Building Education in the North

Where Lies the Architectural Border Between Cultural Memory & Oblivion?

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for Tomasz, Marianna, Amie and Emerson.

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Abstract

This thesis aims to make a connection between the built environment relative to its occupants and argue that a disenfranchised group can achieve cultural agency based on their willingness to adapt a global technology as a tool for cultural preservation through architecture. Such groups would thus never actually be engulfed by globalization but rather use its principles for the preservation of their traditional knowledge. In the context of architecture as a means of cultural production, this thesis will examine architecture as an agent of change within Canada's northern community of Iqaluit. Specifically, the archetype of a post-secondary institution (university) possessing the ability to increase research capacity in the North, expand employment opportunities, provide space for critical development, and act as economic and cultural engine will be discussed. This thesis will also survey the existing conditions of other circumpolar countries and initiatives at establishing university campuses.

Memory and Oblivion - The Architect's Role in Creating Cultural Change

How can architects 'read' other cultural traditions and ways of life such that they create forms that are respectful of the roots from which they evolved? The difficulty is perhaps even more confounded, as an architect's education is typically focused on modernist methodologies. An architect's education rarely encompasses the building traditions of a small, disenfranchised group unless personal interests are invested. Thereby, the architect is forced to translate traditional techniques within the context of modernist technology. Often this can lead to devastating results, such as with Inuit housing, but there have also been extremely successful projects such as Renzo Piano's Tjibaou Centre for the people of New Caledonia. How does one find the balance between tradition and modernity? Is it possible and when is it appropriate? Where does the architectural border between memory and oblivion exist?

Figure 1 Jean Marie Tjibaou Cultural Center Renzo Piano (1998)

Architects are constantly tangled in a web of politics and social change. How can architects free themselves from the institutions and political powers that preside over them? How can architects operate responsibly for clients and make them visible in the modern world? An idealized answer by the twentieth-century philosopher, Michel Foucault suggests that architecture can “produce positive effects when liberating intentions of the architect coincide with the real practice of people in the exercise of their freedom” (Dovey 192). In reality, architecture has little ability to change the world in such significant and efficient ways as might legislature in politics. Thus, does architecture need to be backed by an institution or deterministic system that initially sponsored it? This can often be a very frustrating and confusing notion to students and professionals, resulting in resorting back to traditional models of practice whereby the architect serves the institution, not the people it attempts to empower. Although these traditional models can often become deterrents, it is nonetheless the context in which architects practice. As identified by geographer David Harvey (Findley 35), one of the four tools that an architect possess is the ability to work within a network of power and information. The other equally important three tools are an explicitly spatial and physical cultural practice, imagination coupled with effective techniques for envisioning alternative futures, and actual spatial and physical action to create, move and alter space. Therefore, in the context that architectural practice resides in, these four tools liberate architecture within its own discipline and its relationship with society, giving it a cultural agency. In order to use this cultural agency, one must know these limitations and be able to operate effectively inside of them. This is where the power of architecture to produce change has possibility.

"One always speaks of traditional culture. But what is traditional? It is how others lived before us. But in one hundred years it will be how we are living today that is traditional, and in one thousand years, what we are living today will perhaps be worth its weight in gold! I believe we always have an overly archaeological conception of culture; the culture of the past is considered authentic, but that which is of contemporary creation must be proven authentic perhaps by time" (Findley 65).

Jean-Marie Tjibaou¹

¹ During the 1970s, he undertook a thesis in ethnology at the Sorbonne. While he did not complete his studies, he became engaged in cultural and ethnicity issues on New Caledonia. Jean-Marie Tjibaou became the leader of the Kanak independence movement. The son of a tribal chief, Tjibaou was ordained a priest but abandoned his religious vocation for a life in political activism.

An architect is always met with a challenge when asked to design for a group of people of whom the/she often knows nothing of. Interpretation is best achieved when cultural experts such as anthropologists or people from the community are consulted (Ip Tang 57). As understanding the values and traditions that govern a group of people can sometimes take a lifetime, it is more suitable, realistic, and respectful to work with people who can speak on behalf of that specific group and who are typically more familiar with their values. Throughout the duration of this thesis, correspondence with groups such as Inuit Tapiriit Kanatami (ITK)², The Arctic College in Iqaluit, and residents of Iqaluit have been extremely helpful in providing insightful information and testaments of their lives otherwise not available through published works such as books or journals. Self-publishing websites and blogs are a digital portal to the lives of these people where conversations and entries regarding daily life can be easily accessed. As an outsider, one can gain a great deal of insight probing into such resources for knowledge. It can be seen as a digital anthropology that anyone with access to the internet can experience.

When Renzo Piano was asked to design the Jean-Marie Tjibaou Centre for the people of New Caledonia, he drew upon the cultural expert Alban Bensa. Although Bensa was not a Kanak himself, he was well aware of their practices. Bensa was able to

² Inuit Tapiriit Kanatami (ITK) is the national Inuit organization in Canada, representing four Inuit regions – Nunatsiavut (Labrador), Nunavik (northern Quebec), Nunavut, and the Inuvialuit Settlement Region in the Northwest Territories

provide Piano with traditional knowledge regarding building techniques, village planning schemes and symbolism that might otherwise have been overlooked or misinterpreted. In fact, the majority of the Kanak cultural practices survive today due to the work of Maurice Leenhardt (Clifford), a missionary-turned anthropologist during the early twentieth century (Findley 64). The same can be said of the Inuit. A missionary named Edmund James Peck is known for his dictionary '*Eskimo Grammar*' (1919) written in the Inuit language of Inuktitut (Canada web source). Diamond Jenness's anthropological studies of the Inuit in Canada and abroad are a rich resource of stories and to understand traditional practices (Collignon 26). This translation by others who operate between Western science and an aboriginal culture bridges the gap, putting into context highly complicated cultures subsequently it allows them to be presented to professionals such as architects, doctors, engineers and policy makers in a manner that is legible.

Often groups deemed 'third world' do not possess resources that can support large infrastructure. Building typologies such as hospitals, libraries, airports, government offices and universities simply do not exist, and often local building materials cannot support such vast projects. This is obviously not the fault of the group, as their methods of medical care, education, travel and preservation of knowledge did not require such institutionalization. But within a global culture such archetypes, unnecessary in pre colonial times, are slowly finding their way into many parts of the world. Therefore synthesis of traditional building technique and modern typologies becomes difficult. Scale, substitution of materiality, labour forces and symbolism are major considerations.

Scale becomes an issue when the programmatic requirements outgrow material capabilities. Often the programmatic requirements become very complicated and require a building that is beyond the structural scale of available local material or skilled labour. In the context of Canada's North, the only archetype that was needed formerly by the Inuit was the dwelling. The home often served as a place for gathering, teaching, educating and living. Since groups of people banded in small numbers, large structures were unnecessary (Collignon 37). Most education was delivered directly on the land and involved survival techniques and the ability to predict conditions based on natural phenomena. Also, due to the harsh tundra environment, building material was scarce. Often drift wood or whale bones could be found and used to construct their spring and summer homes. When a family had to relocate, they would often bring crucial building elements with them in order to save time scavenging for new ones at the new site. The scale of material consisted of what one person could carry. This was also reflected in their modes of transportation. Their canoes were typically very light and could be carried by one person over land when necessary. As well, dog sleds had an optimal capacity in that they could be pulled without sacrificing too much energy and speed (Collignon 35). The Inuit's entire lifestyle was in fine-tuned harmony with their surroundings.

Currently, the majority of building materials need to be transported into Canada's northern communities either by ship or air. As climatic conditions worsen in the winter months, shipping can completely halt until safer conditions present themselves. This can last for weeks or months at a time, therefore careful planning of construction logistics is necessary. The scale of cargo is also

limited due to ship size and capacity. Often wood is the preferred choice of material because it can be easily modified on site in case of factory error, whereas steel requires special tools and skilled labourers such as welders. The limitations of wood and even engineered wood often dictate the size of the building and this factor has to be considered immediately from the conceptual stages of the project. This is a traditional method of approaching design and building, humans have always derived their architecture based on natural materials such as stone, wood, and earth. It was not until the industrial age that we were set free from the immediate restraints of materiality through industrial production.

Modern architecture attempts to manipulate every material through an industrialized process. Le Corbusier (Villa Savoye) and Mies Van Der Rohe's later work (Farnsworth House) are merely two modernist projects that focused to highlight the industrial processes. The modernist approach – referring to Western archetypes, although seemingly impractical when paired with the building traditions of the Inuit, becomes necessary in today's evolving global context in order to facilitate the same opportunity for proper health care, education, self governance and to achieve a 'Northern' architecture. One might argue that maintaining these original building traditions is important and that it is unethical for Western society to interfere with these traditions. If current deterministic systems such as LEED (Leadership in Energy and Environmental Design) that encourages a critical regionalist approach to architecture are examined, one will see that these contemporary guidelines and theories are a derivative of traditional values. LEED encourages the use of local materiality, labour and designing for maximum energy efficiency. In fact they are nothing

more than the application of age-old principles of traditional building practices that modernist architecture replaced early in the twentieth century with technological resolutions to passive problems of, as an example, heating and cooling. Designing with solar and wind orientation and using local sustainable materials and practices are constantly used in less developed areas of the world. Therefore, instead of mimicking traditional forms or using folkloric reference, it becomes more important to design using climatic and geographic data as it is embodies the traditional culture of its region.

The Paradox of Modernization

Canada's northern communities have often been used as 'flag poles' over political clashes over the reinstatement of Arctic sovereignty rights that have surfaced due to potential economic gain from resource exploration. The Inuit people are in the middle of these clashes as it is their land that is constantly being probed for new economic opportunities. Although they are a group of people pre-dating colonial expansion, they have just recently been recognized in Canada. With recent agreements to Land Claims the Inuit are in a favourable position to establish land use policies. However, unfortunately, their communities are often compared to third world countries, and are plagued with social, physical and economic problems, preventing them from focusing on larger scale issues such as attaining self-governance. ITK has been presiding over Inuit interests until a permanent elected government can be instated. Health and education are among the major concerns of ITK as they are the most needed in the communities. If Canada wants to establish Arctic sovereignty, it must provide equal accessibility to healthcare and education nationwide. These gaps in modernization are a scar on Canada's history, however, this is not only a Canadian problem but rather a larger global issue for indigenous people in post-colonial³ areas. Paul Ricoeur, a prominent French philosopher of the end of the twentieth century, asked a question regarding the effects of modernization on underdeveloped nations and whether it can be accomplished without sacrificing cultural identity.

³ Post colonial refers to areas affected by the colonial expansion of Europe during the 15th and 16th century

"It seems as if mankind, by approaching en masse a basic consumer culture, were also stopped en masse at a sub-cultural level. Thus, we come to the crucial problem confronting nations just rising from underdevelopment. In order to get on the road toward modernization it is necessary to jettison the old cultural past which has been the *raison d'être* of a nation? Whence the paradox: on the one hand, it has to root itself in the soil of its past, forge a national spirit, and unfurl, the spiritual and cultural re-vindication before the colonialist's personality. But in order to take part in modern civilization, it is necessary at the same time to take part in scientific, technical, and political rationality, something which very often requires the pure and simple abandon of a whole cultural past. It is a fact: every culture cannot sustain and absorb the shock of modern civilization. There is the paradox: how to become modern and to return to sources, how to revive an old, dormant civilization and take part in universal civilization" (Frampton 78)

Ricoeur's rhetoric challenges the notion of whether a culture must lose its identity in order to partake in modernization. This paradox was one that, unfortunately, was experienced by the Inuit in the early part of the twentieth century. Attempts to rectify it have been minimal, typically taking place only if political and economic benefits presented themselves to the federal and provincial governments and corporations.

The '*raison d'être*' referred to by Ricoeur translates to 'reasons for existence,' as a product of culture. The definition that best relates to architecture and that is in succession with the phenomenological thinker Ricoeur was by Martin Heidegger (Frampton 78). Although Heidegger does not actually use the word architecture to describe the process or result that is inherent in its contemporary definition, he relies on the word 'structure,' as its etymology is closer to the act of building or, rather, putting together. Several important characteristics of a good building were pointed out and defined by Heidegger:

"He (Heidegger) believed that building was set out around human presence, configured by it but also configuring the activities of that presence over time. At best, structure was built by its inhabitants according to their needs and configured and reconfigured through the ways in which they dwelt. The inhabitants' lives, in turn, were configured by the building. To him, the very fact of a building also stood for human presence. For Heidegger, a building was built according to specifics of place and inhabitants, shaped by its physical and human topography. It was also built from the fruits of the earth: stone; timber; and metals...less about the abstract objects than located the individuals. And the form of a building could report the ethos of those individuals. Its details could be read for their aspirations and ideals. Moreover, the figure of a building dealt in presences and absences; as well as demonstrating the presence of an inhabitant, it could also show their absence" (Sharr 9).

Figure 2 Three categories of cultural production

If one examines closely Heidegger's characteristics of what good building is, he refers to three important categories, art/crafts, geography and beliefs. Although he does not specifically list the terms, he alludes to each one. The arts and crafts are physical objects produced such as tools and artwork, but are not limited to modes of communication as they are a structured system. Geography is the location, environment and available resources. Beliefs refer to religion, mythology and superstitions. Each of these, when combined with an adjacent characteristic, produce three more categories, identity, regionalism and origin.

Identity is the ability of one group or culture to distinguish itself from another.

Origin is the history or place that a group might associate itself with, while

regionalism defines the characteristic or set of features commonly reoccurring in their everyday life as a result of the climate and geography. The last tier, cultural production, is the product of the previous three and it is central. The ability to participate in cultural production is equivalent to having cultural agency. From the definition by Doris Sommer, cultural agency (Godenzzi 328)⁴, as the

⁴ "As an intervention that seeks to promote, legitimate and energize certain practices in the interest of reinforcing democratic life as an act not derived from a fixed program but created from within the situation in which it intervenes." Doris Sommer – Cultural Agency within the Americas Pg 328

Isaac and Susan Aglukark who have successfully fused southern creative traditions with their Inuit heritage to produce a new genre. This blending of cultures is a testament to the progress of Inuit storytelling and affirms that traditional myths and storytelling are well and alive in the Inuit culture.

Other hybrids of representation in Inuit art often use modern media to show traditional scenes of everyday life and mythology. Janet Kigusiuq (The Centre for Contemporary Canadian Art web source) **Figure 3** Janet Kigusiuq) and Simon Tookoome (**Figure 4** Simon Tookoome) (The Centre for Contemporary Canadian Art web source) present examples of the use of Western media to depict both everyday life and mythology. Similar to the trend in literature and music mentioned above, many artists are helping to maintain traditional knowledge and storytelling. This modernization of Inuit art has made it accessible to other cultures and is spreading awareness of Inuit social, political and climate issues. It can be seen as a method of positive cultural propaganda. The exploration with new media in the arts displays the willingness to continue cultural production and should not be limited to any other facet of their culture, otherwise it would be taking away the cultural agency of the Inuit (The Centre for Contemporary Canadian Art).

Figure 3 Janet Kigusiug

Figure 4 Simon Tookoome

Cultural agency carries with it a responsibility for the three categories arts/crafts, beliefs and geography, thus, it is perhaps suitable that there is a reciprocal relationship that needs to be nurtured through the exchange and passing of knowledge. Unfortunately, Canada is disempowered because of the connection between traditional Inuit knowledge and science in the northern context is absent.

During the earlier part of the twentieth century, Inuit were encouraged and at times forced to settle in communities that were poorly equipped in terms of infrastructure. Schools, houses, stores, hospitals and places of work were poorly built due to the lack of basic funds as well as irrelevant construction techniques that did not properly address the northern climate and Inuit culture. Also, as funding was minimal it was therefore difficult to attract properly trained personnel such as doctors and teachers. This form of irresponsible modernization never addressed or recognized traditional Inuit wisdom in regards to shelter, knowledge and community. Culturally appropriate design was omitted in favour of utilitarian and inexpensive solutions. The risk and fear of losing identity and agency is perhaps why indigenous cultures often resist change. Unlike other aboriginal cultures, Canada's Inuit were not affected by post colonialism until the early twentieth century. This was due to the fact that the harsh climate they lived in had no or little value to Southerners at the time.

“The act of replacing tradition with modernization is perhaps the pitfall of the entire process of modernization. What may appear modern today will become tradition tomorrow. It is not an abrupt change but one that happens over time, although time may be one generation or several. What is happening in fact is better understood as ‘modernized tradition’ (Dahl 8).

Modernized tradition does not completely abolish a culture through appropriation but rather builds on current techniques, allowing members to “adopt innovations and use them for cultural development”⁶ and production, thus furthering cultural agency. The Inuit to this day still hunt seal, whales, caribou, as well as exchange game and gather as a community during specific seasons when going out on the land. The traditional ways of life today are accomplished with southern mechanized devices such as snowmobiles, rifles, store-bought tents and down-filled jackets. This does not mean that the Inuit have turned their backs on their ancestral roots, but rather there has been an inevitable evolution of a culture and its practices. Every culture, if left on its own, evolves or borrows and develops new technologies and methods of living. The development of the bow and arrow at one point in prehistory is the equivalent of the discovery of gun cotton. In fact, certain technological developments can occur simultaneously in different parts of the world without any knowledge of each other's existence.

Many critics have argued that technology destroys the traditional and social relation of a culture, as seen within a modern southern context in social networking such as Facebook, Twitter or email. These social media sites are often cited as a means to avoid direct human contact. This is true in that we live in such dense cities and environments that personal space is hard to come by

⁶ Dahl pg 8

and at times our identities become blurred. But in the context of the North, social media has in fact opened up and connected communications with the North and the South. They have enlarged and have included remote communities in the global dialogue, allowing the exchange of information to be accelerated. Social media in the North is actually performing as intended, bringing people closer, not distancing or isolating them (Dahl 39). Television stations, radio stations and web pages by the Inuit and other Northern residents have been instrumental in attracting attention to the issues the people are facing. These modes of communication allow the exchange of digital data, interviews and dialogue to occur over distances of 2000 kilometers. Digital accessibility is therefore vital to the existence of these communities. This is not related to the so called addiction to technology that Southerners have, rather, it becomes a lifeline for families and industry to maintain operations and partnerships.

Similarly, a phenomenon of accessibility has occurred architecturally in other remote, but developed parts of the world. Architecture has been used to attract attention to groups of people who might otherwise remain obscure. Perhaps the best urban example is Dubai. Instantaneous development and modernization has propelled and ultimately changed the country's economic status and its people globally. Dubai is now a thriving international centre for tourism, real estate and financial services. However, through its modernization one fundamental mistake in regards to cultural preservation occurred. Few records in regards to cultural history of the United Arab Emirates or its constituent emirates exist due to the fact that oral traditions, myth and folklore were not catalogued. This condition, a result of rapid modernization, has occurred globally amongst other aboriginal people. The people of

New Caledonia⁷ had faced the same problem during French rule but, as will be discussed later on, some traditional knowledge was documented by missionaries that today is the key to contemporary Kanak culture. The challenge with modernization is that it often happens too quickly and is a result of force rather than evolution. In order to implement change effectively, it must occur without debilitating friction between the two societies. Letting the less mainstreamed culture choose what it would like to appropriate will achieve a more natural evolution. If the traditional values of the less mainstreamed culture were to be altered too rapidly, than a feeling of remorse towards the more mainstreamed culture could arise.

⁷ The indigenous people of New Caledonia are known as the Kanak

The Existing Conditions of the Inuit People

Who are the Inuit

The term Inuit translates to “the people” in Inuktitut. Inuit are a culturally similar group of inhabitants in the Arctic regions of Greenland, Russia (Siberia), the United States (Alaska) and Canada (Northwest Territories, Nunatsiavut, Nunavik, Nunavut, Inuvialuit) (Inuit Circumpolar Council - Canada web source). The Inuit are descendants of the Thule people, who are believed to have emigrated from western Alaska around 1000 AD, slowly spreading eastwards and displacing the Dorset⁸ culture (Maxwell 250-262). Although related to the Alaskan Eskimo and the Yupik, the term ‘Eskimo’ is not used in Canada and is considered pejorative; the term Inuit is used instead.

As of 1982, the Constitution Act recognized the Inuit as a distinctive group of Canadian aboriginals, setting them apart from the First Nations and Métis; however, unlike other aboriginal groups in Canada, the Inuit still pay taxes. Although the Nunavut Land Claims Agreement allocated land to the Inuit, thus creating their four regions, each region is managed by a crown corporation responsible for the administration of funds. The four regions (Nunangat) that the Inuit reside in Canada account for to 2,970,168

⁸ The Dorset culture existed pre-Inuit and lived in the high Arctic mostly off of sea mammals. They are believed to have been decedents of Greenlandic origin but this remains disputed. The distinction between the Dorset and Inuit was made by Diamond Jenness in 1925. The major difference between the Inuit and Dorset are in the methods of producing tools, as the Dorset lacked bow drills thus all tools had slotted grooves as opposed to circular ones commonly found in Inuit tools. (Maxwell 176)

square kilometres of land, this is nearly 30% of Canada's total land mass and 50% of the coast line (Inuit Tapiriit Kanatami web source) Today there are approximately 51,000 (Inuit Tapiriit Kanatami web source) Inuit living in Canada, the majority living in Nunavut Although the Inuit population is tiny in comparison to the national population (34,278,406) (Government of Canada web source), it is the fastest-growing In 2006 a reported 26% growth in population was recorded As well, the Inuit population is the youngest with 35% under age of 15 (2006) in comparison to 18% nationally This thesis will focus on Canada's Inuit living in Nunangat (a term that denotes land, water, and ice) (Inuit Tapiriit Kanatami web source) and their geography The idea of the Inuit considering the ice as extension of the land has become a recent backbone for Canada's claim to Arctic sovereignty

Contemporary Issues of Canada's Inuit

The social, health and economic conditions that currently exist in Canada's Northern Inuit communities are comparable to those of third world nations. The contributing factors that have led to these conditions are poor government housing policies, neglect and mistreatment of the Inuit by federal housing and education policies, and imposed relocation programs. Testament to this mistreatment has been evident in the Canadian government's apologies for failed programs such as the residential schools that tore Inuit families apart in an effort to westernize aboriginal children (O'Hara and Treble web source). These practices have left many generations wounded from exposure to uncomfortable living conditions apart from their families, physical and sexual abuse and emotional trauma. The earlier part of this century witnessed Canada's attempts to assert Arctic sovereignty over post-World War II Russia. Inuit families were displaced to extremely remote northern parts of the Arctic without proper supplies and broken promises for a better life. Communities established in such places as Resolute Bay and Grise Fiord are evidence of the high Arctic relocation that took place in the early 1950's in order to improve Canada's claims at Arctic Sovereignty (Tester and Kulchyski 102-104).

Apart from the Canadian federal government's poor social policies, climate change has had an extremely negative and rapid impact, furthering the decline of Inuit cultural practices (Inuit Tapiriit Kanatami web source). There is a significant decline in caribou herds, migratory patterns have changed for once commonly found animals (Inuit Tapiriit Kanatami 102), and shorter hunting

seasons are just some of the results of climate change. Every year it is becoming more dangerous for hunting parties to spend time out because of the unpredictable weather conditions, irregular migration patterns of essential food sources such as caribou or seal, and the reliance of mechanized hunting transportation such as snowmobiles and ATVs (all-terrain vehicles). Risk of mechanical failure and the price of petroleum discourage hunting parties from pursuing long trips out on to the land (Inuit Tapiriit Kanatami 95).

Before the federal government's intervention, the Inuit were a nomadic people who would follow their food sources throughout the Arctic. Since the establishment of permanent Inuit communities, the housing provided by the Canadian government has lacked cultural sensitivity and appropriateness for Inuit life and geography. This negligence has prevented the Inuit from continuing with their traditional ways of life. Less time is now spent on the land, which prevents the elders from handing down Inuit traditions, thus slowly dissolving the Inuit culture. This decay and lack of preservation of Inuit traditions coupled with failed government policies and now climate change, have resulted in extremely dire conditions. Overcrowding, soil erosion, poor health conditions, unemployment, lack of infrastructure and homelessness have resulted in dreadful social conditions. Substance abuse, high infant mortality rates, and suicide rates eleven times the national average are prevalent among Inuit communities, according to the research by Inuit Tapiriit Kanatami (ITK) (Inuit Tapiriit Kanatami web source), that has been established to represent the four Inuit regions (Inuvialuit, Nunavut, Nunavik, and Nunatsiavut). Of the four regions, Nunavik has the highest suicide rate amongst young

Inuit men Although this is partly due to the lack of mental health facilities that can treat patients after unsuccessful attempts, communities lack the needed social aid facilities A study out of the University of British Colombia (Lalonde and Chandler 191-219) has concluded that aboriginal (Haida) communities in British Columbia whose members actively participate in culturally-related activities (hunting, fur production, crafts, song and dance) and community management (self-governance, policing, nursing and education) saw a major decline in social problems Their findings have concluded that Inuit bands engaged in community practices who work to help preserve and restore their native culture by creating self-sustaining communities have, for example, seen a decline and at times complete elimination of suicides As suicide rates decline, other destructive behaviour such as depression, substance abuse, crime, prostitution and homelessness have also declined Thus, it seems critical to re-engage a community with its traditional culture and promote self-sustainment

Countries such as Greenland (Inuit Circumpolar Council - Greenland web source) and Finland (Forrest web source) have established governmental policies and treaties with their indigenous people These policies encourage growth, cultural preservation, and self-government Although proper government policies are instrumental in helping Canada's Inuit, they are beyond the scope of architecture Hence, this thesis will focus on architecture, and specifically a library, research facilities, and community gathering spaces, as a means of creating a cultural support system resulting part of a post-secondary institution This institution will help act as an agent of change in Canada's northern community of Iqaluit, Nunavut The establishment of a northern

university in Iqaluit will enable increased research capacity in the North, expand employment opportunities, provide space for critical development, and act as an economic and cultural engine for the city of Iqaluit. Since Canada is the only circumpolar country without a university north of 60 degrees, on an international level, the establishment of a post-secondary institution could potentially reinforce Canada's claim to Arctic sovereignty (Abele web source). While there have been initiatives to establish a curriculum that can encompass the cultural diversity at hand and bridge gaps between traditional knowledge and science, the role of architecture has not been considered (Saul web source). An architecture for Canada's north has not yet been pursued as it has been in other circumpolar countries due to political and geographical circumstances, and thus lacks an identity that encompasses both Inuit and Canadian culture. The question must be posed, is it possible to produce a distinctly Inuit/Canadian architecture that is sensitive to both geographical and social context and that can provide a framework to remedy the current situation in Canada's North regarding education?

Inuit Knowledge

The Inuits' dependence on the land for food and shelter constitutes a way of life even to this day. In fact, they are synonymous with one another and can be termed as 'Cynegetic', a word stemming from Greek meaning 'connected to hunting' (Collignon 64)⁹. Since the Inuit were a nomadic people, they would constantly hunt and relocate, depending on their food source as they relied heavily on a protein-rich diet. Essentially, hunting and travelling are the very nucleus of their lifestyle. Beatrice Collignon, a geographer who has dedicated much of her life to Inuinnait research categorizes Inuit geographic knowledge into two main types, "...in experience gained through practice; second in narrative learned by the transmission of the oral tradition" (Collignon 63). Dr. Collignon describes 'experience' as the practical skills and techniques used in daily life, while 'narrative' comprises the words they use to describe the land through storytelling and place-naming. Together, practical skills and narrative storytelling is the key to understanding places and spaces.

Even though Inuit culture is oral-based, there is a great deal of technical knowledge that is disseminated amongst its people. In the early years, young boys are taught quickly how to 'read' the landscape and become proficient in travelling effectively, not only in their territory but beyond. Understanding the language of the territory is a vocabulary derived from experience. Skills in orientation

⁹ The Inuit are hunters and nomads. Many indigenous peoples in the world hunt all year close to their permanent homes, while others travel constantly, but not to hunt. They are traders, or shepherds who move their flocks seasonally. Central Arctic Inuit were nomadic hunters. For them, travelling and hunting were and still are two aspects of the same activity.

and the ability to read distinctive geography often have a very precise and dedicated vocabulary. As many non-Inuit know, the multitude of words for ice or snow is quite large in comparison to Western terminology. For example, there is no general word for ice because the Inuit vocabulary refers to types of ice, whether it is an 'ice-sheet' or 'freshwater ice,' the terminology is precise. In terms of the Arctic context, this makes the Inuit language more precise compared to others. Western languages such as English rely on the combinations made by stringing words together such as 'ice-sheet' to give approximate abstract comparison that someone can relate to, whereas the Inuit have one term, 'Hiku.' This is not to say that Inuit do not think in abstract terms, it is just that their form of abstraction is relative to their own perspective (Collignon 69). Therefore, it is important to see that language and geography cannot be separated from each other for the Inuit. This reflects how their knowledge is acquired in comparison to other non-Inuit languages such as English.

Victor Papanek, a designer and educator who promotes socially and ecologically responsible design in his book *The Green Imperative*, dedicates an entire chapter to the Inuit and lists his observations why the Inuit are quite possibly 'the best designers in the world.' Firstly, it is important to understand that everything the Inuit do is based on survival, as they are forced to operate in extreme conditions with little room for error, hence the precision in their descriptions of geography. Papanek lists the following as a skill-set and knowledge uniquely possessed by the Inuit (Papanek 223-234)

- Acute powers of observation;
- Highly retentive memory;
- The omni-directional nature of their traditional winter home;¹⁰
- A different system of orientation from that of Southern Canadians;¹¹
- Sensitive reactions to changes in moisture, wind direction, sound and other minuscule stimuli;
- An amazing mechanical aptitude allied with great empathy for things electronic or mechanical;
- The absence of concepts for 'art' or 'artist' in daily life.

¹⁰ Years of evolution and detailed knowledge of climate allow the Inuit to orient their homes in such ways to optimize climatic conditions and maximize comfort. They are capable of predicting snow drift patterns and changes in climate with great accuracy.

¹¹ Although the Arctic may seem like an endless flat tundra to non-Inuit, for them it is like navigating with street signs in a city. Often follow natural geological references and have been known to use their sense of smell or hearing when navigating in snow storms. (Collignon 64)

How Can Building Education Help Canada's North?

Although the fur trade was the first major export of the north and provided some economic opportunity for the Inuit, in the 1920's it quickly came to an end. Later, mineral exploration proved that Canada's North and the Arctic is of great economic value. Canada's case for claiming rights to the Arctic is that since the Inuit use the ice as a place for hunting and living, it belongs to Canada. As mentioned earlier, Canada's relocation programs were an early attempt to populate the high Arctic. Now other circumpolar countries such as Russia are racing to claim rights to the Arctic. Russia is basing its claim to an economic zone through proof that its underwater shelf, the Lomonosov Ridge, is an extension of its continental border (CBC News web source). The Lomonosov Ridge was discovered in 1948 and extends to the Canadian Arctic Archipelago towards Ellesmere Island. In 2000, the Russian Federation submitted a report to the UN Commission on the limits of the shelf, asking to extend Russia's claim to the Arctic beyond the North Pole. Fortunately for Canada it was rejected, prompting more research by Russia and Canada in order to prove their claims. Denmark has made a similar claim, asserting that the continental shelf is part of Greenland. The issue remains unresolved, prompt attention is required if Canada wants to maintain its northern borders. The Russian Federation has the ability to deploy military submarines as exploration vehicles under the Arctic ice to chart their underwater continental shelf. Canada does not, and also lacks the ability to detect any foreign vessels. As the ice is quickly melting, Canada's case is also receding. It is estimated that the Arctic ice may disappear in as little as 10 years' time (Roaf, Crichton and Nicol 126), thus opening up a north

western passage between Asia and Europe, rendering the Panama Canal obsolete and shortening 5000 km in shipping routes. This possibility brings countries such as China and Japan into the picture as they are heavy exporters to both Europe and the east coast of North America, making them most likely to side with making the Arctic international waters. The debate over Canada's Arctic sovereignty will soon become one that is academic and driven by policy, backed by facts, not past 'flag poles.'

Existing Conditions of Post-Secondary Education in Canada North

The Walter and Duncan Gordon Foundation¹² has outlined several key reasons for establishing a physical university campus in the North. The Foundation has indicated that it would build research capacity, expand post-secondary opportunities that are relevant to the Inuit, foster a civil society and space for critical development and inquiry as well as act as an economic and cultural engine (Walter and Duncan Gordon Foundation web source)¹³. Currently, the primary institutions for delivering formal post-secondary education programming in the territories are Nunavut Arctic College, Yukon College in Yukon, Aurora College in the Northwest Territories and University of the Arctic. Unfortunately, they are limited in terms of what programs they are able to facilitate as funding and co-operation with other institutions is needed to run joint degree programs. The University of the Arctic does offer a consistent variety of courses although these are somewhat limited due to the online nature of delivery and study. In other words, one cannot hammer a nail over the internet. The Arctic University is an entity that acts as a mediator between other circumpolar schools in circumpolar countries to coordinate student interests with other universities that may offer courses or programs to accommodate their academics. Programs in biology, geology, humanities and engineering are often delivered in the Arctic context. Although the Arctic University provides necessary services, often more applied fields such as nursing, trades, and crafts

¹² "The Walter & Duncan Gordon Foundation is dedicated to the development of sound and innovative public policies, founded on those values fundamental to Canadians, and designed to foster the continuing evolution of a dynamic and independent Canada " www.wdgc.ca

¹³ The Walter & Duncan Gordon Foundation report outlined several strategies and surveyed existing infrastructure regarding education in Canada's north www.wdgc.ca/publication/131

are facilitated by community colleges in Northern communities in Canada. Often these colleges do not possess degree granting rights, which limits the type of education that can be delivered from them. For this reason, engineering, sciences, medicine, and humanities degrees are only available in southern institutions. This creates a gap in the education available to Northerners in Canada. Degrees in the previously mentioned disciplines are not Canadian-Arctic specific and are not as accessible, whereas European circumpolar universities can provide specializations in and Arctic-specific degree programs such as Arctic Technology or Terrestrial Arctic Biology¹⁴.

Deterrents such as lack of funding, vastness of Canada's North, existing low levels of academic achievement, conflicts between Western academic and indigenous practices of knowledge and limited political momentum are to blame. Although these deterrents are a reality, these are precisely the issues that a northern university would address through its curriculum. Degrees that focus on Inuit education would help solve the problem of low levels of achievement and bridge indigenous knowledge and modern science. Funding would come from research-based initiatives both from federal institutions and corporate business. There is already an enormous resource-extraction industry that would support having a pool of better-educated people to choose from.

¹⁴ Arctic University is an international organization dedicated to bridging the gap between circumpolar countries and providing a cohesive academic opportunity to students by allowing them to link with other institutions www.uarctic.org

For example, the Diavik Diamond Mine has established its own internal education and external scholarship programs for its employees and communities¹⁵ to bridge the existing gaps.

¹⁵ www.diavik.ca/ENG/ourapproach/543_building_northern_communities.asp

Case Studies – Selected Arctic Institutions

Figure 5 Map of circumpolar countries and distribution of circumpolar

A survey conducted by the Walter and Duncan Gordon Foundation produced an inventory chart (Figure 5) depicting all the Northern universities around the world. Of the eight circumpolar countries, an astounding fifty universities world-wide with a total of sixty-one campuses averaging seven per country were counted. As illustrated by the map, Canada has none.

Svalbard Research Centre

The Svalbard Science Centre, designed by Jarmund/Vigsnæs AS Architects MNAL in 2005, is located on the Norwegian island of Svalbard in the city of Longyearbyen. The city is quite small, with a population of only 2000 residents. The programs that are offered vary from Arctic biology to chemical oceanography to Arctic policies. Although the centre is quite modest in size in comparison to other campuses from the South - only about 25500 square feet and not exceeding three stories - the contemporary architectural features give it a distinct aesthetic that is completely alien to the city's existing artificial urban context consisting of small wood frame buildings. It sits on more than 390 steel piles, a common building method in most Arctic cities. Although its form resembles a series of jagged metal boxes that protrude out from a central volume, it is purposefully derived to minimize the effects of wind on the structure; the form has been generated to allow wind to pass over and underneath it to minimize problems with snow accumulation. Traditional Inuit snow houses were hemispherical as this shape possesses the optimal volume-to-surface ratio, thereby minimizing heat loss (Matus 59). The Svalbard Centre compensates for this with its aerodynamic geometry and orientation. This scientific approach with aesthetic intentions frees the designer from traditional

archetypes that are limited in size due to material constraints but still fosters the essence of traditional techniques. It is regarded as one of the most northerly situated research station in the world¹⁶ and is an excellent example of contemporary Arctic architecture. Due to its architectural performance in the cold climate it has attracted much attention to its locality. The largest building complex in the city, the Svalbard Science Centre has become synonymous with Arctic research since its construction. Svalbard hosts numerous conferences, tradeshow and summits related to Arctic issues. The facility has become a world renowned institution.

Nuuk University

The Nuuk University buildings by KHR Architects¹⁷ are located in Nuuk Greenland built in 1996 and expanded in 2005. Nuuk is a fairly large city in comparison to Iqaluit or Longyearbyen, with a population of over 15,000 residents. It is as well-developed as the capital of Greenland. It also sits on a bedrock plateau, and has a milder climate than Iqaluit or Longyearbyen, thereby allowing for a larger infrastructure. Departments of Language, Literature and Media Studies, Management and Economics, Cultural and Social History and Theology offer Baccalaureate and Master's degrees and Doctorates in all except Theology. Its library holds over 18,000 volumes. The departments are housed in rectangular shaped buildings made of poured concrete and steel clad in wood siding. The main building is approximately two thousand square meters and houses laboratories, offices and facilities for forty

¹⁶ <http://www.unis.no/>

¹⁷ www.khr.dk/#/144985/

employees and one hundred fifty students. It is an excellent example of an evolved network between industry and academia. Apart from residences for students, apartments are provided for visiting professors and research partners, encouraging a cross-pollination of knowledge between related institutions and industry leaders. The institution is dedicated to higher learning and has become an internationally recognized centre for Arctic and climate change issues.¹⁸

Reykjavik University and Open University

Reykjavik University is one of six Icelandic universities, located in Reykjavik, Iceland (See Figure 5). Reykjavik numbers 120,000 people and is the capital of Iceland and seat of government. The main post-secondary institution in that city possesses a physical campus and offers MBA and even Doctorate programs in a multitude of disciplines such as computer science and various engineering programs, and facilitates an 'Open University Program' as well. This is an online service, helping students to bridge the gap between universities, continuing education, distance and executive education. This is a key component that a Canadian northern university should pursue to ensure accessibility of its programs. Since Canada's Inuit are spread out over nearly two million square kilometers, delivering education to some of the remote communities can prove difficult. However, online access can

¹⁸ <http://www.avj.dk/Greenland209.aspx>

be supported, since there is already an existing telecommunications infrastructure. Residents of remote communities could use public computer systems that can be easily located in community centres, government offices, or existing schools and colleges.

Synopsis

The Svalbard Research Centre, University of Greenland and Reykjavik University are excellent models for Canada's own northern university. As its programs clearly state, Svalbard has a more 'hands-on approach' as it deals with more research/field work. Its high latitude location compliments the research aspect of its programs. Svalbard has also indicated that if a facility such as itself is built in Canada, interest from other nations, industry sectors and academia will surely help it to flourish. Only since 1979 has Greenland gained home rule from Denmark, making it an autonomous country within the Danish Realm but still receiving subsidy. Therefore Nuuk University focuses primarily on the arts, cultural studies and policy to provide itself with future leaders. Greenland has a population of only 56,000 and 88% are Inuit or Inuit-Danish mixed, hence the strong emphasis on preservation of culture through education and self-governance. Greenland's Inuit population is very close in size to Canada's, 50,480 in 2008 (Inuit Tapiriit Kanatami web source). Of those, 78% live inside of Nunaat (Statistics Canada web source). Nunaat was officially established in 1999 as it was separated from the Northwest Territories as part of the Nunavut Land Claims Agreement. One can draw parallels between Greenland and Nunavut in that both are young Inuit realms still functioning within the context of a modernized Western state. Canada's northern university should embody both Nuuk University's orientation towards policy and

governance and Svalbard Research Centre's focus on the physical sciences to become a key component in the future mineral exploration in Canada's Arctic, potentially backed by Inuit legislation and policy that would be developed in unison

Existing Canadian Research Institutions

Cambridge Research Station

Although the Cambridge Research Station is in the feasibility stage and has not yet been built, it is intended to enable southern researchers to maintain a presence in the North. The federal government has dedicated approximately \$200 million and another \$18 million to explore and develop green building options that will allow it to 'coexist with the community' (Nature News web source). Although one criticism that has surfaced is that there is currently inadequate logistical support, "there needs to be an intermediate connection between high Arctic stations and southern institutions" (Nature News web source) especially considering that its completion is expected in 2017.

Iqaluit Research Institute

The Iqaluit Research Institute is part of the existing Arctic College. It provides facilities for scientists to conduct their research, but is unspecific about what types of research it can support. Basic laboratory equipment such as dissecting tables, meeting rooms,

living accommodations and internet access are supplied.¹⁹ The facility is typically over-booked, indicating the demand for such facilities.

McGill Arctic Research Station

The McGill Arctic Research Station is located on the Central Axel Heiberg Island in the Canadian Arctic.²⁰ It has been operational since 1960 and is currently the longest-operating seasonal field research facility in the high Arctic. It consists of a small hut equipped with a cook house, and two other temporary structures capable of supporting twelve occupants. Current research includes studies in glaciology, climate change, permafrost hydrology and planetary analogues, to name a few. Although it is a proven valuable research tool, it is still only accessible through a southern university, thus limiting access to Northern students.

One major criticism of northern education put forward by John Ralston Saul, essayist and novelist, writing in the *Literary Review of Canada* is that the gap between Northerners and the way that higher education is administered represents a colonial relationship. This is prevalent with the attitude researchers have, as they spend a majority of time in their southern institutions only visiting the north when convenient or necessary. While there are some notable programs aimed towards producing lawyers and nurses that

¹⁹ http://www.arcticcollege.ca/news/News_eng.aspx?ID=211

²⁰ <http://www.mcgill.ca/mars/>

are trained to work within an Arctic context, these are often managed by contractual arrangements between a Northern college and Southern university. This occurs for the simple reason that education is publicly funded through federal or provincial taxes and the majority of tax payers reside in the South. This condition in the Canadian tax system essentially results in a colonial structure. Also, the actual research process, as referred to by Ralston-Saul, is a “live south, work south, invest south, think south, visit north” approach. This is clearly inappropriate as it perpetuates the cultural gap between the South and North. Other circumpolar countries believe that part of being a northern country involves creating an intellectual and physical infrastructure (Saul web source) from which everything can flourish. The North is simply not integrated in Canada’s national dialogue, seeming to only receive attention during elections or environmental disasters.

Site of Canada's Northern University- Iqaluit

Iqaluit lies on the coast off of Frobisher Bay on Baffin Island and is 63 degrees north which puts it above the tree line. Much of its vegetation consists of small shrubs, bushes and indigenous fauna. Baffin Island is part of the remaining outcrops of the Appalachian Mountains and is considered to be in an active permafrost zone. There, the top layer thaws and freezes with the seasons, making construction difficult if a building needs to be placed on the ground directly. When possible, all large buildings are located on bedrock for the best structural integrity, while smaller buildings such as homes stand on stilts bearing on permafrost. Due to the isolated locale of the city, it is accessible by ship during the warmer months and air year round. Importing goods is costly and limited to specific sizes, hence the modular nature and size of construction that is present in the area.

Figure 6 Iqaluit Aerial view

Figure 7 Site plan of city of Iqaluit

Figure 8 Iqaluit from Joamie Hill

The city of Iqaluit is the capital of Nunavut and the governing city of the other three Inuit regions with a population at nearly 7000 and rising. The city expects to double in size in about 10 years and has taken careful initiatives to plan for the increase. In 2010 Iqaluit developed an official plan that addresses the need for more housing, energy conservation measures, pedestrian-friendly streets and new zoning to allow for expanding commerce. FoTenn Consultants, an Ottawa-based planning and urban design firm, was commissioned to provide advice on a range of planning issues such as

- Cash-in-lieu of parking policy,
- Development agreements,
- General Plan & Zoning By-law housekeeping amendments,
- Staff planning workshops,
- Planning application forms,
- Planning application information brochures,
- Survey sketch reports,
- AutoCAD sketches of existing conditions, and
- Geographic Information System (GIS) analysis & mapping

The plan includes the participation of the community and the elders, thereby bringing together traditional knowledge and current planning practices

The character of Iqaluit is often presented as a romanticized fishing village. At first glance, starkly painted homes in primary colours, spread out in clusters on outcrops of solid rock plateaus, read as a picturesque mosaic of modest living. In reality, finding appropriate sites to erect structures is difficult due to location of Iqaluit on the edge of the world's most northern mountain range, the Arctic Cordillera. It is a highly mountainous region in Canada's archipelago, stretching from Ellesmere Island to Northern Labrador. Typically buildings are clad in wood, metal or vinyl siding. Brick and stone are uncommon due to the need for foundations. Iqaluit, like many other hamlets in Canada's North, are typically composed of small 'salt box' wartime homes also commonly found in aging districts in Canada's southern cities. Since major expansion of Canada's northern territory occurred during the post-war period, southern building technology was the only known method of providing homes by the federal government. Although the economics of stick frame seemed logical, the lack of insulation, ventilation and proper vapour and air barriers accelerated the aging process of these homes and made them uninhabitable within a short period of time.

The site for the proposed northern university is situated on the side of a steep hill between downtown Iqaluit and the Apex²¹. It has access to the water from the south and is sheltered from the wind during the colder months by natural outcrops of bedrock. The site's soil is a mixture of active permafrost and bedrock; thus, two conditions exist when dealing with the foundation system that will be discussed later. As per the official plan, there are pedestrian and snowmobile paths that run adjacent to the area and can be used to access the proposed university. To the north of the site, the City of Iqaluit is contemplating moving the legislative body from its downtown location to a larger new building to accommodate growth. A relationship between the potential government building and the university is important to maintain as they will both be prominent symbols for the community.

²¹ The Apex is a district adjacent to Iqaluit that was the initial settlement known as Frobisher Bay, prior to being renamed Iqaluit. www.city.iqaluit.nu.ca/i18n/english/history.html

Concept

It can be assumed that building an 'instant university' in the North is financially and physically extremely difficult for reasons beyond the control of the architect. Hence, any such extensive construction endeavour needs to be approached as a multi-phased project. The initial phase of this proposed university building will involve house administrative areas, a gallery, a cafeteria and a portion of the library. As the building grows in either direction additional faculties can be added as needed along with a an expanding library and residences. This strategy accommodates the inevitable growth of the university and allows for a systematic approach to construction. Each modular unit differs only slightly based on its placement on the land, allowing for rapid construction and yet customization of the interior space depending upon the potential use.

Figure 9 Interior of Library Space

The slow expansion of the structure through phases addresses the university as the growth of a scientific, academic and cultural community. As each module is added over the course of the university's existence, it can be understood as the growth of

knowledge. This growth is a response to the ongoing global effort in Arctic research. As new disciplines are anticipated to arise from the ongoing research, it will allow the university to adopt its architecture to meet the new specific needs by allowing the customization of each module in response to its projected use.

The building is a metaphor for the nomadic life the Inuit were accustomed to. The building embodies the same essence of Inuit culture. Someone who might live in the residences would travel along or underneath the library to get to their destination which often would be their place of study or the community hub. The library is shaped in such a way that it allows for maximum solar gain during the winter months and minimizing it during the summer months. The summer solstice is 72 degrees from the horizon and can last up to twenty hours. During the winter solstice the sun rises at 32 degrees and only provides few crucial hours of daylight. The façade of the library responds to these conditions by changing the angle of the wall through its faceted planes. See Figure 10.

Figure 10 Library - showing solar angles

Figure 11 Library Section

Within the central library volume the Hall of Ancestors ties together a very European way of thinking of knowledge with what might be considered a much more Inuit way of thinking of heritage as an ever growing body of stories and legends which build the identity of the people. As the University expands and along with it its resource of written text and digital learning, the hall also expands to accept the language of the Inuit's story telling through form, sculpture, path and linkages to their native environment.

Figure 12 Conceptual rendering of Inuit folklore sculpture in the Hall of Ancestors

Z

Figure 13 Interior of Library

Figure 14 Top level of library overlooking Inlet

The building is sited upon a steeply sloped site ranging from nearly flat to over 30 degrees. In response to this condition the academic portion will be constructed on stilts, which will help to accommodate for the variation in slope. Architecturally this relates to the contemporary building practices in Iqaluit that situate commercial and institutional buildings of stilts/piles. Also this strategy will allow vehicular access underneath the building, connecting Iqaluit to the Apex through the campus. The library will have a similar structural system that allows pedestrian movement underneath it. The library will act as a covered walkway along the length of the entire building and in the winter will allow snowmobiles to pass through allowing access to the inlet just south of the campus. The residences are situated on grade thus referencing Inuit traditions of placing in direct relation to the ground/snow.

Figure 15 Proposed university site plan

Programmatic Needs

In order to best support the citizens of Iqaluit and the Inuit across Canada, the university should be a part of the public realm. Foremost, the proposed northern university building must address the needs of the students and faculty. However, in the context of Iqaluit where all public facilities are slowly aging and in need of repair, the new university should be accessible to all citizens of Iqaluit in order to further justify a building of its size and budget. The programmatic elements that would be made available to the citizens alongside the university students are a library, a cafeteria, lecture halls, classrooms and art gallery. Allowing the use of these facilities by the whole community will engage the citizens to see the school as their own. This sense of ownership aims to encourage input from the community as well as cooperation between the Inuit and Western researchers. See Figure 31 Community Hub.

Figure 16 Diagram of building program

Apart from the spaces mentioned above, classrooms, faculty offices, laboratories and residences will also be provided through the proposed university. Residences are designed for approximately three hundred students and fifty faculty members. It is also assumed that not all faculty will be permanent staff members but rather seasonal visitors, thus, housing should allow for long stays and be able to accommodate these faculty and their family members. It is important to build the residences separate from the immediate campus so that the occupants can maintain a sense of 'home' apart from the university.

The residences are located on the northern side of the library. These are divided by a commons area that separates faculty dorms from students. Each residence can accommodate forty students and twelve faculty/researchers. The residence is connected to the library through a bridge that allows access to the remaining parts of the building, including classrooms and laboratories. The layout of the residence maintains a sense of community. The main atrium space is open to three stories above and the student units have windows that access the atrium. Therefore the inward views of the atrium are as important as the exterior views of the land since the atrium is the link to other occupants. This condition helps re-enforce a sense of community and family which the Inuit respect deeply and cherish. The faculty share the same building as the students but are separated by a commons area so as to allow some privacy but also help distinguish the knowledge holders (professors) from the knowledge seekers (students). This helps establish a respectful distance between student and professor but still maintain proximity.

Classrooms located in the academic wing would be non-hierarchical and centralized when possible in keeping with Inuit traditions, while simultaneously moving away from European models of schooling that are planned hierarchically. Hierarchical planning involves placing an authoritative figure at one end of the space and students at the opposite. The speaker broadcasts the material and hence the situation is a uni-directional process as opposed to a group learning situation where knowledge is exchanged and flows between the participants. Architects Randall Fielding and Prakash Nair of Fielding Nair International discuss the importance of merging curriculum with the building's architecture and the benefits of group-led learning as opposed to traditional lecturing as represented by conventional seminar rooms, workshops and laboratories; hands-on spaces allowing group learning specific to various disciplines will be encouraged and facilitated within the school²². Each academic wing would house a specific discipline for which the spaces can be customized to suite. However, each academic wing will have a main lecture area that faces the land as a reminder to the occupants of their surroundings. (See Figure 29)

²² Fielding Nair International is an international leader for planning and architectural design of educational facilities. The firm has worked on over \$10 billion dollars worth of school work and created the largest database of over 400 schools in 30 countries, available on designshare.com www.fieldingnair.com

Faculties

As analysis in previous chapters shows, the three exemplary Arctic universities offer a diverse selection of programs that reflect the Inuit community needs. In the case of Canada's Iqaluit, a diverse selection of programs is required to address both scientific disciplines and the social sciences.

The proposed departments are: Arctic Policy and Affairs, Arctic Biology, Arctic Geology, Arctic Technology, Northern Languages, Culture and History, and Social Sciences. These programs are similar to those that are offered at other circumpolar universities, but would also address the specificity of the Canadian Arctic. Arctic Biology, Arctic Geology, Arctic Technology, Northern Languages, Culture and History are commonly found at other circumpolar universities, while Arctic Policy and Affairs will address the sovereignty and self-governance specific to the region. Social Sciences would encompass specific niches such as social work and early childhood education which are currently in demand and will continue to be in the future.

Administrative and faculty offices will also be needed and placed within the learning centres of the school. Exchange of knowledge is encouraged to take place not only between faculty and students in the same discipline but also between disciplines. This can be easily accomplished by overlapping common space and making it usable by a multitude of students from various disciplines.

Architectural Technology

Typically, larger structures belonging to the federal government or businesses from the South are built with higher standards. These buildings can afford to use composite cladding materials as opposed to wood or vinyl siding. They often mimic the diverse colours and rigid geometries of their building predecessors. The bulky volumes are a result of keeping the surface area of the building minimal so as to reduce heat loss. Also, since skilled labour is short in supply, complex forms often require outsourced labour to be brought in, which increases the cost of construction. The advantage of outsourced labour however is that more interesting and higher quality construction is possible, likewise this potentially poses a major economic driver and an opportunity to introduce new trades or inform existing ones.

Another option is prefabrication in remote communities. The advantages of prefabrication are that less skilled labour can be employed locally without loss of time or quality, and minimal supervision and repetition decreases the chances of error. For remote communities such as Iqaluit, the disadvantages can devastate a project as the advantage of off site construction can also hinder the process. If a component is manufactured incorrectly, rectifying the problem can become impossible due to the lack of facilities or proprietary equipment. Shipping the component back to the factory can take months because of the limited access and seasonal travel. Thus, it is ultimately more efficient to employ an on-site construction method that is systematic but that can also take advantage of mass customized/produced components that can be modified on location if the need arises.

Structure

Iqaluit's existing residential and small commercial buildings are predominately wood frames supported on wood stilts that bear on a spread footing on top of active permafrost. Smaller buildings are erected this way so that heat loss through the floor does not melt the 'load-bearing' permafrost which would eventually lead to the structure sinking into the ground. The gap between the floor and surface allows any escaping heat to be dissipated by natural ventilation. This is a satisfactory solution for smaller-scale structures, it is far more difficult for large buildings such as schools, arenas, warehouses and offices. The most commonly used material is heavy wood framing, but steel and concrete are used as well if needs arise.

Snow/Wind

As in other parts of the world with high levels of snow precipitation, one would expect steep roofs to be common in the North. However, since Iqaluit is located in the tundra, it is drifting snow that is more of a concern. Snow accumulation against the side of buildings poses a greater problem to rain screens than falling snow does to the roofs. When snow piles against the façade of a building it typically closes any natural ventilation (air cavity) between the exterior cladding and insulation. This prevents pressure equalization in the cavity and leads to heat being trapped inside the cavity. This heat will eventually be carried into the sub-structure of the building and start thawing the load-bearing permafrost. Another undesirable consequence is that ice forms within the air cavity, trapping moisture. Hence, the majority of structures have either low-slope or shed roofs, as these allow blowing

snow to move over the buildings with little resistance, thus preventing accumulation on top of and alongside the building. If buildings cannot be placed near natural buffers such as on rock outcrops or within small valleys to shelter them from blowing snow, artificial wind deflectors or snow fences are often built. The deflectors create turbulence that forces the wind to move over the building entirely and allows the snow to settle beyond it. Snow fences have a similar effect but they trap snow against the side of the fence, eventually acting as a wind deflector. The difference between the wind deflector and the snow fence is that the deflector is often attached to the building it services while the fence is free-standing and is used to protect not only buildings, but exterior spaces such as roads and access points from being covered over by snow.

Exterior penetrations such as windows, doors and mechanical components must also be carefully placed so as to prevent blockage due to snow and ice. Traditionally, the Inuit would always place entrances either on the side of their home opposite from, or on a wall parallel to the prevailing wind direction. This allowed the air currents to clear snowdrifts from the entrance. Another method was to provide a buffer wall, typically used as storage for food and equipment so as to shelter the liveable areas from cold infiltration. Today's buildings must also consider placement of mechanical components so as to prevent them from forming ice and thus minimize stress on the systems during operation and allow the proper operation of windows and especially exists.

Thermo-syphoning

Flat and Sloped Systems

Thermosiphoning is a recent technology that was first used by the U.S Army Corps of Engineers in Alaska in 1965. It was used to preserve foundations in 'warm' permafrost. Since then, it has been applied in Canada and Russia. Other derivatives have evolved such as thermopiles, sloped pipe thermosiphons and flat pipe thermosiphons. All of these work on principles similar to heat exchange but have specialized uses (Holubec i).

Figure 17 Flat loop thermosiphon system

Figure 18 Sloped thermosiphon system

Figure 19 Near Surface Ground Temperature

A thermosiphon is used to extract heat from one place and have it released or exchanged to another. In the context of northern architecture, heat is drawn out from the soil and dissipated into the atmosphere. There are no resulting bi-products such as carbon dioxide or greenhouse gases that are released into the atmosphere, thus making it a sustainable technology. In order to make the system more efficient, carbon dioxide is used as the fluid inside of the closed system under pressure of about 300 psi to 700 psi (Holubec I). The main reason for this is that carbon dioxide remains in its gaseous state to about 78 degrees Celsius and becomes solid at temperatures less than -78 degrees Celsius. Typically permafrost remains at -5 degrees Celsius and lower (-10 to -5 for Iqaluit).

The system relies on the temperature differential between the soil and atmosphere. During the winter months the air outside ranges from -20's to -50's, while the temperature of the permafrost remains constant throughout the year. The thermosiphon draws out the heat from the soil through conduction between the thermosiphon loop (evaporator pipes) and the soil. The carbon dioxide absorbs the heat and rises up into an exposed column above-ground. When the wind passes through the fan coil or when exposure to colder temperatures occurs, the heat is released into the atmosphere and the carbon dioxide naturally drops back to the lowest point in the system to restart the convection cycle. This cycle will continue as long as the temperature outside is colder than the temperature in the ground. During the summer the accumulated cold is preserved by a layer of insulation above the horizontal evaporator pipes. This system has proven very successful with over eighty five flat loop foundations in Canada's north and Quebec. The system still relies on several other important components that must be carefully installed in order to ensure optimal performance.

The key factors in a successful installation are as follows:²³

- Organic soil must be removed and replaced with a dry, cold and compacted granular bed for easy drainage of any trapped moisture that will occur;
- Ground must be level and dry;
- Construction should occur during spring or autumn months. If construction is done during the summer months the ground must be re-frozen artificially or naturally by waiting for the winter before proceeding;
- Vertical bends in the horizontal evaporator pipes application should be limited;
- All radiant heating pipes (if applicable) should be placed near the top of slab and insulated properly;
- Sufficient perimeter drainage should be provided to avoid frost heave;
- All interior structural piers and walls should be insulated and isolated to prevent heat transfer;
- Mechanical systems should be insulated if located in a crawl space about the thermosiphon system;
- Proper venting should be provided in the crawl space between the building and ground; and

²³ The recommendations are an amalgamation of case studies by Igor Holubec for the Government of the Northwest Territories, titled Flat Loop Thermosiphon Foundations in Warm Permafrost (Holubec)

- Pipe spacing cannot be too wide as it will create irregular cooling and heating situations that can result in ice boils that can cause heaving.

In comparison to other thermo systems such as thermopiles, the advantage of a flat or sloped system is that it does not require large amounts of drilling. The system can be upgraded to accommodate larger heat loads by adding pumps or by mechanizing the system to increase the rate of heat exchange. The system can be customized in regards to the space it is serving, also known as 'zoning'. The disadvantage is that the system needs careful installation as mentioned above, and at times seasonal changes can delay construction. It also requires more on-site co-ordination with other mechanical systems and therefore must be carefully planned.

Thermopiles

Thermopiles work on the same principle of heat exchange as the flat loop system. They are a load-bearing element that performs similarly to typical piles found in southern architecture. They are designed to reduce frost heave to nearly negligible quantities and are ideal in applications where heat load to the subgrade needs to be reduced due to nearby development. The heat transfer rates of thermopiles can also be sized to dissipate heat transfer between structures and subgrade.

Thermopiles are installed using three methods. The first method is by drilling a shaft slightly larger than the thermopile at the desired depth and then placing the pile and backfilling it with native material or slurry that will freeze and create a bond between the soil and pile. This is known as 'adfreeze' and is the preferred method of installation. The slurry acts in a similar way to concrete in warmer climates but stays frozen throughout the life cycle of the building. Additional mechanical or convective freezing can be added to help maintain frozen conditions. The second method is done by driving a hollow steel tube into the ground, removing the soil inside and replacing it with slurry as mentioned above and then connecting a heat exchanger to freeze the inside, similar to the flat loop system. The final method involves a proprietary system that is quite common, which uses Helix-Piles (Arctic Foundations Inc. web source). The pile has a large helical shear ring attached to the shaft, similar to a typical screw, and it is drilled into the ground in a similar fashion. The advantage of this system is that the Helix-Pile can be used in the same applications as 'adfreeze' piles but has a much higher load-bearing capacity. The disadvantage of these systems is that they require heavier machinery and

boreholes to test soil composition are sometimes necessary, adding extra cost and time. Thermopiles typically allow room for a crawlspace that acts as a natural syphon between the underside of the building and the ground. This added 'layer' of protection also allows for mechanical equipment to be installed under the floor, thus concealing it but allowing access for maintenance should such a need arise.

Figure 20 Thermosiphon pile system

Application

For the purpose of this thesis, soil conditions are assumed. It would be necessary to obtain more accurate data through borehole exploration before selecting an appropriate system. The academic wings will reside on typical piles since it is known that bedrock is present subgrade. Since there is some complexity in the direction of the piles due to the angles, the holes will be drilled prior and the steel is inserted thereafter. The remaining void will be filled with 'adfreeze' slurry as to create a stronger bond between the soil and the piles. This will create a friction pile system in case bedrock is not found (see Figure 21 Section through academics wing). The library is placed on helix piles since the underside of it will mostly be in the shade year round and vented naturally. The Helix piles system allows an easy and shallow application into places where bedrock is likely not to be present. It is a friction based system that relies on the soil cohesiveness and friction between the piles to support the structure above (see Figure 22 Section through library). It is assumed that all soil under the residential program is soft silt or clay, thus requiring and capable of supporting a slab on grade structure. This is a typical method of construction for large areas in cold climates. But in order to prevent the permafrost under the building from thawing a thermosiphoning system under the slab is required. This system is a series of small pipes that run under the slab and would cool the soil while recapturing the heat loss from the slab (see Figure 23 Section through residences). This allows the exploration and development of all three systems ('adfreeze' method, thermo-pile and Helix-Piles), and their potential architectonics in relation to the building's program. See Figure 30 Section through typical module.

Figure 21 Section through academics wing

Figure 22 Section through library

Figure 23 Section through residences

1 Cross Section
1/84" = 1'-0"

Conclusions

As this thesis explored the potential impact that a post-secondary institution could have on the Inuit and Canada's northern relations within itself and other countries, it is important to note that the architecture in this thesis is only a symbol for a much more complex set of ideas. The initial idea for a northern university is far more important than the architecture that embodies it. As suggested by the Walter and Duncan Gordon Foundation, using the infrastructure of existing colleges along with partnerships from southern universities is an acceptable method to expand education. However, as demonstrated in the previous chapter, in the case of the Kanak people and Renzo Piano, there can be a much greater impact on a group that architecture itself delivers. A physical architectural presence is an acknowledgement of the people and their culture. The web-based University of the Arctic, although an instrumental institution that creates awareness regarding Arctic research, is rarely known outside of its academic circle. If Canada was to use a similar model of combining fragments of post-secondary institutions such as the Arctic College in Iqaluit to form its own on-line university, it is not likely to ever reach the status of such physical circumpolar universities such as Nuuk University and Reykjavik University. Therefore, investing in resources to provide a physical architecture to house the northern university would provide the necessary momentum to help establish a responsible self-government and encourage the self-directed progress of Canada's Inuit. The real and symbolic roles of the architecture of Canada's first Arctic University would be enormous not only amongst circumpolar countries but within international academia. It is this identity that would help empower

Inuit communities as their indigenous knowledge would be recognized, validated and incorporated into future development. In turn, this would highlight their contributions to contemporary issues dealing with climate change, sovereignty and social well-being in their own communities.

“...it easier to receive their education in their own part of the country than away, as enrolment in local schools is high where spots in distant schools are left unfilled. It is a very good possibility that keeping Inuit students in their region to learn would likewise ensure more people interested would opt to go.” (Ip Tang, *Architecture and Healing* 39)²⁴

This presence of an Arctic university would produce doctors, writers, legal workers, architects, teachers, and policy makers who are sensitive to the Arctic and its people. It would also provide a bridge to connect southern universities, host Arctic specific disciplines, and research with northern agendas. Despite years of oppression, the Inuit today show just how resilient and capable they are of adaptation and embracing progress. While the architecture of such a school would never be the voice of the Inuit, it could be a significant transmitter for their voices.

²⁴ Morgan Ip Tang's thesis examines the importance of cultural appropriate design and how it contributes to cultural healing through dissemination of knowledge between generations of people (Inuit)

Illustrations

Occupancies Legend

MAJOR OCCUPANCIES

ACADEMIC

COMMUNITY

EXHIBITION

LIBRARY

RESIDENCE

CIRCULATION

COMMONS

ACADEMIC DEPARTMENT

ADMINISTRATION

EQUIPMENT STORAGE

SERVICES

LECTURE AREA

COMMONS

CLASSROOMS & LABORATORIES

AUDIO & VISUAL RECORDING

CIRCULATION

RESIDENCES

ACCESSIBLE UNITS

SHORT TERM STAY

FOUR BEDROOM UNIT

SESSIONAL PROFESSOR UNIT

PERMANENT STAY UNIT

SERVICES

CIRCULATION

COMMONS

Figure 24 Ground Plan

Figure 25 First Floor Plan

Figure 26 Second Floor Plan

Figure 27 Third Floor Plan

Figure 28 Fourth Floor Plan

Figure 29 Typical Module

Figure 30 Section through typical module

Figure 31 Community Hub

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