirrors my activities in design research, especially within the design exploration node.
An offshoot of ethnography is visual ethnography, which uses photography or video. Bas Raijmakers has developed a design research method that draws on a form of video ethnography that he calls discovery research. He uses documentary filmmaking as a way of creating data and as a way of thinking:

Filmmaking was an essential part of the modes of analysis. Making my films did not happen separately from my thinking. Creating my own data (the films) was a way of thinking about design documentaries (Raijmakers, 2007).

Raijmakers process mirrored the design research triangle’s design studies, practice and exploration nodes as he considered his primary activities thinking, making, reflecting and doing. His emphasis on thinking-through-making compares with the triangle’s emphasis on artifact creation.

Both ethnography and discovery research are relevant to some aspects of my research, but their focus on understanding existing situations through observation or filmmaking does not address the formal aspects of my project. This thesis addresses a specific subject and problem (representing the culture, time and environment of False Creek on a map), but it also strives to understand some of the formal implications of combining digital media and cartography. I had to go beyond the specific content and data to include a consideration of hybrid media forms that could be applicable elsewhere.
CHAPTER 4 DESCRIPTION

In this chapter I explain the two main facets of my approach—organizing the formal qualities through a process of orchestration, and examining content through a mapping of time. This is followed by a description of a series of animatics that were the product of my investigations. These animatics made concrete the challenges and design issues I encountered using 3D as a mapping tool. Analysis of the outcomes of these animatics is continued in section 5.4 Findings.

4.1 Approach

The project originates in the design exploration node of Fallman’s triangle, and so it has an orientation towards societal critique through design that challenges current paradigms. While successful design often does transcend current paradigms, it is more typical within the industry to begin with a focused brief that specifically details the problem to be solved and criteria for the solution. Design exploration allows for a starting point that is open-ended, that encourages a wider ranging definition of the problem as part of the design process. My central goal for the project was to challenge the paradigm of urban mapping that prioritizes the depiction of infrastructure over the less tangible space of culture and biosphere. My approach was to investigate how the affordances of digital media could augment cartography and support a new form of mapping.

Critique is an activity of design exploration that comes from an association with humanities and contemporary art. It allows for an interpretive stance towards data. My second goal for the project was to adopt a communication mandate for presenting findings, rather than to make a tool for analysis of data. I wanted to develop an approach to data selection and interpretation that resulted in a cohesively mediated visual artifact.
I will describe two approaches that arose out of my goals for the project. The first goal relates to form, and asks the question ‘how can digital media support a new way of mapping cities?’ The second goal relates to content with the question ‘what is the data for a map of invisible things?’ The approach taken here was to look at how a representation of time can reveal the immaterial qualities of place.

4.1.1 Orchestration

I thought to narrow down the first question to a more manageable and specific one. How can the affordances of 3D computer generated imagery support a new cartography of cities? Upon investigation, however, 3D graphics and cartography spawned many more questions, as their antecedent forms required consideration. Working in 3D, I also needed to look at traditions in visual art, animation, cinema and photography. Cartography required a look at bird’s eye views and early pictorial mapping. This abundance of forms shaped my first approach as one of orchestration.

Map as Stage

A starting point for the project was map as stage. Scenography is an emergent academic discipline that extends set design to a broader understanding of performance space. Pamela Howard defines scenography from a designer’s perspective as “the seamless synthesis of space, text, research, art, actors, directors and spectators that contributes to an original creation” (cited in McKinney & Butterworth, 2009, p. 3). Scenographers create meaning by orchestrating these elements in the 3D space of the stage.

Several ideas from scenography have particular relevance for 3D mapping: that text and image interweave and create meaning for each other; that the stage contains an interaction of conceptual and physical space; and that sound can have pre-cognitive effects in describing space.
Howard describes the stage as “a world in which the eyes see what the ears do not hear” (cited in McKinney & Butterworth, 2009, p. 4). The bird’s eye view map is likewise a site where image and text can complete and augment each other. Here, information design can provide the ‘text’ as it can be crafted as an interpretation of the data or story. Text can also occur in the ambient map form as audio spoken word. As a media form, a map can access the evocative properties of sound for describing place.

In my consideration of map as stage, I wanted to portray the physical world in a pictorial way to ground a more experimental portrayal of the less tangible aspects of space. The notion of a conceptual space interacting with a specific physical space supports an attempt to view the living elements of biosphere and culture in relation to the built world of a city.

**Synthesizing digital media: A hybrid form**

The notion of orchestration transposes easily from stage to digital bird’s eye view. Lev Manovich’s argues that the computer is also a site of orchestration of digital forms (Manovich, 2006). Manovich notes that digital media may resemble their analog forbearers on the surface, but underneath they are all built from a common digital code. This shared structure allows the co-existence of these media in one production environment—the computer.

Hand-drawn elements, photographic cutouts, video, type, 3D elements are not simply placed next to each but interwoven. The resulting visual language is a hybrid. It can also be called a metalanguage as it combines the languages of design, typography, cell animation, 3D computer animation, painting and cinematography (Manovich, 2006, p. 26).

Manovich points out that this metalanguage has an underlying logic, but takes shape in endless variations.
Conventional production techniques and the material forms of individual media no longer dictate their use. Manovich suggests that this leads to a hybridization of formerly distinct visual languages. For him, the future of the image is in this new hybrid aesthetic, a distinct new visual language that goes beyond mixed media to a fusion of a new kind of image. Animation, he claims, is no longer just a medium in itself; it has a new role as a technique that can be applied to other media such as film and video (Manovich, 2006).

The ambient map is a direct example of Manovich’s hybrid image because it takes disparate data sources and in a sense equalizes them through pictorial representation allowing them to interact using visual language. Because digital media are all built from the same binary code, a sepia photograph, a historic speech, a cloud of air pollution can all be reconstituted in a hybrid form.

4.1.2 Mapping time

Another consideration involved figuring out how to support pictorial representation of elements that are not visibly present in a landscape. As I considered how to represent culture and biosphere in place, I realized that time was an integral and defining force for both.

Understanding the dynamics of culture and ecosystem in a particular place depended on seeing change over time, so the map needed to create a sense of continuity with the past. This is not easy to see in contemporary cities, which are inhabited by relatively transient populations. New arrivals to a city are often more focused on the future of a place than its past, looking for up-and-coming regions that promise future employment and schools for future offspring.
Personal narrative as historic data

2011 marked the 125th anniversary of Vancouver’s incorporation as a city and was a chance for the city to present its past. A variety of historical views competed for public attention. The Vancouver Sun ran a series of articles chronicling old-timer businesses that still remained open, and the City of Vancouver re-issued a series of books on the histories of different neighbourhoods. The celebrations have focused on personal narratives as opposed to historic narratives, which might involve more critical examinations. The factual events of Vancouver’s short history show a city whose growth was largely based on land appropriation, commodity speculation, and racist protectionism (Macdonald, 1992).

Personal narratives can be used to compensate for untidy historical narratives, but they can also reveal critical views of that history. 2011 also marked the unveiling of a community art project by the False Creek Watershed Society, which documented residents’ relationships to False Creek over the years (Williams, 2011). The art project included the perspectives of Aboriginal residents alongside newer settlers. Stories from Aboriginal residents are especially compelling because they offer a direct account of historic events. Because of the relatively short duration between the arrival of European settlers and the development of the city from a frontier town to a global real estate commodity, contemporary residents of the city have witnessed key moments in its transformation. Historic time is within reach of living personal narrative. In this project, it became important to include personal narratives as time data, because they can emphasize the nearness of these historic events.
A place imbued with time

Past events have physical manifestations in buildings, symbolic markers, historic sites and natural landmarks such as trees. These place-time markers can make the past vivid for those who are connected to its histories—and visible for those who are not directly connected. When place holds a collective history, personal histories are reinforced through cultural and social experience. Cultural experience can bind personal history to community, and to ecosystem and universe in the case of some indigenous cultures.

As I looked at local history through maps and stories, it was increasingly evident that Aboriginal relationships to history and land are different from settler perspectives (Carlson & Xwelixweltel, 2006). Being rooted in a place over many generations promotes a long view of time. Without this generational connection, newcomers to Vancouver have a less personal, learned understanding of the past. Strangely, as a newcomer myself to Vancouver, I had the opposite experience.

Growing up in Toronto with a mixed Japanese and British ancestry, I had the sense that the cultural differences I felt were a result of my personal history, which I shared with a small number of close relatives. On moving to Vancouver, I found that my experiences were shared by many more, and discovered a collective past that was grounded in Vancouver’s former Japantown. In the 1930’s the heart of Japantown was Powell Street, a commercial street lined with merchants selling Japanese food and wares; and Powell Grounds, a community focal point that hosted championship baseball games. Today, the Powell Street Festival is a long-running annual community festival that celebrates Japanese Canadian arts and culture. Far from being an ethnic showcase, after 35 years it is run by ever-younger generations of artists and writers in the community. Although the community has abandoned Powell Street, it still returns every
year for the festival. Now a part of the Downtown Eastside, Powell Street is in a neighbourhood infamous in Canada for its large number of drug users and homeless residents. Several years ago the festival had to address safety concerns and some lobbied for the relocation of the festival. This brought an outpouring of support for keeping the festival in its historically significant location. By returning each year to the former Powell Grounds, the community strengthens its ties to the past and charges the historical space for future generations.

Like other Japanese Canadians, my father’s family was forcibly removed from the west coast during the Second World War, and eventually settled in Ontario. My sister and I moved to Vancouver as college students and were surprised to find a place that manifested our histories in a way that our hometown could not. Despite the rupture in my family’s tenure, for us, Vancouver is a place charged with markers of time and collective history. This history only goes back three generations before the immigrant displacement from Japan causes an even greater rupture in family history. It is humbling to think of a family history that goes back many more generations rooted in a single place. In an age of mobility and discontinuous relationships to place, Aboriginal residents hold the long view of the value of place and the specificities of home.

**Time and the ecosystem model**

Time is a key factor in the ecosystem model. A healthy ecosystem responds to feedback loops as a way of maintaining adaptability and resilience. Feedback loops occur in time and are a marker of how a system responds to change (Berkes et al., 2000, p. 19).

In the context of urban development, feedback loops can be hypothetical as well as material, and, as a result, can offer insights into decision-making and outcomes. An opportunity for a feedback loop in *Bird’s Eye Vancouver* is the
case of a rejected condominium master plan for the north shore of the creek. Here, a hypothetical feedback loop could have been generated based on the original architectural plan. Planners foresaw negative impacts, particularly in the privatisation of the waterfront, which would have eroded the civic identity of False Creek.

1.1 Description of animatics

*Bird’s Eye Vancouver* is a series of short animatics that prototype various possibilities for a hybrid map form that uses 3D modelling, audio and animation within the pictorial space of the bird’s eye view. It presents several views of Vancouver’s False Creek, as it was transformed from fishing grounds to condo towers in 150 time-lapse years. These views include representations of time, biosphere and culture. Each view would have an interactive time slider at the bottom of the frame that indicates a position in time. Three of the views emphasize time, showing transformations over the full 150-year time span. Two views focus on culture, mapping a particular cultural event, as well as mapping the cultural activity that occurs in a place over a year’s time. A further view focuses on mapping biosphere in a particular location and emphasizes presence in time rather than historic change.

**Animatic 1: Culture**

An early animatic describes a particular event (figure 9), and is followed by a later version that offers a way to generalize an approach to depicting cultural activity on a map (figure 10).

The particular event depicted is the annual *Winter Solstice Lantern Procession* that takes place along the shores of False Creek. Now in its 18th year, it is a community festival created by artist Naomi Singer to mark the return of the
sun with neighbourhood lantern processions and performances from different cultures. It was Singer’s vision to create a celebration that would encircle False Creek with the glow of lanterns, and be an inclusive event that would see people from many cultures mark a celestial phenomenon that has long been acknowledged in human culture. Singer lives on the south slopes of False Creek, and began the event with support from the more established communities in that area. As the condo towers rose on the north shore, she was determined to involve the new residents in an area that had not yet formed an identity as a neighbourhood. The event now includes participation from neighbourhoods ringing False Creek: Yaletown, Chinatown, Strathcona, Commercial Drive, Olympic Village, Granville Island and Vanier Point.

The lantern festival brings residents to the urban shore on the night of the solstice. In doing so, it may be supporting the cultural values that are preconditions for the protection of ecosystems, according to Fikret Berkes, Carl Folke and Johan Colding (2000). In their study of non-western resource management practices, they suggest that one of the key ways that societies maintain healthy and balanced ecosystems is through strengthening cultural
values that reinforce respect for resources and understanding of ecological signals. These cultural values are internalized through ritual, ceremony and celebration. They offer the example of the Mexican milpa ceremony, which governs crop rotation. They describe it as an act “which binds together the family, the community, the ecosystems, the universe” (Berkes et al., 2000).

A second cultural animatic offers a way to generalize an approach to depicting cultural activity on a map. The notational system indicates a way to describe intensity and duration of cultural activity. While culture can have many definitions that encompass language, and the production of objects and practices, I am here trying to depict culture as human activity that is collective, intentional and meaningful for participants. The notation would need to be driven by an algorithm that takes into account the cultural values being measured. My criteria for inclusion for example, was two of the following; community-building, participatory and identity supporting. This was a way to distinguish events centred on entertainment and spectacle, (which may attract greater numbers of people and generate more revenue) from cultural events that have relevance to the Berkes conception of culture that supports sustainable urban practice.
Animatic 2: Story

The third view uses a mix of written and spoken word combined with vectorized portraits of residents to situate personal narratives in place and time (figure 11). This view presents a sketch of a potential project that would benefit from public involvement in the gathering of stories. There are precedents for visually locating individual histories on maps. The bird’s eye view is especially conducive for its stage-like layout, which can locate stories with reference to physical and topographic context.

Animatic 3: Land

This animatic focuses on land transformations, including the physical shoreline of False Creek (half of which was filled in the 1910’s), the imposition of the urban grid on forest, and the shifting designations of land use (figure 12). My intention was to show how human activity changes the physical land and shore. Maps often suggest a false sense of accuracy, especially concerning coastlines, where interpretive decisions must be made as to how to use a line to represent the fluctuating zone where water meets land. In the 1910’s the first aerial
photographs of Vancouver enabled a more accurate mapping of the coastlines (Macdonald, 1992), but these photographs are still a product of the season and lunar phase they were taken in; and still required an interpretive act on the part of the mapmaker. Animating the shoreline over time is a way to suggest the dynamic nature shore mapping.

Land-use maps are a significant component of urban planning. They are usually drawn in plan view and use colours or textures to mark zoning designations. The utility of an orthographic or bird’s eye view here is in its capacity to include pictorial elements to reference land-use impacts, especially those that preclude other uses. For example, the industrial zoning surrounding False Creek was based on sawmills initially, and the creek was used to transport logs. The resulting congestion and pollution meant the creek was no longer suitable for fishing. This sort of impact can be suggested pictorially.
The fourth view is an attempt to illuminate the biosphere as it appears over and through False Creek. This view takes a different approach. Rather than showing change over the 150-year time span, it emphasizes a single moment in the creek’s history. Here, the intention is to create an ambient sense of time—to portray a place that is dwelling in time (figure 13). I am using the term ambient to describe a sense of a surrounding element, as in the way ‘ambient air quality’ describes the surrounding air in the environment. Our experience of living in the physical world is somewhat cyclical (the breathing cycle, the cycle of waking and rest), and so this view loops animation cycles to reference the cyclical dynamic elements of space that make up the biosphere. The audio portion of this view captures a moment posted on You Tube when False Creek office workers glimpse a grey whale in the water outside their lunchroom.
The final view takes an experimental approach to portraying population density. It reflects the imprecise nature of the data available, while still attempting to show the general trend over time. Historical accounts list population data in tables, but the actual process of census taking in the 1860’s was complicated by migrant prospectors of the gold rush, aspiring settlers still living on boats and the seasonal movement of Aboriginal inhabitants.

The animatic includes small circles to represent one person, and larger circles to represent one hundred people. Stacked circles refer to condominium tower dwellers (figure 14). An attempt at including ethnic distribution is included because Vancouver has been shaped by a significant mix of ethnic groups from its beginning (McDonald, 1996). The proportional change of these ethnic groups continues to be a factor in the development of the city, as the 2006 census shows distinct ethnic zones still evident in Vancouver neighbourhoods.

Figure 14  Animatic 5, People.
CHAPTER 5 DISCUSSION

I began this project investigating how the technological affordances of CG could support mapping. I later found it worthwhile to reverse the direction of this question and consider how cartography could inform the representation of CG space. Pictorial cartography and art have long-standing traditions of representing space that have relevance for this emerging medium.

This chapter is a discussion of each of the affordances, including how they are currently being used, how alternative approaches drawn from art history and cartography informed my design, and what I discovered in incorporating these findings into a working model (mapping context).

The three affordances of CG that I investigated are representation, orientation and dynamic space. Each of these affordances is already informed by a set of conventions, expectations and stylistic approaches. The use of representation in CG divides primarily between the photo-realism of cinematic contexts and the bright hyper-realism of animation contexts. The use of orientation primarily views objects in Cartesian space, emulated by a film camera. Finally, the dynamic space of CG has developed primarily along the trajectories of cinematic conventions of cameras and montage, and interactive conventions of navigable space.

5.1 Representation: degree of detail

The first affordance of CG investigated was representation, and this included a consideration of how styles of representation can impact map functioning. The elements of a 2D image—colour, texture, line, shape, composition—all have a role in 3D imagery although this is sometimes overlooked with processes such as photo-skinning, which project photographs onto 3D models. I found that the
degree of detail was important. Creating a quiet ground (with less detail) meant the 3D world could function as a stage for other kinds of data. As well, using 3D selectively simplified and directed attention (figure 15).

5.1.1 Current Approaches

In terms of representation, technical development in map databases is moving towards a greater degree of photo-realism (figure 16). This level of detail is valuable in a database context where exploration and analysis of data is the goal. In the context of presenting findings, however, visualization research suggests that it is necessary to clearly differentiate findings from data (Robertson, Fernandez, Fisher, Lee, & Stasko, 2008). Photo-realism offers a degree of detail that can compete with the presentation of findings. In my role as a communication designer, the presentation of findings often calls for interpretive decisions that filter out extraneous data. One way to do this is to reduce the degree of detail from photographic to graphic.
5.1.2 Other approaches

Wayfinding studies

The following are two public examples of projects that support a reduced level of detail in bird’s eye views to facilitate a more focused engagement with content. The National Park Service commissions illustrators to create bird’s eye view maps of historic sites. Their rationale for a pictorial approach is that users are more engaged with this type of image and need a material understanding of places they are being encouraged to explore. The National Park Service oversees the production of these maps from their cartography department, but asks artists and illustrators to create the maps. They acknowledge that the form is more aligned with the aesthetics of landscape painting and the visual languages of digital media than with cartography (Patterson, 2005). The Parks Service does not strive for the photorealism of CG. They have found that an illustrative approach has more clarity and is better able to direct users to the relevant points of interest. Their technique for creating bird’s eye view maps
is well documented (Patterson, 2005) and is a hybrid form based on the two-
dimensional map. I have used some of their techniques to likewise preserve the
relationship to the 2D map within a more pictorial and 3D environment.

A second example highlighting level of detail in a public setting is the Legible
London way-finding study, which found that selective use of 3D drawings on 2D
maps helped pedestrians form mental models of places. Developing a mental
model of the surrounding area seemed to encourage pedestrians to explore
further by boosting their navigational confidence (Transport for London, 2006).
The Legible London maps use 3D isometric drawings sparingly. I have likewise
limited the 3D modelling of buildings to only those that encircle False Creek.
Instead of setting up the expectation of a comprehensive model city, selected
usage suggests 3D is there for a specific reason. I have used 3D buildings to
indicate stages of development in different time periods.

**Rakuchu Rakugai screens**

The Japanese room screens discussed earlier show the value of offsetting highly
detailed areas with flat areas of colour, creating a visual dynamic that functions
differently at different viewing distances. The alternating surface qualities set up
a narrative rhythm that focuses the viewer on a series of detailed scenes located
within the larger spatial context. Japanese prints, such as those by Hiroshige in
the 19th century, also use large areas of flat colour to direct the eye through the
image. These prints provided a rationale for my use of flat colour and sparse line-
texture, and this was effective as a ground for informational notation in figure15.
In the first animatic (Culture1) I incorporated photographic imagery and video
on a flat plane of colour (the darkened mountains) to see how detail and flat
colour could be juxtaposed (figure 9) Unlike the Rakuchu Rakugai screens which
alternate detail and shape within the same drawn medium, I found the mix of
photographic and graphic imagery on a small map to be in competition with each
other. To address this issue I had to darken the scene considerably to allow the photographic element to take the necessary precedence.

5.2 Orientation: Volumetric space

The second affordance is orientation, which covers the depiction of 3D space. I had thought that building the 3D stage would be a preliminary matter of accessing modelling data and building it in the appropriate software (figure 17). Instead, in exploring the capabilities of the software I found that two of the design specifications seemed to have a significant impact on the resulting images. These two specifications yield an image that is sometimes at odds with how we perceive space. In the following sections I discuss the current paradigm in 3D software, along with two other conceptual models of 3D space that led me to try a different approach.
5.2.1 Current Approaches

3D software represents space through a linear perspective algorithm and renders views through a simulated camera lens. These two specifications are fundamental to the software’s ability to render images that integrate with photographic imagery, but they are not the only way to approach 3D spatial representation.

My hope in creating a three-dimensional map was that it might better capture the feeling of being in a physical space. A 3D map has the benefit of being able to include significant descriptive features such as terrain and buildings. As I built my 3D model, I couldn’t help being disappointed that it did not live up to the potential I had seen in preparatory sketches. I experimented with composing the view of the model using different focal lengths and camera positions in the 3D software, but none compared with the sketches I had done, which more easily captured the sense of space as perceived.

Journal entry:

I found as I experimented with cameras that it was not corresponding at all with my experience of False Creek as a big space. 3D space and bird’s eye view are too far away. I look to Hiroshige for different landscape scales that convey a real sense of place. The camera dynamic is important too—for panning along the creek. What are the ramifications if I do a closer view? This comes up as I try to texture the scene and realize the resolution is too low, that it is too big an area.

Looking at the 3D model through a view meant to emulate a film camera created a double remove. The first remove was the model itself. A numerically accurate model often does not look quite right. GIS technology presents topographical
data with numerical accuracy, but cartographers routinely exaggerate features such as the height of mountains to aid perception on the map, and to increase congruence with lived experience of mountain scale (Willet, 2008). Distorting the numerically accurate model for height perception left the problem of representing it in perspective view.

3D software designers do include some provisions for automated visual distortion. The ‘camera lens’ is an example that provides built-in distortion simulating a camera’s focal length, depth of field and manoeuvrability. This is useful for CG that needs to match photographic output. When trying to capture a sense of space, however, the 3D camera lens does what the photographic camera does—it forces the photographer to take several shots to compensate for the disappointment of each one not capturing the full sense of the space.

At this point in the project I had to consider why I was imposing constraints on how the space was portrayed. If the static image was not conveying the sense of space I was hoping, why not make the leap to a cinematic portrayal using multiple and even moving cameras? I tested a series of pans and camera angles that created a montage of multiple views. This approach would have led to a more directed filmic narrative however, and I wanted to preserve the map quality of overview. From the beginning one of the forms that inspired me was the children’s picture book. The detailed urban drawings of Richard Scarry and Mitsumasa Anno offer children multiple visual narrative threads that can be pursued at will. Picture books offer the pleasure of overview. The eye can roam across the page, freely choosing where to linger. Cinematic montage does not afford this type of agency. Film is a medium highly suited to description of place, but I focused on exploring these possibilities within the hybrid map form.
5.2.2 Other Approaches

Hyperbolic Space

Analysing the difference between my 3D output and my drawn sketches, I found the sketches each contained multiple points of view (figure 18). These slightly different views suggested a combined experience of place that included a high vantage point that emphasizes the vertical wall of mountains that frames the north view of the city; another that addresses the sense of False Creek as a wide body of water that would be experienced standing at water’s edge; and a third point of view that was top down, emphasizing the shoreline. The hand-drawn sketch can incorporate these points of view without apparent contradiction, and yield a recognizable place, whereas the 3D output was bounded by Cartesian perspective and the added constraints of camera lens simulation.

Cartesian space uses the perspective grid to create the illusion of 3D space receding on a flat plane. William Mitchell describes how varying an algorithm can transform a 3D model, simulating views that not only include two and three-point
perspective, but also the pictorial conventions of Chinese and Japanese painting (Mitchell, 1992). Nonetheless, if the model resides in a 3D Cartesian coordinate system, the many possible perspectives can only be seen one at a time. In order to approximate the sketch view, I had to leave pure Cartesian space, taking with me a series of different outputs that were then layered—in the two-dimensional space of illusion that comprises all flat representations of space prior to the invention of CGI. I refer to the resulting illusory 3D space as volumetric space.

In some regards, this composite space of multiple points of view is akin to hyperbolic space. Patrick Heelan argues that the space portrayed in paintings by Cezanne, which critics often speak of as made up of multiple points of view, can actually be accounted for by a single point of view in hyperbolic space (Heelan, 1989). Heelan describes hyperbolic space as the space of vision, a physiological space that includes the distortions brought about by looking at the straight lines of mathematical space on a curved retina. These predictable distortions include dilations of space on the periphery of the near zone and a flattening of space in the distant zone, as if from a telephoto lens, creating a finite sense of distant space. Heelan points out that this “horizontal dilation of the visual field… is an effect well known to painters and critics, particularly since the seventeenth century: Panofsky called it the ‘spheroidal world of sight’” (Heelan, 1989, p. 72).

The notion that the spheroidal eye might perceive a straight line as curved, is easily overlooked in a predominantly Cartesian world. Heelan notes,

Panofsky makes the point that people can become so conditioned by the perspective of their time that they fail to see perceptual possibilities that contradict it. He reports that Kepler did not notice that straight lines were sometimes perceived as curved until he discovered that we come to know reality not through the planar image of classical perspective but through a retinal image that is curved (1989, p. 103).
Heelan claims there are two “structures of visual perception”: the mathematical Euclidian structure of metric space, and the curved visual space of sensation. In the ‘spheroidal world of sight’, it seems reasonable that human perceived space might differ from the representation of measured space, just as a study of the amphibian eye would likely yield a third very different structure of visual perception.

Heelan’s hyperbolic space model provides a way of understanding the representational choices made by artists such as Cezanne and Van Gogh who walked a line between Classical perspective and a representation of perceived space. Cezanne’s painting *A Turn in the Road at la Roche-Guyon* embodies some of the visual paradoxes I struggled with in False Creek (figure 19). A photograph taken from Cezanne’s probable vantage point, shows a flattened scene that resembles the results I came up with in my initial 3D model (figure 20). Cezanne’s painting, in contrast, depicts an extended foreground that seems to resemble the overhead view I sought for the body of water; a dilated peripheral zone of the built world; and a flattened distant zone consisting of a wall of
mountains. It would be interesting to see if a hyperbolic ‘lens’ could be created for CG software. The software currently simulates the distortions of a 10 mm ‘fisheye’ lens, and this suggests it might be possible to simulate a hyperbolic lens based on the mathematical model of hyperbolic space.

**Space-medium**

The dilations of hyperbolic space seem to be congruent with my concept of volumetric space as a multi-faceted alternative to the Cartesian grid. A second attribute of volumetric space is suggested by the work of Cezanne and Van Gogh, as well as Seurat and Monet. Manovich uses Pavel Florensky’s term *space-medium* to describe the space depicted by these modern painters (2001). These artists, he notes, portrayed space as a “homogeneous, dense field, where everything is made from the same ‘stuff’ (2001, p. 265) Space is not empty, but rather acts as a medium, which “occasionally hardens into something that we can read as an object” (2001, p. 255).
One of my intentions in Bird’s Eye Vancouver was to map the space that surrounds the built world. I wanted to portray this space as containing often-unseen ecological elements, as well as conceptual elements of culture and history. This was a space of interconnection between the physical world and less tangible—and intangible—forces. Like souvenir snow globes with their liquid snowstorms, I had hoped volumetric space could encapsulate an activated 3D space.

Manovich notes that architects “always have to work the basic dichotomy between built structure and empty space” (2001, p. 265). The current tools of digital 3D are founded on this dichotomy. CG technology tends to prioritize the figure/ground relationship; Cartesian perspective defines space through a depiction of the objects in it as they recede and scale in defined mathematical ways. Manovich argues that CG space holds the potential for going beyond this dichotomy and depicting space as a totality. Because virtual space has a structural unity—as it is all made up of pixels and polygons—CG space is actually “closer to modern painting than it is to architecture” (2001, p. 266) One of the most promising new directions in 3D software development is the pursuit of increasingly sophisticated visual effects that transform objects, space and light into seamless and dynamic interactions.

5.3 Dynamic Space: Key-framing the environment

The final affordance is for depicting dynamic space. I found that in order to retain the active overview function of the map, while at the same time taking advantage of the capacity for dynamic space, I could animate the background as opposed to the objects and cameras in a scene, as is more typical in CG. Key-framing the environment was a way to locate the map in time.
5.3.1 Current Approaches

In CG the two dominant forms of dynamic space are driven by the film and game industries. The cinematic convention for portraying dynamic 3D space uses moving cameras and montage of different points of view to describe space. In gaming, navigable space emphasizes first person exploration of space through a kinaesthetic interface. I was interested in how cinematic and navigable space relate to mapping and what alternatives exist for dynamic portrayals of space in the mapping context.

The Cinematic Map

Considering how the cinematic camera relates to mapping, I imagined what a cinematic map might look like. A cinematic map might involve either a moving camera or a sequence of moving images that are explicitly linked to particular locations. One example that I would characterize as a cartographic film (that is, more film, less map) is Kate Hennessy and Richard Wilson’s *Active Pass to IR9* (2008). Shot from a moving car, the video focuses on the centre line of a small highway as the filmmakers drive from one end of Galiano Island to the other. Parts of their conversation scroll down the screen as they talk about growing up on the island in local Aboriginal and Settler communities, and their different relationships to the island. The Aboriginal family has deep roots in the region, but are experiencing a long court battle to prove their connection to place; the settler family is a relatively new arrival on the island who appear completely at home in their new surroundings. The film’s silent visuals track the conversation from the ferry dock at one end of the island to Indian Reserve #9 at the far end. The visual record of travelling across the island grounds the conversation in real time and real space. Considered as a map, the cartographic film opens up potential for a rich narrative description of place, but it is limited to this directed narrative, and loses the overview feature of maps.
The Kinaesthetic Map

While many games offer a first-person view for exploring space, here I offer the example of two overview perspectives that more closely resemble a map view. In the 1970’s, a popular family game was the ball bearing maze. It consisted of a wooden box with a maze on the top plane that could be tilted along two dimensions. The player would make subtle changes in the tilt of the plane to guide a large ball bearing around holes and through the maze. As the ball teetered at the edge of a hole, a player often physically reacted with a full body balance correction. This correspondence between moving a proxy through a map and having a physical sensation of being in the map sets up powerful ways of experiencing map space. The game industry is built on this correspondence.

A contemporary version of the ball bearing maze is the Wii River Bubble game. The player uses a balance board interface and can make slight shifts in balance and tilt of the body to manoeuvre a character in an air bubble hovering over a river with sharp cliffs on either side. The balance board interface is in its introductory stage. The fun of learning how to use it takes much of the user’s attention. As a novel interface, kinaesthetic movement provides a new way of interacting with the computer screen, and at this point, engagement with interface may overshadow exploration of spatial content. Very popular among children, the kinaesthetic interface will likely have a significant impact on the generation now growing up with the technology, enabling complex exploration of spatial data as the technology develops.

The directed narrative of cinematic maps and the primacy of interface in kinaesthetic maps both created limitations for representing the type of space I was investigating. My research was pointing to time as a key factor in understanding how culture and environment shape the development of place. The importance of time was supported by the ecosystem model, and by
Aboriginal understandings of place. I needed to consider other representations of dynamic space that accounted for time. Manovich has pointed out that humans live in 4D space: the three dimensions of space, plus time (2006). Perhaps the way to map time with CG is through a representation of 4D space.

5.3.2 Other Approaches

One technique for depicting 4D space is time-lapse photography, which slows or speeds up time to reveal dynamic properties that are otherwise invisible. In film, time-lapse often uses a static camera to emphasize change that occurs over time in one spot. This potential for a dynamic view from a fixed vantage point makes time-lapse a promising technique for portraying time on a map.

As well as showing physical change over time, time-lapse reveals dynamic forces that are otherwise invisible. For example, our experience of weather is incremental. Now it is cloudy, now it is clear—glimpsed in passing from an office window. Sped up through time-lapse photography, weather flows over the city, flooding the built world like a vapour tsunami. This change in the time scale creates a dynamic pattern now visible as flow. Human activity also changes through the time-lapse lens. People become ants in a collective frenzy of purposeful group activity, cars pulse through streets energizing the arterial grid. Time-lapse is originally a photographic medium. For my purposes, I wanted to consider time-lapse as an animation technique applied to drawn elements in a 3D scene. I hoped that, on a historic timescale, time-lapse animation might offer insight into human embeddedness in the natural world.
Tilt-shift films

Tilt-shift films are a new hybrid form that combines bird’s eye view with time-lapse photography. Tilt-shift uses the same photographic process as time-lapse, but takes a different approach to composition and frame-rate that results in an emphasis on the specificities of place rather than the universalizing qualities of the time-lapse sensibility.

Perhaps because time-lapse photography often focuses directly on its subject, these compositions tend to extract the phenomenon from its context. Iconic time-lapse images—mist streaming under a bridge, crowds of people along a sidewalk, night-time streets filled with streaming car lights—are often shot with a telephoto lens to isolate the time-lapse movement.

Tilt-shift films, in contrast, often seem to be characterized by a bird’s eye view perspective that locates time-lapse movement in the wider context of place. This slightly different approach to composition reflects a different intent of the medium. The bird’s eye view sense of looking down on a tiny world is re-created.
in tilt-shift images that are processed with compositing software that simulates the properties of a macro wide-angle lens—the lens that is often used for photographing models (figure 21). The resulting footage looks very much like a miniature physical model, with the addition of real human activity and time-lapse clouds and shadows. It is difficult on first look to determine whether it is in fact a model; the illusion is heightened by having near objects out of focus, simulating the shallow depth of field of a macro lens. It is these foreground objects that help create a sense of place in the composition: the cornice of a building, the trees and lamp posts and roofs that frame a city view. A recent tilt-shift film on Ho Chi Min City (Miniature HCMC (Saigon), 2009) uses these compositional devices to create a portrait of the city that draws the viewer into a miniature world. An accordion soundtrack further emphasizes the low-tech toy-model context, engaging the viewer in a nostalgic portrayal of a well-functioning city.

Using the wide bird’s eye view perspective, tilt-shift films capture both the human activity in a city as well as the environmental flow of wind in the trees, clouds, light and shadow. This portrayal of cultural and environmental dynamics is made possible through a representation of time in bird’s eye view.

**The Ambient Map**

In mathematics, ambient space is the space surrounding a mathematical object. A line resides in a 2D ambient space, a cube in a 3D space. If humans, as Manovich suggests, reside in 4D space (2006), that ambient space contains the dimension of time, and helps locate objects within it, in time. An ambient map, therefore, could be a 4D map that uses ambient space to reveal a presence in time.

In video art and music, the term *ambient* characterises a style of engagement. Situating the artwork in the audience’s ambient awareness defines a particular relationship to the audience. Ambient video artist and theorist Jim Bizzocchi
describes ambient art as pleasing to have in background awareness, and through subtle change, able to engage attention at any moment (Bizzocchi, 2008).

In this project however, I use the term ambient to describe the representation of an ambient space within the work, as opposed to an audience relation. I use it in the sense of ambient air quality. That is, in the sense of an awareness of the quality of one’s surroundings.

Subtle animation helps distinguish an ambient CG scene from a static image. The root of the word animate is ‘to give life to’, from the Latin ‘anima’, or breath (Oxford University Press, 2000). A technique used in game design to create ambient space is the character rest-cycle animation. In early video games, this often consisted of a breathing animation, and was meant to show a character’s readiness to be interacted with. An ambient map might contain ecological breathing cycles, an environmental ebb and flow that would create a living presence in time.

Current advances in technology support a move from static to ambient space. 2D software is increasingly able to manipulate 3D objects. Adobe Illustrator and Flash have 3D drawing elements; and Photoshop CS5 can import a 3D model and light, texture and render it in a 2D environment. The additional capacity to incorporate 3D animation will blur the line between 2D and 3D, and between cinema and landscape as static representations start to breathe.

Technology advances in screen resolution may support further possibilities for creating ambient map space. Bizzocchi argues that advances in high-resolution screen technology will allow ambient video art to access some of the representational qualities of cinema. A higher resolution screen can portray spatial depth and detail, and support a pictorially rich image. “The incorporation of slow change, gradual transition, visual effects and metamorphosis will support still longer and closer examination [of the ambient image]” (Bizzocchi, 2008).
5.4 Findings

5.4.1 Summary of three affordances: Design considerations

The process of developing *Bird’s Eye Vancouver* helped me define a series of design parameters for the use of three CG affordances in the context of mapping.

To summarize, first the affordance for representation required finding an optimum level of detail. The National Park Service use of bird’s eye view maps supported an illustrated, pictorial approach, in contrast to the more common trajectory towards photorealism. Second, the affordance for defining orientation in 3D space benefited from the incorporation of multiple points of view to better approximate the experience of a space familiar to the viewer. In order to emphasize the environmental and cultural aspects of that space, the map should also go beyond a representation of physical objects to a portrayal of space-medium—hence a volumetric approach to space that activates the space around physical objects. Finally, to retain the map capability of overview, the third CG affordance of dynamic space would take a static camera approach that emphasizes key-framing the environment through time, rather than animating objects or cameras.

I have found that using CG to support the mapping of intangible properties of space requires that some of the foundational conventions in CG, including photorealism, Cartesian perspective and cinematic or kinaesthetic portrayals of space, must be re-thought for use in a cartographic context. My research suggests that a pictorial, volumetric and time-based approach to mapping through an ambient map form can support a representation of the living elements of space—the changing human and environmental qualities—that are usually invisible in maps.
I want to briefly outline three strategies I developed, inspired by traditions in visual art, that have relevance for the use of CG in mapping. The first concerns the use of narrative in the project and looks at the narrative contextualization of data. The second and third look at ways of disrupting the image frame to enhance the sense of perceived space that can be accessed through movement within a static image.

5.4.2 Narrative contextualization of data

This project has had a strong interpretive component, starting with its genesis in exploratory design, which takes an interpretive approach that is aligned with the humanities. Unlike the humanities, which have established interpretive forms such as the novel, information design and mapping have fewer obviously interpretive genres. Instead, they are primarily data-driven and have a responsibility for portraying that data accurately. In cases such as Bird’s Eye Vancouver where the data contain historical gaps that require interpretation, and where a significant and valuable portion of the data involve personal narrative, the question arises of how to indicate these varying degrees of interpretation within forms such as information visualization and mapping, which are regarded as precise and authoritative. I began with an approach inspired by the Rakuchu Rakugai screens.

The Rakuchu Rakugai screens offer a couple of possibilities for narrative contextualization of data. First, obscuring large parts of the image with clouds makes evident the work of the artist in choosing what to reveal and what to leave out. The screens depict cultural events that occurred several hundred years in the past. In blocking the field of view, the clouds help disturb expectations of a complete field of information, instead setting up a more narrative and episodic understanding of the past. A second way the screens contextualize their historic
data is through pictorial representation. The hand-drawn image bears the mark of the artist in a similar way that the novel is recognized as an interpretive act of an author.

I developed several approaches to narrative within the project. The first cultural animatic uses a voice-over description of an event and includes ambient sound and music from the event. This aligns the view with documentary filmmaking and clarifies the interpretive extent of the content through association with an established medium. It also gives the visual element an illustrative role that complements the descriptive quality of the view. In the first test of this view I included photographs of the event projected onto the darkened mountains, accompanying the voice-over. I found this photographic element somewhat at odds with the simplified pictorial map view. Further testing could find a balance between satisfying the descriptive promise of the documentary form and creating an integral pictorial form that can seamlessly contain photographic elements.

The Story animatic directly focuses on narrative, presenting personal stories contextualized in time and space. Pinning the stories to data points on the map suggests an accuracy in location of the stories both on the map and in time, while the portraits of the people and the verbal and written content are clearly more interpretive forms. This separation of qualitative and quantitative data is easily understood and is a fairly conventional use of mapping and narrative. This delineation of content could be useful as a navigational device for accessing greater narrative detail on the map. It could also act as a portal to move in and out of the map form to access other modes of representation such as video.

An interesting situation arose with the People animatic, which contrasts a narrative element with information visualization graphics. Unlike the other two views that contain an explicit narrative focus, this view juxtaposes three levels
of data interpretations. The first is a plotting of settlement over time that shows a small Aboriginal population rapidly overtaken by settlers. This is represented by large and small dots in colours that correlate with a second data marker, an ethnographic slider that shows proportional change of ethnic demographics over time. A third element brings in a narrative thread in the form of a voice-over of a Musqueam elder speaking of his relatives welcoming the first European explorers, as he is now welcoming Vancouverites to an event on Musqueam territory.

My intention was to show multiple ways of looking at a phenomenon, but I found it difficult to represent the quantitative component in a way that characterized the rough nature of the data. Initially I used clean circles to represent the population on the map, but this referenced the circles often used in trend analysis and quantity notation in visual analytics, and so I replaced the geometrically perfect shapes with irregular glowing dots that more closely resembled the intermittent dynamic quality of the data. I consider this small change an addition of a narrative cue. Motion has enormous potential for characterising notational shapes (Johansson, 1973). This was an attempt to characterize the nature of the data through its notational representation.

On a larger scale, the choice of medium of representation brings with it a set of viewer expectations and associations, which can be used to contextualize the content. While I actively searched for ways to frame the content through variations of form, I also considered the implications of framing the image.

In the process of sketching and modelling the 3D map, the issue of the image frame became an ongoing consideration. As I worked in the 3D software the frame mostly disappeared. Modelling requires a constant shifting of viewpoint to check the developing 3D form from different angles. It is common to reference the multiple view layout with its side, top, front and perspective windows, but much of the shaping occurs in a dynamic view that allows the modeller to
continually rotate the mesh. This movement creates an understanding of form that parallels our understanding of objects in the physical world. The process of rendering is very different from modelling. Rendering marks the return of the frame, fixing the object in a single camera view for two-dimensional viewing on a screen.

5.4.3 Summation of movement

Summation uses multiple points of view to collect views that are a product of movement in space. The CG camera view frames an image on a flat plane, as does the view created in classical perspective. Cezanne made a choice not to follow classical perspective in his painting *A Turn in the Road at la Roche-Guyon*, he chose to create a different sense of space that incorporates multiple vantage points. As I thought about Heelan’s comparison of a photograph to the view in Cezanne’s painting, I imagined riding a bicycle along that country road, and the disappointment of having only the photograph as a record of the experience. The painting is a much more satisfying depiction of a place because it captures a dynamic sense of the elements—the immediacy of the curve of the road, the upcoming village in the valley, the steep hills in the background. It is as if the photograph captures only one frame in a movie, whereas the painting is a summation of movement through space. This approach challenges the singular frame of linear perspective, while still presenting an image within the confines of a material frame.

The Kangxi scroll discussed earlier is a form that departs from the physical frame of the 2D image by taking the material form of a 72’ scroll. Here the artist Wang Hui uses a mobile vantage point to create a sequence of views that describe an experience of space. As the viewer physically scrolls through the image, Wang Hui draws the viewer’s attention along the winding river, across bridges and through village streets using multiple shifting vantage points.
While my sketches incorporated some of the multiple and contradictory vantage points that are used so effectively by Cezanne and Wang Hui, it was difficult to incorporate a summation of views into the 3D map model. An early view paralleled the hyperbolic model of space by compositing a compressed middle ground with a flattened background. It avoided distortion in the foreground by remaining at a distance from False Creek and thereby not including the near-distance. This view did not work because it was too far removed from the central subject of False Creek. When I tried to create a closer view in a rough composite (figure 22) I ran into problems of distortion and incompatibilities between vantage points. In another attempt, I used a 10mm lens simulation in the rendering software to fill the foreground with the breadth of False Creek (figure 23). This allowed a closer approximation of the hyperbolic model, but created excessive fish-eye distortion in the foreground. To address this in future, I would model each part of the foreground, middle ground and background individually using the hyperbolic model of space as a guide. This would build-in specific distortions, and would avoid the blanket distortions of a simulated camera lens.

Figure 22 Composite of views, digital.
Sequencing vantage points

Sequencing uses a mobile vantage point to draw the viewer’s eye through the space of the image. In an early motion test, I looked at possibilities for sequencing a mobile focal point by animating a canoe along the creek (see appendix 1). In order to maintain a close up view, I had to shift the camera angle several times. The motion test showed that it was possible to maintain a sense of orientation across these camera angles to track a moving focal point. This essentially set up a montage of views using cinematic conventions. In the context of an interactive map, however, this use of sequencing created problems. In creating a linear flow pictorially, going back in time meant one visually paddled backwards up the creek. My intention was to create a sense of presence in time that could flow interactively into either past or future. So, instead of sequencing a series of mobile vantage points, I sequenced vantage points in time. My intention was to create a presence in time by key-framing the environment.

Figure 23  Distortion of 10 mm lens simulation in software.
Hyperbolic characters in a hyperbolic world

Classical animators developed techniques of visual distortion, including squash and stretch, and anticipation, to amplify the lifelike qualities of movement. These hyperbolic distortions have been well received in the world of CG character animation, where software now provides programmatic support for techniques such as ease-in and out. Similar perceptual distortions of the classically animated background environments found in Disney cell animation, have not crossed over to the same degree. Key-framing the environment on a CG map brings possibilities for creating a living space that is ready to move forward or backward in time.
CHAPTER 6 CONCLUSION

6.1 Developing the ambient map form: a detailed description

In this section, I provide a detailed description of how the components tested in animatics might be integrated in a future iteration. The bird’s eye view animatics, the hyperbolic space model and the concept of orchestrating space, text, research and art, all come together in the ambient map form. At first glance, the map would look like a bird’s eye view map of False Creek, a body of water prominent in the foreground, a compressed cityscape in the middle ground and a flattened wall of mountains to mark the finite space of the hyperbolic model. Breezes cross the surface of the water, clouds pass overhead and boats drift across the inlet. At the touch of a slider, the viewer moves the map forward or backward in time. The slider has a responsive feel so that large time periods can be scrolled through easily, along with the corresponding visual changes. The slider stops with a pull of gravity and returns the map to the slow change mode of ambient presence. If left alone, the map would slowly cycle through its 150 years over a 10-minute period. The slider allows a fine scrolling through time to enable the viewer to see pictorial changes and examine data sets that can be selectively layered over the pictorial map. Viewers can choose among a variety of data sets such as population growth and distribution, land claims and transactions, Aboriginal settlement patterns, commoditization of land and resource, air quality, land use, flow of water and waste—all animated over time. These data layers can be played individually at pre-set speeds with linked audio tracks, or they can be layered together in different configurations, played back at one speed to show interactions between conceptual and physical elements such as legislation/land use/pollution. The map returns to its ambient state at whatever point in time the slider is left at. The ambient state emphasizes ecosystem dynamics and
the continuity of the natural environment, even as the infrastructure changes dramatically over the sped-up viewing. Ambient air quality changes with industry, causing the screen to be occasionally obscured by fog or smoke. The notation for data sets reflects the character of the data. The more precise and quantitative data is portrayed with clean lines and shapes, while the more ambiguous or spotty historical data has a corresponding fuzziness of representation.

6.2 Future Work

I will discuss the potential for future work in terms of design, technical and project development. I look at new contexts, technology advances, and ways of extending process to include multi-disciplinary teams.

6.2.1 Design Development

The ambient map form has potential for greater use within a narrative media context. A recent PBS series, Saving the Bay, took a multifaceted approach to portraying a subject with historic parallels to Bird’s Eye Vancouver. Focusing on the San Francisco Bay, the series looked at a similar 150-year period when the fast pace of urban development transformed the bay into a polluted eyesore, and the subsequent attempts to recognize the ecological and cultural value of the bay. The series used maps as reference points and included one animated map that showed the projected effects of bay infill. If a similar production were to be created on the history of False Creek, greater integration of an animated map could provide a consistent view of the historic change, depicting the arrival of explorer ships, the rejected development plans, and other events on False Creek without photographic record. The history of False Creek informs a contemporary understanding of the city, from its presence in international planning discourse, to its current ranking as the most liveable city in the world, and its unresolved land
claims issues. The ambient map could integrate with, and enhance, other media forms through development of its narrative elements.

An immediate differentiation of this project is in how it looks. The simplified pictorial representation takes cues from the flatness of Japanese prints and from the clean diagrammatic information design graphics of the New York Times via Edward Tufte. I would like to develop this aesthetic to offer an alternative to the technology-driven progression towards greater photo-realism. The ambient map has to portray multiple visual layers of data, and requires a quieter ground. Information design often involves a paring down of photographic detail in order to carry a different kind of data load (Ware, 2004). I would like to develop the quality of ambient animation in this project to extend the flat illustration aesthetic with subtle vector animation.

### 6.2.2 Technical Development

**Interactive features**

A valuable complement to the ambient aspect of an information design display is the ability to seamlessly move into interactive control over the pacing and selection of information. A future implementation would be the addition of touch screen controls to control the passage of time, and to select a point in time to delve into in greater depth. As well, through this interface one could access extended audio in the form of stories and interviews.

**Return to 3D**

While I ended up creating a hybrid 2D/3D form, there is an advantage to trying to re-create the model (with its distortions) entirely in 3D. The current iteration is an amalgamation of 2D and 3D elements—a fully 3D version would allow more people to work on it by standardizing assets and processes. This would also aid
in its portability to other platforms and the ability to depict other cities. A challenge would be to develop a way to portray hyperbolic space in a Cartesian modelling environment.

**Linked to GIS**

Dan Campbell at the City of Vancouver suggests that the next technical leap for the city’s 3D model is integration into GIS, so that the model would be fully indexed to location data (Campbell, 2009). If the ambient map is rebuilt in 3D, a further link to geo-spatial referencing would allow access to municipal databases. This will increase the capacity for the ambient map to be used as an urban information design tool. Access to data that can then be situated in a design environment which is conducive to presenting data, could enable the ambient map to become an effective communication tool.

**User content**

Another valuable feature would be the capacity for adding new content, perhaps in an on-line version. Because of the community orientation of the work and the treatment of personal narrative as historic data, public input would likely enrich the project considerably.

**6.2.3 Project Development**

**Public contexts**

Future work would involve developing public contexts for the map. Information screens are beginning to appear in public spaces such as train stations and on board ferries. These screens include advertising and logistical information. Perhaps there could also be a screen-saver mode that would display a local ambient map, serving visitor curiosity for local surroundings as well as engaging
the waiting passenger. Screens in lobbies and community centres could serve people lingering in public meeting spots, taking advantage of the ambient capacity for optional lengths of engagement.

**Classrooms**

The ambient map could be readily modified for use in classroom electronic screens. Content for the *Smart Board* is now being developed for use in schools across the US. The ambient map could have additional grade and curriculum-specific audio. The 3D pictorial basis of the map might be conducive to an educational setting where a technical drawing or more abstract representation might limit access by younger age groups.

**Other cities**

A test of the viability of the form would be to develop ambient maps for other cities. New features might arise in response to other histories and locations. The focus could be on the urban shore as a border zone of heightened activity and exchange between cultural and environmental forces, or the focus could shift to the neighbourhood as a historic unit of a city. It could look at the development of the neighbourhood in the context of its evolution from a natural landscape to a built environment, as well as the social and demographic changes.

**Development teams**

Future iterations would benefit from multi-disciplinary support teams. An ideal team would consist of an artist, information designer, programmer, urban planner, historian and Aboriginal representative. A more ethnographic approach towards data collection could include community workshops and calls for personal narratives.
6.2.4 Final word

Affordances for pictorial, volumetric and dynamic maps offer new cartographic resources to the field of urban planning. A recent air quality study in Vancouver tracked automobile pollutants through neighbourhoods in a study of how the built world influences health (Marshall, Brauer, & Frank, 2009). The authors used static 2D maps, but described a need for ways of portraying temporal variability and change over time. Bringing the affordances of CG to mapping draws on visual traditions in film, graphic design, information design, painting and animation. As urban planners face global ecological challenges, this new mapping will support a greater understanding of the elements of place that shape a sustainable approach to urban design.
APPENDIX A: DEVELOPMENT AND CONTEXT

Context: A map of the urban shore

The City of Vancouver is situated on a sheltered inlet of the Pacific Ocean, on the north side of the Fraser River delta. The city grew up around False Creek, a small inlet that bounds the downtown core on its north shore, marks the western terminus of the CPR at its end, and edges the city’s wealthy residential neighbourhoods on its south shore. False Creek is an iconic feature of the city that has embodied the city’s changing image over the last several decades as large parcels of its land were developed in very different political eras.

The first post-industrial use of False Creek lands was the development of housing co-ops near Granville Island in the 1970’s. The burgeoning co-op and environmental movements, as well as a progressive city council and collapse of the real estate market in 1982 enabled the large-scale experiment in federal housing development. In the late 1980’s after Expo ’86 most of the north shore of the inlet was sold to a single Hong Kong developer (Chau, 2008). The decision to move towards the Hong Kong model of high density high profit housing resulted in a wall of condominium towers along the inlet’s north shore.

In the industrial period, the soft mud shores were held by the federal and provincial governments and the CPR, later creating a blank slate for large-scale development projects when industry was relocated. The shores of False Creek have thus been able to reflect Vancouver’s changing identity as a city as new developments were created in the image of the times. Vancouver was known as ‘Terminal City’ in the 1890’s after the CPR established their cross-country terminus station at the end of False Creek (McDonald, 1996). After Expo ’86, the Hong Kong style development of the north side shaped Vancouver’s identity as a Pacific Rim city (Lowry & McCann, 2010). The latest incarnation of Vancouver
as a Green city, is evidenced in the marketing of the ‘ sustainable’ Olympic Village of southeast False Creek. By 2002, city planners had set their eyes on this last remaining parcel of industrial land. It was envisioned as a sustainable village pioneering new technology for carbon neutral living, sharing some of the community ideals and mix of incomes of the Granville Island co-ops, but at a slightly higher density. When Vancouver won the bid for the 2010 Olympics, the focus of the project shifted towards luxury condos priced for the coming world spotlight.

**Development Sketches**

![Development Sketches](image)

**Figure 24** Sketches for a narrative approach that follows boats from different time periods up and down False Creek. This uses montage of different camera views, and so loses the overview aspect of maps. It has an advantage of being large-scale and showing human activity more easily.
Figure 25  Map vs. film approach: moves towards overview and away from montage. One consistent wide shot is divided into three sections, and uses dissolve to lessen the impact of change of point of view. This is to make it a more continuous view, a slight turn of the head as opposed to cutting to a new angle.
Figure 26  Five Views of False Creek, an iteration that divides up the linear narrative into five themes: People, Story, Land, Biosphere and Culture. Linear narrative was constricting as it did not allow backwards movement in time without having images reverse through space (ie. a backward moving canoe.)
Figure 27  Development of Five Views of False Creek. The views use formal qualities of pattern, (people), line (industry/infrastructure), positive and negative space (biosphere), shape (land use) and all four combined (culture). Positive and negative space would have explored negative space by lighting the underwater zone and activating the sky with cloud and shadow and passage of the sun.
Figure 28  A series of sketches that test different viewpoints and scales.
Figure 29  Beginning of analysis of multiple points of view.
APPENDIX B: ELECTRONIC FILES

Electronic files listed below and appended as supplemental files or as a CD, form part of this work under the copyright of this author.

Videos may be opened in standard video software available on most computers.

Quick Time Videos:

Animatic 1  CultureLanterns.mov  17 MB
Animatic 1a  CultureNotation.mov 16.7 MB
Animatic 2  Story.mov  19 MB
Animatic 3  Land.mov 18.6 MB
Animatic 4  Biosphere.mov  43.2 MB

Note: This animatic is meant to be accompanied by audio from a YouTube video uploaded by office workers on False Creek when they spotted a grey whale in the water in front of their lunch room. This video can be found here: nromick (Uploaded by). (2010, May 5). Whale in False Creek 2. [YouTube video]. Vancouver, B.C.: You Tube. Retrieved from http://www.youtube.com/watch?v=A6HIDqczQYU.

Animatic 5  People.mov  19 MB

Note: This animatic is meant to be accompanied by audio from a YouTube video, featuring a conference welcome from Musqueam Elder Larry Grant who first greets the audience in the Musqueam language and then in English.

The audio excerpt can be found here, and begins at 1:13.
BIBLIOGRAPHY


doi:10.1177/1746847706065839


