DESIGN AND WICKED PROBLEMS IN THE RURAL ARCTIC

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Industrial Design | Faculty of Art and Design | University of Lapland
Pro Gradu thesis
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ABSTRACT

Design and Wicked Problems in the Rural Arctic is a study on how the wicked problems of arctic indigenous communities can be tackled through design. As part of a post-colonial region, indigenous villages in the Arctic have gone through rapid social changes; this, together with climate change, threatens the wellbeing and resilience of these communities. Many of the villages have no access to clean water or shelter. Colonisation settled the traditionally nomadic communities, bringing demand for waste and sewage management systems, but due to the challenging location, such infrastructure is difficult to establish. The problems in these Arctic communities are wicked; they are interrelated and difficult to define. This MA thesis answers the question: *What kind of framework enables a designer to tackle the wicked problems of arctic indigenous communities?* The data is collected with a *research through design* case and semi-structured interviews, which are interpreted with a systems approach. Grounded theory is applied to analyse the data. The data indicated that there is a significant gap in communication between communities and western agencies. Communities are often passive recipients of projects carried out by western agencies who are unfamiliar with the culture- and location-related needs.

This thesis proposes that the designer work as a coordinator, *a sense-maker,* in the design process by creating a common understanding between the stakeholders. Instead of designing a solution, the process itself is designed, and implemented in collaboration with the community.

Keywords: *Design for Arctic/ Cross-cultural design/ Participatory Design/ Sustainable Design/ Systems thinking/ Wicked Problems/ Traditional knowledge*

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TIIVISTELMÄ

Design and Wicked Problems in the Rural Arctic [Muotoilu ja viheliäiset ongelmat Arktisissa kylissä] tutkii kuinka muotoilla kestävän kehityksen periaatteiden mukaisesti Arktisiin alkuperäisväestön kyliin. Arktinen alkuperäisväestö on käynyt läpi rajun sosiaalisen muutoksen kolonialismin myötä, ja yhdessä ilmastonmuutoksen aiheuttamien haasteiden kanssa se koettelee yhteisön kykyä selviytyä [resilience] muutoksista. Edes puhdas juomavesi ja asunto eivät ole itsestäänselvyyksiä monissa kylissä. Kolonialismin seurauksena monet nomadit vaihtoivat pysyvään asutukseen, mikä loi tarpeen muun muassa jätteiden käsittelylaitoksille, mutta paikalliset olosuhteet olivat usein liian haastavat länsimaiselle infrastruktuurille. Ongelmat Arktisissa kylissä ovat viheliäitä ja vaikea ratkaista. Tämä Pro-Gradu työ tutkii *Millainen viitekehys mahdollistaa muotoilijan työstää viheliäisiä ongelmia arktisissa alkuperäisväestön kylissä?* Tieto koostuu research through design muotoiluprojektista ja teemahaastatteluista, jotka tulkitaan systeemiajattelun näkökulmasta. Tuotettu tieto analysoitiin aineistolähtöisen sisällönanalyysin keinoin. Tutkimus osoitti, että alkuperäisväestö on usein passiivisen vastaanottajan roolissa heitä koskevissa kehitysprojekteissa, jotka on toteutettu länsimaalaisten toimesta. Usein kehitysprojektien toimeenpanijoilla on virheellinen kuva sekä kulttuurin että ympäristön vaatimuksista.

Tämä Pro Gradu tutkielma ehdottaa muotoilun rooliksi toimia koordinaattorina ja tilanteen selventäjänä arktisiin alkuperäisväestön kyliin kohdistuvissa muotoiluprosesseissa. Sen sijaan että muotoilija suunnittelee ratkaisun, muotoilu kohdistuu muotoiluprosessin suunnitteluun ja osapuolten, eritoten yhteisön, osallistamiseen.

Avainsanat: *Arktinen muotoilu/ Cross-cultural design/ Osallistava muotoilu/ Sustainable Design/ Systeemiajattelu/ Wicked Problems/ Perinnetieto*

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FOREWORD & ACKNOWLEDGEMENTS

It took a good while to turn this thesis from an idea into words. I am aware that an MA thesis can be reached with less effort. Still, I don't regret my choice to do this comprehensive study on design for the Arctic, because for me it was not only a thesis, it was also research for my career. It was an opportunity to make contacts for the future and create understanding on the Arctic. I studied another Master's degree, in Creative Sustainability, while writing this, and the continuous learning led me to reshape the thesis topic over and over again. I decided to postpone most of the writing until I better understood the new perspective. My approach to the design case became more holistic, and my understanding of the issues and the importance of the connections between the issues changed. That transformation made me think about the audience of this thesis. I hope that it will be accessible also to people without a design background, not only so that they could benefit from it, but also that I myself would learn to communicate about the topic to an audience that is not familiar with the methods and theories of design.

I want to thank Glen Forde, who proofread the thesis, and helped me with language. He was a remarkable support, listener and source of feedback throughout the process. I also want to apologize him for having to listen constantly about Arctic this and Arctic that. Big thanks go also to all the interviewees: Jack Hébert, Jacqualine Qataliña Schaeffer, Elina Helander-Renvall, Bruce Forbes and Svetlana Usenyuk. I especially want to thank Jack Hébert and the staff of Cold Climate Housing Research Center, who enabled the case study together with Bob Tsigonis and Lifewater Engineering Company. Finally, I want to thank my supervisor Satu Miettinen, who supported, encouraged and guided through the research process.

Heidi Konttinen
12 of May 2016, Helsinki, Finland

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PART 1

INTRO-DUCTION

1 Introduction
2 Data and methods
3 Theoretical framework
4 Setting the scene - Arctic and people

1 INTRODUCTION

The Arctic is an exceptional region in terms of its environment, political position, and demography. It is home to several indigenous groups: at least 10% of the Arctic population are natives[1]. Indigenous groups have settled the area for thousands of years, developing skills and a culture that has enabled them to live in balance with nature. For many cultures ice and snow are challenges, but the arctic indigenous people have found ways to benefit from the cold weather. In fact, good ice and snow seasons have become so important for the survival of some of these groups that global warming and the lack of cold winters are leading some of the coastal villages to be evacuated. A warmer climate exposes the villages not only to flooding, erosion, and winter storms, but it also affects the ability to maintain traditional livelihood.

Nevertheless, the changes in nature are not the only challenges that arctic indigenous communities are facing. As a post-colonial region, the indigenous groups have gone through rapid social changes, and it is important that the future of the communities is not designed and decided elsewhere, but instead in the village with the community. My interest in design for rural arctic indigenous communities arose during an internship in Alaska at the Cold Climate Housing Research Center (CCHRC). CCHRC is a nonprofit organization that designs and builds sustainable houses for Native Alaskan villages. I was fascinated by CCHRC's way of practicing design with the villagers, and how they combined traditional ways of knowing with the western way of building. I also became aware of how little I knew about the Arctic, and the arctic indigenous people, and how so little that I had learned about design applied in this region - even though I had lived and studied in the Arctic for years. Long distances between villages that are accessible only by air, lack of manufacturing, extreme weather conditions, climate change, and cultural differences were just a few of the challenges that caused confusion in a young designer's mind.

That was 4 years ago, in 2011. Since then, the topic has been in the back of my mind, which led to my return to CCHRC in the summer of 2013 to work on a *research through design* case on a sanitation system for rural Alaska. It was discovered that the problems in the Arctic indigenous

1 *Finland's Strategy for the Arctic Region, 2013,* p.20

communities are often wicked, and they cannot be approached the same way as tame problems. The wicked problems are complex, and approaching them is not straightforward. Designing for arctic indigenous communities is not straightforward. This discovery led to the research question of this MA thesis, which is *What kind of framework enables a designer to tackle the wicked problems of arctic indigenous communities?* The research through design resulted in three main themes for tackling the wicked arctic problems: Design for rural Arctic (chapter 5), Design with Arctic indigenous community (chapter 6) and System approach to the wicked problems in the rural Arctic (chapter 7). Only some information about cross-cultural design with Arctic communities was gained from the design case. The two other categories also required more information, and therefore the gaps in knowledge were filled by semi-structured interviews of five Arctic experts. Grounded theory was applied to analyse the data from the design case and the interviews, and the themes that emerged were compared with theory and Arctic reports. The result of the research is a diagram, which explains the gaps in Arctic design, and suggests a framework in which a designer can improve the process.

1.1 SCOPE OF THE RESEARCH AND PROBLEM FRAMING

The research covers rural indigenous villages in the entire Arctic region. The purpose of the research is to define the main environmental and social characteristics of these communities, and from there to understand how the wicked problems of the Arctic could be tackled with design methods.

Design research is often divided into three categories according to Christopher Frayling's (1993) theory. These three categories, which Frayling derived from Herbert Read's analysis of art education, are research *into* art and design, research *through* art and design, and research *for* art and design. Research *into* design is research on the design activity itself. Research *through* design generates data from design activity. Research *for* design gathers findings for design to benefit from.[2] This research is both research through design (design case) and research for design (interviews).

The research will benefit projects that aim to enhance the well-being of Arctic indigenous communities. The information is useful for all design, whether the plan is to design a sanitary system or improve health care in a village. The research offers a view on how design has been done for

2 Frayling & Royal College of Art, 1993

those communities, the current situation and recommendations for the future.

1.1.1 NOTE OF LANGUAGE - DESIGN *FOR* AND DESIGN *WITH*

In the article *From User-Centered to Participatory Design Approaches,* Elizabeth B.-N. Sanders describes the difference between *design for* and *design with* as a shift from "designing for the users to designing with users". As the name of the article states, it is a shift from user-centered design, where designer learns about needs of the user and designs for that criteria, to participatory design, where the user him-/herself is an active part of a design process.[3] Nevertheless, in this research, design *for* arctic indigenous community only expresses that the work is situated *in* these communities. The term *for* doesn't exclude design *with* the community, which means that design can prompt from the community.

1.2 RESEARCH QUESTION

1. *What kind of framework enables a designer to tackle the wicked problems of arctic indigenous communities?*

The research question asks *how* should design for Arctic indigenous villages be carried out? It is *cross-cultural design*, but it can also be *design for changing climate*, *sustainable design*, and participatory *design*. Knowledge from one discipline alone cannot solve the wicked Arctic problems, so interdisciplinarity is required. Knowledge from one culture alone may not solve the wicked Arctic problems, so cross-cultural work is required. How to select the correct framework that would not exclude the other necessary themes? History in the Arctic is full of examples of how a single action has accidentally turned into a system-level change. For instance, the rapid social change in Arctic indigenous villages is a consequence of introducing western education system to the villages. The action can be as small as introducing a new type of clothing, or as big as introducing a new education system, but the trend is that often the consequences of the actions have not been predicted, and the connections to the big picture have not been understood. Therefore, looking at the problem only through one lens may lead to a disaster. It is also good to remember that outsiders' actions have caused more harm than good to the indigenous villages, so before acting it should be asked if outsiders' input is even needed in a community.

3 Sanders, 2002

1.3 LIMITATIONS

To ensure the validity of the work, arctic indigenous communities should be included in the research process, or at least the results should be reviewed with them. Within the limitations of this research, this was not a realistic option, and such a review was not done. Although two of the interviewees are members of indigenous groups, both have leadership roles in the implementation projects, and therefore it can be argued that the research has an emphasis on a top-down, rather than bottom-up approach.

2 DATA AND METHODS

Data for this research is from one design case and five interviews. All data is qualitative. The design case was carried out in 2013, and interviews in 2015. This chapter describes how the data was gathered, what the data is and how the data was analysed.

2.1 DESIGN CASE: SANITATION SYSTEM FOR RURAL ALASKA

The case served two purposes: it was a design case, but it also revealed information by research-through-practice about what a designer needs to know when designing for Arctic Indigenous villages. This section explains how the data was gathered and the results of the design case.

2.1.1 DESIGN CASE - FRAMING THE BRIEF

The design case was completed in summer 2013 at the Cold Climate Housing Research Center (CCHRC) in Fairbanks, Alaska. The project involved cooperation with Lifewater Engineering Company and Alaska Native Tribal Health Consortium. The project was to design a solution to overcome the sanitation problems in rural Alaska. Several rural Alaskan indigenous villages are lacking a proper sanitation system, and many households have only a so-called *honey bucket*, which is a bucket inside of a frame, as their toilet. Essentially, it is an outhouse, but located indoors. When the bucket is full, someone from the family, often a child, empties the bucket into a container outside the house. Once that container is full, it is taken by all-terrain vehicle into a sewage lagoon that is also a dump for all domestic waste. Honey buckets are hazardous to health, and there is urgent need for a better solution.

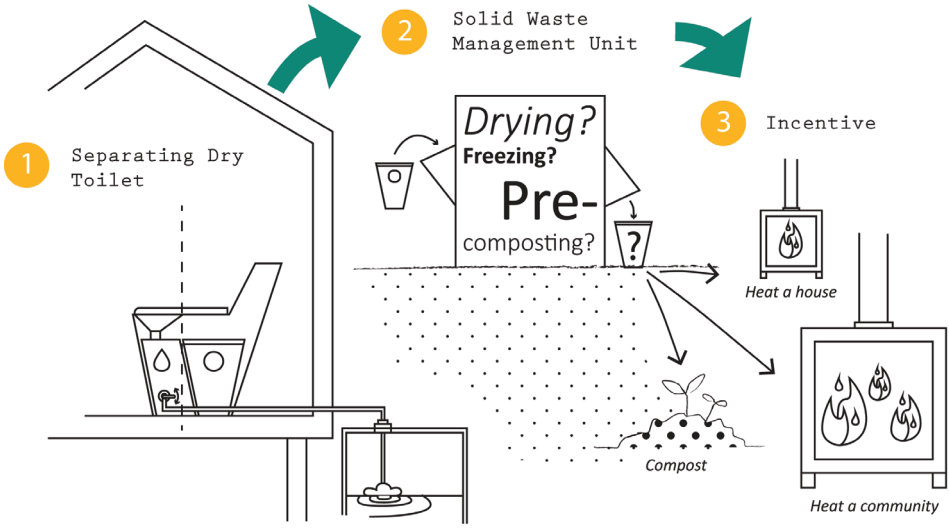
It became apparent why there are no better solutions for sanitation: extreme weather conditions, long distances, and lack of road connections, expensive energy, lack of manufacturing, and even cultural differences made the design case challenging. The problem was wicked, and I soon discovered that many things I had learnt in design school did not apply in the rural Arctic.

2.1.2 DESIGN CASE

The goal of the design case was to create a concept of a better toilet that could be adopted by rural Alaskan villages to replace the harmful honey buckets. The environmental, social, and economic sustainability of the product's entire lifecycle was a high priority from the beginning. Nevertheless, the more I learned about design for a rural Arctic community, the clearer it became that in order to reach the sustainability goal, we cannot just design a sustainable product - a toilet seat - but first design a sustainable system for a community, and then the products for that system. Therefore, the result of the design case was a concept of the whole sanitation system. The situation could be compared to designing a puzzle: you cannot design all the pieces of a puzzle individually first, and then try to fit them together; you need to have the holistic picture of the puzzle first, and then start breaking it into parts.

The timeline of the project was three months, and it was clear from the beginning that this would limit the project outcome to be conceptual, rather than develop a functional solution. There was no budget, and no guarantee of actual implementation, and so involving the community in the design process was considered to be irresponsible practice. Clearly it was, then, impossible to determine the community's wants and needs and the environmental restrictions of the village. Doing so would have also been irresponsible. Since the project couldn't be carried out with the villagers, the decision was made to concentrate on the information that was available. The suitability of existing sanitary systems was evaluated with respect to the challenges of the rural arctic environment. Research into previous sanitary projects in rural Alaskan villages included reading reports and especially discussing with the representatives of CCHRC, Lifewater Engineering Company and Alaska Native Tribal Health Consortium. With the help of Lifewater Engineering Company, a prototype of a dry toilet was built which provided user experience of a dry toilet both from the user and the maintainer perspective. From there it was possible to develop a flexible concept of a waste management system that could be modified according to the needs of the village and the villagers. The concept (Image 1) has three different stages of dealing with the waste: A toilet seat, a waste management unit, and an incentive for making use of the waste. Each of these stages includes a list of options that are either already proven to work, or have potential to work, in the Arctic circumstances. This concept is a conversation tool in a waste management system design process. While solutions may be selected from the list, its purpose is to inspire the community to generate suitable ideas for their own village.

WASTE MANAGEMENT CONCEPT FOR RURAL ALASKA



1 **Separating Dry Toilet.** Urea is collected into a container, which can be emptied by opening, and closing the valve. The feces are collected into a bucket, that either is airtight, or connected to a ventilation system.

2 **Solid Waste Management Unit.** This unit handles the feces suitable for further use. It could mean drying, composting, or some other method to make the microbes harmless.

3 **Incentive.** Think waste as a resource. Consider the possibilities to use waste, and ask what the community needs, and what would motivate to take care of the whole system. This is illustrated to the end of the material flow, but the design should actually start from here, because it defines if the waste needs to be dried, and formed into pellets for the stove, or burned in a big incinerating plan, that produces heat for the whole village on the coldest days, or used for something else.

Maintenance. The arrows describes the action, when the solids are being transported from one unit to another. *How it will be transported*, and by *who*, are the questions that should be solved with the community.

Image 1. Conversation tool for rural Alaskan community waste management planning

2.1.3 RESEARCH THROUGH DESIGN

In *research through design*, knowledge is constructed through design activity. Typically, the design created for research purposes is a prototype, scenario or concept - the main focus is in research, not the creation of a finalized design. This method is also known as *constructive design research*.[4]

The methods used in the design case were *experiencing*, *observing* and *discussing*. *Experiencing* included observing characteristics of Arctic design through design practice. *Observing* and *discussing* involved learning from peers. The project was completed in the Cold Climate Housing Research Center, which presented an opportunity to learn the practice from the experts of rural Arctic design. Reviews and suggestions from peers guided the project. The documentation of the design case includes background research, meeting notes, drawings, and a report of the case.

2.2 LEARNING FROM THE ARCTIC EXPERTS - THE INTERVIEWEES

The design case brought good overall understanding about the challenges in design for rural Alaskan villages, but it also raised questions. The clearest gap of information was in *design with arctic indigenous communities*. The missing information was sought through five interviews in summer 2015.

2.2.1 SELECTING THE INTERVIEWEES AND INTERVIEWING METHODS

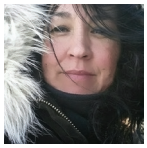
There are only a few designers, or other experts, who are working with the same scope as this research. Despite the small number of designers and experts working on this topic, the ones that were interviewed had great experience and genuine passion to cooperate with arctic indigenous communities. The interviews were semi-structured, which means that themes and questions were drafted according to the interviewees expertise, but the structure of the interview was open for discussion and emerging questions. The structure also allowed new themes to emerge, if they were relevant to the topic.[5] All the interviews were done through video call, and were recorded and transcribed. The length of each interview was approximately an hour, which was seen as adequate time to get deep enough into the topic, but also stay within the limits of the topic.

4 Koskinen, 2011, p.4-6
5 Hirsjärvi, Remes, & Sajavaara, 2007, p. 203

2.2.2 INTERVIEWEES

***Jack Hébert* | CEO and founder of Cold Climate Housing Research Center | ALASKA | USA**

Cold Climate Housing Research Center (CCHRC) is a nonprofit organization with significant experience in sustainable housing design for rural Alaskan indigenous communities. The communities participate in the planning and building process, and traditional and western knowledge is combined in the designs. Jack Hébert has almost 40 years experience of designing and building homes for circumpolar Northern communities. Through his personal achievements as a contractor and work with CCHRC, he has broad knowledge on sustainable design for Arctic indigenous villages.[6] The theme of the interview was the design process for rural Alaskan indigenous communities.



***Jacqualine (Jackie) Qataliña Schaeffer* | Project Specialist | WHPacific, Inc.|ALASKA |USA**

Jacqualine (Jackie) Qataliña Schaeffer grew up in an Iñupiat village in Kotzebue, Alaska. She studied fashion and interior design in London, but established a career in a regional energy planning team for rural Alaska. For both the community and the energy planning team, she is a person who understands the conditions in the villages, making her the link for the local perspective. She coordinates and facilitates a multi-agency project for a rural Alaskan village, Oscarville, which applies a holistic approach to improve wellbeing in the village. The interview included questions about facilitating a holistic approach project for a Native Alaskan village, and cross-cultural communication.

***Svetlana Usenyuk* | Postdoctoral researcher | Department of Ethnohistory, Anthropology research group, Institute of History and Archaeology | Ural branch of Russian Academy of Sciences | RUSSIA**

Svetlana Usenyuk is a designer working with an anthropology research group. Her research interests are transportation networks and transportation vehicles for the Arctic. She has researched the mobility of indigenous reindeer herding communities in Finland, Norway and Russia. The interview included questions about traditional knowledge and work with Arctic indigenous groups; her insights on the design profession in the Arctic was also valuable for this research.

6 http://www.cchrc.org/about-us

***Bruce Forbes* | Director of Global Change Research Group |Arctic Centre | FINLAND**

Bruce Forbes is a director of Global Change Research group at Arctic Centre. He led a research project, Environmental and Social Impacts of Industrialization in Northern Russia (ENSINOR), which took place from 2004 to 2007. *The project undertook a multidisciplinary analysis of the social and environmental consequences of energy development in northern Russia*[7]. One of the results of the project was a *declaration of coexistence* between nomads and the oil and gas industry in the Russian North. The research group coordinated the cooperation between these two groups, who both shared an interest in the same land. The main theme of the interview is to understand how the coordination and communication proceeded between the herders, regional administration and the oil industry.

***Elina Helander-Renvall* | Director of Arctic Indigenous Peoples and Sámi research office | Arctic Centre | FINLAND**

Elina Helander-Renvall has both personal and professional understanding of indigenous people in the Arctic. Her research field is resource use and customary law among the Sámi people. Helander-Renvall's latest research is about Traditional Ecological Knowledge in the Sámi homeland region of Finland. Traditional knowledge was the theme of the interview, but understanding differing worldviews was another important topic during the interview.

2.3 ANALYSIS OF DESIGN CASE AND INTERVIEWS

To form a holistic understanding of design for rural Arctic indigenous communities, the method for collecting data should not be too exclusive. In the beginning of the research, it was not clear what information was important and what was not. This was intentional, because the purpose was to be objective and learn about emerging themes around the topic. The same method is used for analyzing the data. Data is not organized according to a certain theory, but according to topics that emerge from the content itself (see image 2). The method this research uses is *Grounded Theory* [GT], developed by Barney G. Glaser and Anselm L. Strauss, and published in the book Discovery of Grounded Theory in 1967. Later Glaser and Strauss developed the grounded theory in

7 http://www.arcticcentre.org/EN/RESEARCH/Projects/Pages/ENSINOR

different directions, and this research follows Strauss's method for coding (organizing) data[8]. GT was developed for the formation of new theories, which is not a realistic goal for Master's Thesis level work. Instead, the method is applied here to form new information.

GT is based on the phenomenon of complexity. This means that the object of research is approached with a holistic view. GT is a predominantly inductive method for collecting and organizing data, which means forming a new hypothesis from the collected data, instead of aiming to test (verification method) or implement (deductive method) existing theories.[9] Coding and analyzing of data proceed simultaneously, and therefore new topics may arise throughout the process[10]. Strauss divides coding into three phases: Open, axial and selective coding. *Open coding* categorizes the data according to its similarities and differences. *Axial coding* places the categorized data in relation to each other, creating subcategories. In *selective coding* the essence of the data is formulated on a more abstract level to answer the research question.[11]

The information from the interviews and the case study is divided under three themes in the open coding phase of analysis. :

- *Design for Rural Arctic* (Chapter 5)
- *Design with Arctic Indigenous People* (Chapter 6)
- *Systems Approach to the Wicked Problems in the Rural Arctic* (Chapter 7)

Within each theme, the information is clustered into sub-themes which emerged from the interviews and literature; this is the axial coding. The chapter *Design for rural Arctic* compares the findings from the design case and interviews to reports and literature about rural Arctic circumstances from an environmental perspective. Environmental reports, especially the Arctic Climate Impact Assessment (ACIA), had a key role in understanding environmental trends in the Arctic. The chapter *Design with Arctic Indigenous People* is about cross-cultural design, and bridges understanding between western and arctic indigenous cultures. In particular, the Arctic Human Development Reports (ADHR; ADHR II) support the analysis. In the chapter *Systems Approach to the Wicked Problems in the Rural Arctic,* the data is reflected to theories of systems thinking and design.

In the selective coding phase, a conclusion is derived from the essence of these three chapters.

8 Silvonen & Keso, 1999
9 Strauss, 1987, pp. 6; 11-12
10 Strauss,1987, pp. 22-23
11 Silvonen & Keso, 1999

RESEARCH JOURNEY

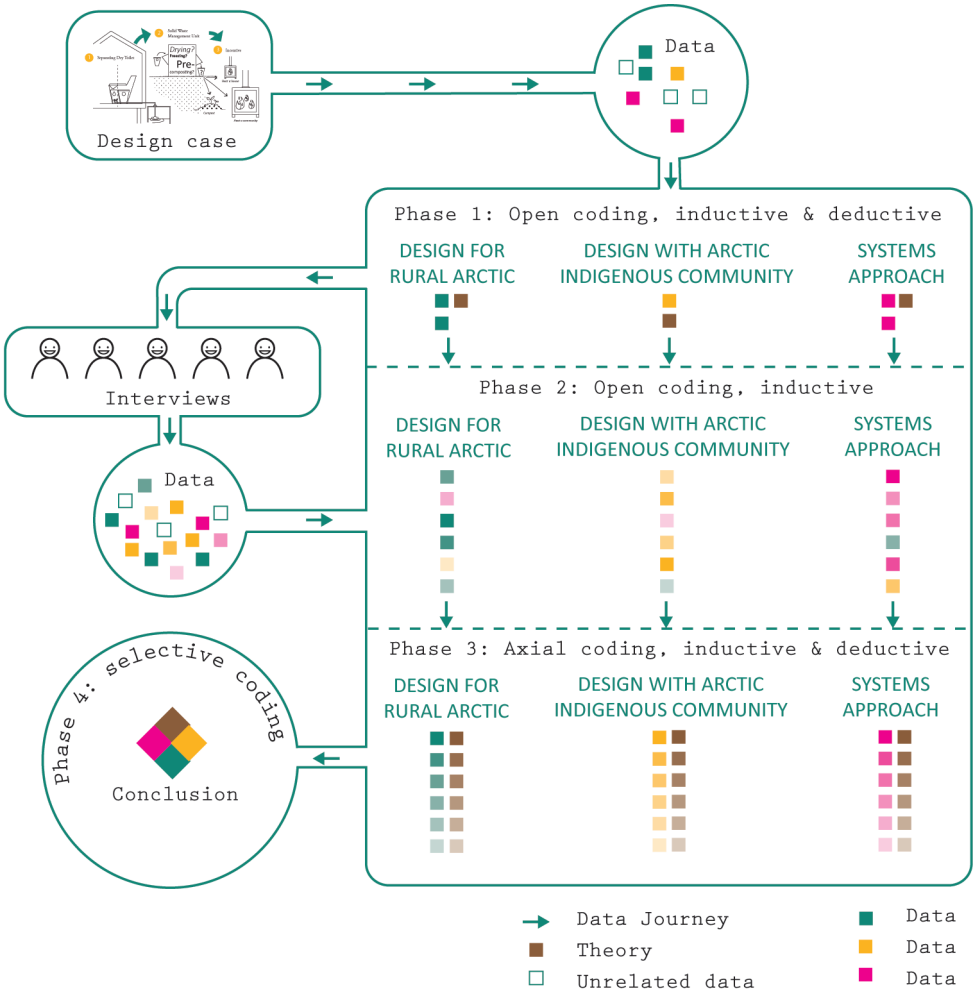


Image 2. This diagram describes how the research proceeded with grounded theory.

3 THEORETICAL FRAMEWORK

3.1 SUSTAINABILITY AND DESIGN

Ezio Manzini defines design as an activity that everyone does, but few are professionals in it. He compares design to running: everyone can run, but not everyone runs a marathon, nor becomes a professional runner..[12] In this research, the term *design* is used rather freely - it describes all planning activity, whether it is considered good or bad. Nevertheless, design is *evaluated* from the point of view of a designer from art and design school. This means that good design considers also people, not only the solving of technical problems.[13]

"There are professions more harmful than industrial design, but only a few of them." These are the first words from the preface of Victor Papanek's book *Design for the Real World*. Papanek addresses design's capability to enable mass production of unnecessary products, which are harmful to both nature and people. Instead, he suggests, design should be considered as a tool to fulfil *the true needs of men*.[14] William McDonough & Michael Braungart inspire designers to create products as wonderful as a cherry tree, that gets all its energy from the sun, creates fruits that not only create more trees, but also nurture biodiversity, and at the end of its lifecycle will turn itself into nutrients for other beings. The concept is Cradle to Cradle (C2C), which is based on the three pillars of sustainability: Ecology [environment], Equity [social] and Economy. C2C calls for designs which consider these three aspects of sustainability both in the material lifecycle and the function of the product.[15] It is easy to agree with the message of these theories; the difficulty is to apply them in practice. It is rare that one person can acquire such knowledge that

12 Manzini, 2015, p. 37
13 Koskinen, 2011, p. 8
14 Papanek, 1972, Preface
15 McDonough & Braungart, 2002, pp. 92, 150-154

includes the whole lifecycle of design from raw material to product and back to raw material. Design that follows these principles often requires a team of experts working together. Papanek addressed this already in 1971, explaining that in a cross-disciplinary team, a designer is often the link between all disciplines. Every discipline has its own language and working methods, and the designer's educational background enables them to bridge these gaps. Papanek explained that besides filling the designer's role, a designer is a *team interpreter*.[16] Yet, it seems that when the goal is to solve the *true needs,* team interpreting becomes an even more important part of the designer's work than the traditional design role. John Thackara (2005) suggests that instead of considering design as an act of creating solutions for problems, design should intervene in the problematic situation by conducting change. Thackara compares this design approach to the composition of an improvisational musical piece. He describes that "in a sense the situation is itself designed: The composer places an idea, a score, and people on the stage, but he does not furnish a finished script."[17] Therefore, in the field of sustainability, the designer is often most useful as a coordinator of a change.

3.2 WICKED PROBLEMS

The essence of Thackara's definition of design approaches is that traditional design solves problems, but a sustainable design approach conducts problematic situations. To put it another way, there are two type of design problems which need to be responded to differently. Horst Rittel (1972) divides design problems into *Tame Problems* and *Wicked Problems*. The tame problems are relatively easy to define and solve, but the wicked problems need to be looked at from the systems perspective to understand them, and there is no single definition of, or solution to, a wicked problem.[18] Nigel Cross concluded in his book Design Thinking (2011) that expert designers given a tame problem may realize that it is actually ill-defined, and see the necessity to treat it as a wicked problem. Understanding the wicked nature of the problem is crucial, because it cannot be solved the same way as a tame problem[19]. From the design case, it emerged that the nature of the rural Alaskan sanitation problem is wicked, and the data revealed that the wickedness is a frequent feature of the issues of rural Alaskan communities. That discovery prompted the decision to examine Arctic communities from a systems point of view.

16 Papanek, 1972, p. 21-22
17 Thackara, 2005, pp. 211-212
18 Rittel, 1972, p. 392
19 Rittel, 1972, p. 392

WICKED PROBLEMS AS HORST RITTEL AND MELVIN WEBBER (1973) DEFINE THEM:

1. **There is no definitive formulation of a wicked problem**
   Definition of a wicked problem depends on the suggested solution. If the issue is too few female leaders, how should the problem be defined? Is it because women don't want or don't have the courage to apply to high positions, is it lack of education or does the culture favor male leaders? Whereas tame problems are dealt by defining the problem and solving it, wicked problems are dealt with by suggesting a solution, and this solution defines the problem.

2. **Wicked problems have no stopping rule**
   Wicked problems don't have a clear end; an end is defined by resource limitations rather than by finding a clear solution.

3. **Solutions to wicked problems are not true-or-false, but good-or-bad**
   The solution cannot be evaluated like a solution for an equation, which is either correct or not, because for wicked problems there are no correct solutions. The evaluators' personal interests and opinions affect their judgement, so the evaluation of success is subjective.

4. **There is no immediate and no ultimate test of a solution to a wicked problem**
   A solution for a tame problems can be tested and evaluated as working or not working. A solution for a wicked problem cannot be tested, because after placing the solution into a context, it will create *waves of consequences* - both short- and long-term - which are too ambiguous to be predicted in advance.

5. **Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly**
   In the wicked planning problems every implemented solution is consequential. It leaves traces that cannot be undone. Building a sewage system for a rural arctic community is a huge challenge, requiring a lot of human and economic resources, and still it may not work as projected.

   Author's note: In some cases, the risk can be reduced by using co-experience methods for testing.

6. **Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan**
   It is impossible to be certain that all possible solutions to a wicked problem have been considered, nor that the solutions considered will be correct.

7. **Every wicked problem is essentially unique**
   Wicked problems cannot be categorized. For instance in mathematics, certain types of equations can be solved with certain methods, but there is no single method to solve wicked problems, because the nature of the problem is always unique.

8. **Every wicked problem can be considered to be a symptom of another problem**
   The level at which a problem is settled depends upon the self-confidence of the analyst and cannot be decided on logical grounds. The issue of high suicide rates in arctic indigenous communities can be traced to many levels and directions; in the end there are no correct answers, and the solution is often selected without logical reasoning. Often the level at which action is taken is selected to match the knowledge and courage of the implementer, instead of the level where it should be tackled. If the approach is too shallow, it may make solving the case more problematic.

9. **The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution**
   Considering the same example, high suicide rates in the Arctic, there are multiple ways to attack the problem. The reason can be mixed identities, social relations, or the sense of having no purpose in a community. If we decide that the problem is connected to unemployment, we can attempt to solve the problem by creating more job opportunities. If we successfully decrease unemployment, we may say that the project met the goals. It is an another thing to ask if the act really decreased suicide rates, or just created more western economy in the village.

10. **The planner has no right to be wrong**
    The planners are responsible for the consequences of the solutions they suggest and implement. The solutions may have a major impact on people's lives, especially in Arctic communities. Even though the aim would be to improve wellbeing, there are no guarantee that the decisions would have been good.

3.3 SYSTEMS THINKING

"The righter we do the wrong thing, the wronger we become. When we make a mistake doing the wrong thing and correct it, we become wronger. When we make a mistake doing the right thing and correct it, we become righter. Therefore, it is better to do the right thing wrong than the wrong thing right. This is very significant because almost every problem confronting our society is a result of the fact that our public policy makers are doing the wrong things and are trying to do them righter."
Russ Ackoff (2004)

As Rittel & Webber addressed, "Every wicked problem can be considered to be a symptom of another problem". To understand wicked problems, one needs to look at them from a holistic perspective. Understand the problem as a part of a system, and learn what the elements and the rules of that system are. From there, the possible leverage points can be defined.

3.3.1 SYSTEM

A forest is a system, and a tree is an element in that system. Besides being an *element* of a larger system, a tree also forms a system itself. Leaves, branches, trunk and roots are elements of that system, and cells are subsystems. Nevertheless, elements themselves don't form a system, there needs to be *interconnections* between the elements, and a *function*[20]. Interconnections are relations between elements. They can be physical, like water and nutrients going through the tree, but often they can also be immaterial, such as information flows. For instance, if the roots cannot have enough water, the interconnection is the message to the leaves to close their pores to stop evaporation. If these information flows are delayed or interrupted, it may strain the resilience of the system. Not everything is a system, but everything can become a system. A piece of firewood in a basket is no longer a system like a tree is, but if it is thrown into a fireplace, it is part of a heating system, or if it is thrown into the forest, it will decompose and become part of the ecological system of the forest.[21]

If the elements, interconnections or function of a system are changed, the system behavior also changes. This is an important point, because it means that systems can be changed by affecting these three points. Often, problems are tried to be solved by changing the visible parts of the system, the elements, even though greater impact could be achieved

20 Meadows & Wright, 2008, p. 11
21 Meadows & Wright, 2008, pp. 12-14

by changing the interconnections or the function of the system. For some problems it is enough to replace the weak elements with better ones, but some problems require changing the rules [interconnections] of the game, or reframing the purpose [function]. Meadows compares this to a football team: if you change the players [elements], the game is still the same, but depending on the players it can be good or bad. If you change the rules to basketball rules, the game is all different. Also, if you change the purpose of the game to losing instead of winning, the behavior changes completely.[22]

3.3.2 BOUNDARIES

"If you try to solve a sewage problem by throwing the waste into a river, the towns downstream make it clear that the boundary for thinking about sewage has to include the whole river. It might also have to include the soil and groundwater surrounding the river. It probably doesn't have to include the next watershed or the planetary hydrological cycle."
Donella Meadows (2008, p. 97-98)

A large part of understanding the nature of the problem is to understand its correct *boundaries*, what systems to include and what to exclude. If the boundaries are too narrow, important things may be missed; by making the boundaries too broad the system will become difficult to handle. The correct boundaries are not easy to draw, especially because they rarely follow anthropogenic boundaries, such as academic disciplines or regional borders.[23]

3.3.3 RESILIENCE

Resilience is a frequent theme in the Arctic literature, from the perspective of both people and environment. Meadows (2008) defines resilience as an elasticity to changing circumstances. It means the ability to stretch and bounce back, without losing the original function. In other words, a resilient system has an ability to restore and repair itself. Still, resilience always has limits; if the change exceeds the limits of resilience, it will lead to a collapse of the system.[24]

22 Meadows & Wright, 2008, pp. 12-17
23 Meadows & Wright, 2008, pp.97-98
24 Meadows & Wright, 2008, pp.76-79

4 SETTING THE SCENE - ARCTIC AND PEOPLE

The sanitary system design case began with benchmarking the existing solutions for the sanitary problem. A variety of dry toilets was found, many of them designed in Arctic countries like Finland and Sweden, but none of them were designed for extreme rural Arctic circumstances. Instead, similar sanitary problems were identified in several rural villages all over the Arctic. That led to a decision to compare the wicked problems and the ways they have been tackled throughout the whole Arctic. This chapter explains what the Arctic is and who its inhabitants are. The purpose is to gain an understanding of the whole region and the ongoing trends there.

4.1 ARCTIC

This section focuses on the characteristics and trends in the arctic environment. This is to understand the nature of the region, which will be useful in order to understand especially the environmental context of the design. This section creates understanding about ongoing research and contemporary environmental issues in the Arctic.

4.1.1 DEFINING ARCTIC

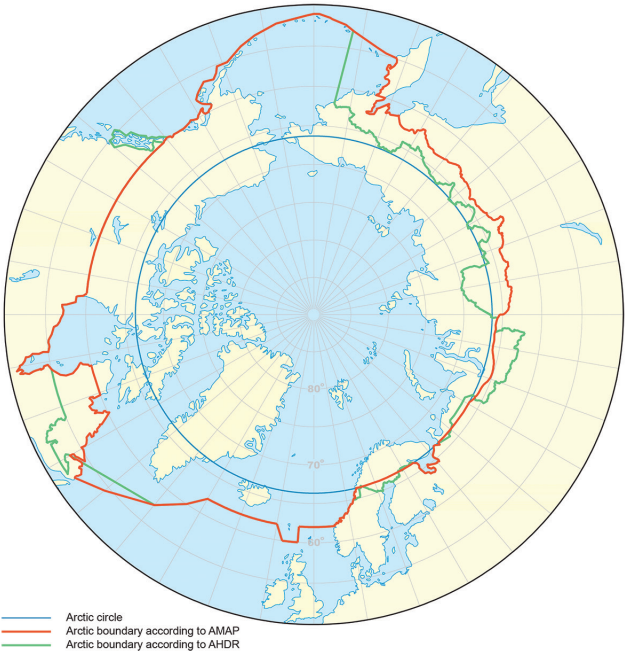
The borders of the Arctic change as the point of view changes. Different disciplines have different interests in, and criteria for, this northernmost part of the world, which influences each one's definition of the Arctic. Some may set the Arctic boundaries according to flora or fauna, permafrost, or average temperature, but it also could be defined by latitude, regional borders, or human groups. Increasing cooperation between disciplines and organizations also creates new variables. Besides that, the definitions change over time. Because of climate and social change, circumstances in the Arctic are changing so rapidly that the boundaries

drawn on the map are also changing quickly. There are as many definitions as there are points of view, but they have some things in common: the Arctic has cold and dark winters, until spring wakes up the nature, leading to relatively warm nightless summers that eventually turns to fall to prepare the nature for another winter. Flora and fauna follow this cycle, as do humans, more or less. The Arctic is a variety of extreme climates, from cold and dry inland to humid and windy marine climate. There is more or less as much sea as there is land, and a huge part of both of those are covered by permafrost. Arctic forests are mainly coniferous forests, switching to a treeless tundra in the North, and a remarkable part of the land is swamps[25]. The Arctic starts from the North Pole, but how far it reaches down depends on the definitions from each branch of science, or political agreements[26].

The Arctic Council's[27] Arctic Monitoring and Assessment Program (AMAP) defined the Arctic boundaries in its reports in 1997[28] and 2002[29] based on 60° N latitude with country-specific modifications. The member states of Arctic Council, which are Finland, Sweden, Norway, Denmark, Iceland, Canada, United States, and Russia, set the boundaries of their own Arctic region, and together it formed the AMAP map of the Arctic.[30] This AMAP map of Arctic was the baseline for Arctic Human Development Report (AHDR) map of Arctic, 2004. AHDR redefined the Arctic region to cover its multidisciplinary interests on Arctic issues, and many of the new boundaries were mainly determined by *location of jurisdictional or administrative boundaries and the availability of data*.[31] Arctic Human Development Report map (Map 1) is used in this research due to the commonality of its interests.

25 Mähönen & Joki-Heiskala, 1997, p.14
26 Valtioneuvoston kanslia, 2013, p. 14
27 http://www.arctic-council.org/index.php/en/about-us/arctic-council/history, *In 1996, the Ottawa Declaration formally established the Arctic Council as a high-level intergovernmental forum to provide a means for promoting cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic Indigenous communities and other Arctic inhabitants on common Arctic issues; in particular, issues of sustainable development and environmental protection in the Arctic.*
28 *Arctic pollution 2002: persistent organic pollutants, heavy metals, radioactivity, human health, changing pathways*
29 *Arctic pollution issues: a state of the Arctic environment report*
30 Mähönen & Joki-Heiskala, 1997, p. 14
31 *AHDR*, 2004, pp. 10-17

ARCTIC BOUNDARIES



Map 1. Compiled by Winfried K. Dallmann

4.1.2 CLIMATE CHANGE IN THE ARCTIC

Oscillations in temperature are not unusual events in the Arctic. There have been colder and warmer periods throughout history, but the change in climate after the industrial revolution has been too rapid and lasting for its origin to be anywhere other than in human activity. It is commonly known that there is a strong connection between human-caused greenhouse gases and global warming. That warming has started a reinforcing loop of climate change, and as ACIA report predicts, by the end of the 21st century temperatures may be 4-7 °C warmer on the Arctic surface, and the Arctic Ocean will be completely free of ice during summer. For the Arctic, climate change means thinning and diminishing ice and snow cover, thawing permafrost, and several changes in ecosystems and people's lives. Warming in the Arctic also has global consequences, which will be seen for instance as a global sea-level rise that is anticipated to be 20-70 cm by the end of 21st century.[32] Melting permafrost,

32 *ACIA*, 2005, *Summary and Synthesis of the ACIA,* pp. 989-997

glaciers, and ice sheets can increase freshwater runoff into the Arctic Ocean, which will desalinate the seawater. That affects the density of oceans, which can change global thermohaline circulation, such as the gulfstream. Total shutdown of circulation is unlikely, but reduced circulation is possible. Thermohaline circulation brings milder winters to some continents, but if this changes, it also means that some regions will experience cooling.[33]

Jari Haapala from Finnish Meteorological Institute states that the consequences of climate change are first seen in the diminishing Arctic sea ice, then melting permafrost, and finally, the melting of Greenland's ice sheet.[34] The melting sea ice opens up new navigation routes, and extends navigation season and potentially access to natural resource extraction. From the commercial economy's point of view, oil, gas, commercial fishing and minerals are the most significant resources in the region, but climate change also has a remarkable impact on access, mainly reducing access to the traditional resources such as fish, wildlife, plants and wood. The Arctic countries, and even the countries beyond the Arctic, are interested in the opportunities that this change will present. However, the change will also have impact not only on indigenous people, but also the Arctic ecosystem.[35] Marine mammals, particularly polar bears, walrus, seals, and narwhals, are in danger of losing their natural habitat. The impacts on ecosystems are not limited only to the Arctic. Science magazine published a report that estimates every 6th animal or plant species will become extinct because of climate change by the end of 21st century, if the temperature rises 4.2 C°. The study is based on 131 published predictions on extinctions from climate change.[36]

4.1.3 GLOBAL ENVIRONMENTAL THREATS ON THE ARCTIC - ANTHROPOGENIC POLLUTANTS

Humans have an impact on the arctic environment in many ways both directly and from a distance. Inhabiting the North and extracting natural resources from the Arctic impacts climate, environment, and ecosystems in the region, but also human actions at warmer latitudes have crucial consequences for the arctic environment. Climate change is one of the challenges, but along with it, heavy metals, persistent organic pollutants, acidification, and ozone depletion are significant human-caused environmental threats. The cold climate enables many pollutants to travel long distances all the way to the Arctic, but also, because of cold air, pollutants get stuck there. Some pollutants arrive in the North by

33 *ACIA*, 2005, *Summary and Synthesis of the ACIA,* pp. 999-1000
34 "Ilmastotutkija: Jos metaani vapautuu ilmakehään, niin peli on pelattu," 2012
35 *ACIA*, 2005, pp. 997-1002
36 Urban, 2015

air, but some are brought by sea currents, or in animals' food chain. The sum of these events may expose arctic people to toxins more than people from the latitudes where the pollutants were created.[37]

4.2 ARCTIC INHABITANTS

There are about 4 million inhabitants in the Arctic, approximately 10% of whom are indigenous people.[38] In most places, indigenous people were the first settlers of the region. Their ancestors arrived in the North as early as 4,000 years ago, if not even earlier. Over time, these native groups formed distinct lifestyles, based on self-sufficiency and adapting to the Arctic circumstances. Much later, the North began to generate more interest among other cultures, and migration started from Greenland in the 10th century. Migration proceeded slowly, and some areas, such as Canada's High Arctic, had little contact with outsiders until the early 20th century. Even though migration was relatively slow, contact quickly led to a series of radical social changes in Arctic indigenous communities. These days, indigenous people are a minority in the most of the Arctic states, but in some subregions they still form a majority.

The Arctic is also a homeland for many non-indigenous people. After curious explorers of the unknown Arctic, hunters and multiple sects of Christian missionaries started to take their place in the Arctic. The era of missionary work is over, but its influence is seen in the western culture that has spread through almost the entire region. During the 20th century, the Arctic became a source of non-renewable resources and commercial fishing. Mineral extraction and Arctic oil and gas reserves attract investors, and employ people in the North. This enables a livelihood for people who already live in the Arctic, but also for people who move there, either temporarily or permanently. Cooperation within the Arctic states is exemplary, but it has not always been so. During the cold war, it was a military playground for the United States and Soviet Union to show off their power. The situation calmed down after the Soviet Union collapsed, but the Arctic still has a major role in both states' military strategies. Natural resource extraction, and the military, brings a lot of people there, but research and tourism are other attractions of the North.[39]

37 Mähönen & Joki-Heiskala, 1997, p. 64
38 Prime Minister's Office, 2013, p.20.
39 *AHDR*, 2004, pp. 22-25

4.2.1 DEFINING THE INDIGENOUS PEOPLE IN THE ARCTIC

"No matter what is the topic, it always ends up as a discussion about who is Sámi." [Oli aihe mikä tahansa, niin lopussa tuli aina puheeksi se, kuka on saamelainen]

Länsman & Kortelainen describe the results of their research on *The most popular topics on Yle Sápmi internet news and readers' comments*[40]

The definition, and the amount, of indigenous people varies greatly within the Arctic states. Even if the group would be the original inhabitants of the region, and their culture is distinguished from the country's mainstream population, they might not be regarded as an indigenous group in their country. For example, in Russia a group is not defined as indigenous if the amount of members exceeds 50,000, and therefore Sakha and Komi are not registered as indigenous groups. Indigenous people are also partially mixed with the main culture, so defining who is indigenous, and who is not, is not always unambiguous.[41] To be addressed as a part of an indigenous group is not only to provide protection for the indigenous culture, but it is also an important part of a person's social identity and their relationship to a group or a land. Some indigenous groups are more assimilated into the mainstream culture than others, but a strong relationship to nature in both the economic and cultural sense has remained. Economies vary from reindeer herding and subsistence seal hunting to industrial fishing and oil-related business.[42] Indigenous people of Alaska are often referred to as Native Alaskans,[43] and the main indigenous groups there are Inupiat and Yup'ik Eskimos, Alutiiq and Athabascans[44]. In Canada, the indigenous are defined as *aboriginal peoples of Canada*, and include First Nations (also referred as Indians), Inuit and Métis[45]. The indigenous people of Greenland are Kalaallit and Inughuit, indigenous of Northern Fennoscandia are Sámi, and in Russia the 26 *Northern minorities* include Chukchi, Nivkhi, Sámi, Even, Evenk, Shakhas, Khants and Nenets[46]. (See Map 2)

40 Lakkala & Wesslin, 2014
41 *AHDR*, 2004, p. 21
42 Nuttall, 1998, pp. 2-3
43 *AHDR*, 2004, p. 21
44 Nuttall, 1998, p. 2
45 *AHDR*, 2004, p. 21
46 Nuttall, 1998, p. 2

ARCTIC PEOPLES SUBDIVIDED ACCORDING TO LANGUAGE FAMILIES

Map 2. Compiled by Winfried K. Dallmann, Norwegian Polar Institute, and P. Schweitzer, University of Alaska Fairbanks

Although indigenous people have been the first occupiers of the land, they have rarely had a chance to take part in the decision-making in the Arctic, or even in the decision-making in the region their ancestors have lived in for several generations. Laws, human rights, and rights to use the land are usually written by the majority of the country, and indigenous cultures' adaptation to these decisions has been mistakenly taken for granted.[47] United Nations (UN) published in 2008 *Declarations on the Rights of Indigenous People*, proclaiming indigenous people's right to their lands, whether the bond to the land is spiritual, economical, or traditional. The declaration also addresses the right to nurture culture and traditions, and a right to not be assimilated into the mainstream culture. Also, indigenous cultures should have the right to get compensation for lands that have been taken away from them. In 1989, the International Labour Organization (ILO, agency of UN) composed an international Convention on indigenous rights, ILO 169, which have been approved by 22 countries[48]. In Finland, ILO 169 is an example of the difficulties of fitting indigenous peoples' rights into law. The definition of Sámi, rights for indigenous land, and the legal status and management of the Convention have been unclear for the Finnish Parliament[49], so the Convention has not yet been ratified. Once again, on 13.3.2015, the decision was postponed to the next electoral term[50]. Discussion on ILO 169 has increased interest and investigation into Sámi rights, which has led to a deeper understanding of the issues of indigenous rights. Essentially, the Convention would provide an international law for indigenous rights, alongside the domestic law for Sámi rights, but it is not clear whom it would concern and how.[51] Even though the Convention has been criticized for the fact that no indigenous groups were officially involved in its preparation, and *indigenous customs and institutions can be too easily overridden by the government in the name of other laws of the country*[52], Sámi Parliaments and Sámi Council have all actively promoted the approval of the Convention[53]. This case describes well the difficulties of fitting two legal systems, indigenous and western, into the same region. It also addresses the challenges that post-colonial regions need to solve in order to be fair for the colonized communities.

47 *AHDR,* 2004, p. 22
48 *ILO Convention No. 169* from 1989 concerning Indigenous and Tribal Peoples in Independent Countries.
49 Joona, 2012, p. 186
50 Lakkala & Näkkäläjärvi, 2015
51 Joona, 2012, p. 187
52 Joona, 2012, p. 186
53 Henriksen, 2008, p. 31

DEFINING SÁMI

Sámi are the only indigenous people of the European Union. They have inhabited the Northern parts of Norway, Sweden, Finland, and Russia before the borders of these countries were even formed, permanently at least for 2000 years.[54] During the past few years, there has been a lot of discussion of the definition of Sámi, and what their rights are in Finland. As Länsman and Kortelainen (2014) discovered in their research on the most popular topics on Yle sápmi news, it seems that the comments about Sámi internet news, no matter the topic, always ends up as a discussion on "(...) who is Sámi, who has a right to talk as a Sámi, or for Sámi."[55] Currently, Finland's law recognizes Sámi as a person who identifies her/himself as Sámi, and fulfills at least one of the following criterias:

1. Himself, or at least one of his parents or grandparents has learnt Sámi as his native language, or
2. He is descendant of a person that has been registered of a practitioner of traditional Sámi livelihood, including forest, mountain and fishing Lapp, or
3. At least one of his parents has, or could have, the right to vote in Sámi commission or Sámi court election.[56]

In 2015, the Supreme Administrative Court of Finland accepted 100 new persons to the Sámi electoral register - against the will of the Sámi parliament. From the Sámi parliament's perspective, it is not enough that a person has traditional Sámi livelihood practitioner in his lineage; on the contrary, it emphasizes the person's relation to Sámi culture and the Sámi community.[57] As a response to the decision of the Supreme Administrative court, the former president of Sámi Parliament Klemetti Näkkäläjärvi resigns from the Sámi register. He is concerned about a Sámi definition that emphasizes documents more than an actual relation to Sámi culture. He also addresses a mistrust of the Finnish judicial system that forces Sámi to assimilate into the main culture.[58] Nevertheless, defining Sámi according to their relation to the Sámi community has also been criticized in the Sámi parliament, because it also means that the person can no longer define his own identity; the Sámi community has to accept him as part of the group.[59]

Sámi definition is an ongoing debate that not only strains the trust between Sámi Parliament and Finnish Parliament, but also delays laws on indigenous rights. Jari Lindström, current Minister of Justice and Labor, prioritizes Sámi definition as a top issue of Sámi politics at the moment, and hopes for international, unbiased comparative research to bring a solution to this sensitive topic[60].

54 Huurre, 1995, p.151-152; Helander-Renvall & Markkula, 2011, p. 14
55 Lakkala & Wesslin, 2014, Quote by Länsman & Kortelainen, *Research on the most popular topics on Yle Sápmi internet news and readers' comments*, Giellagas institute, University of Oulu
56 Finland's law, laki saamelaiskäräjistä, 17.7.1995/974, 3§
57 Näkkäläjärvi, 2015
58 Wesslin, 2015
59 "Pääkirjoitus: Saamelaismääritelmä hiertää edelleen," 2014
60 Länsman, 2015

4.2.2 ARCTIC INDIGENOUS COMMUNITIES IN THIS RESEARCH

The interest of this research is indigenous villages located in the rural Arctic. To some extent, the results can be applied also to some more urban indigenous groups, but the main focus is on small rural villages. The majority of the data concerns rural Alaskan Native villages, and therefore the circumstances in those villages set the standards for this research. However, many Arctic indigenous villages, for instance in Canada, Greenland and Russia, are also facing equivalent challenges.

PART 2

INTER-VIEWS & CASE STUDY

5 ***Design for rural Arctic***

6 ***Design with arctic indigenous community***

7 ***Systems approach to the wicked problems in the rural Arctic***

5 DESIGN FOR RURAL ARCTIC

World War II reshaped many countries and cultures, and the changes also reached Arctic indigenous groups. The post-war behavior of Arctic states led to the assimilation of minority cultures and encroachment on indigenous people's autonomy.[61] Jack Hébert described how about 50-60 years ago rural Alaskan housing stock changed from nomadic or seminomadic settlements to permanent structures with electricity. The change was imposed by government, and housing was just one part of big changes, such as in the education system, which meant that children were sent away from their families for school. Before, it was usual that people lived in tents and sod iglus, and for the newcomers it could be easy to think that anything would be better than that. Yet, the new housing brought new problems with it. As Jack put it, it was *designs and building science that did come from elsewhere, and these homes were in a way sort of dumped on a society and they were moved to these homes.* The structures were not designed for a cold climate, and didn't support the cultural perception of a home. Indoor air quality was poor, but still the buildings required too much energy to stay warm. Building permanent structures on a thawing permafrost is itself a challenge. This chapter looks into the challenges of rural Arctic environment especially from a housing point of view, but more than that brings comprehensive understanding of design for rural Arctic settlements.

"Literally all cases, those early homes are reached the end of their life. They're structurally unsound, and the indoor air quality in the houses is poor, they're expensive to heat, tremendously expensive to heat, because they're not energy efficient."

Jack Hébert

61 *AHDR*, 2004, p. 46

5.1 LOGISTICS, MATERIALS AND MANUFACTURING

A number of rural Arctic indigenous villages have no road system, and therefore the primary ways to get there are by plane or boat. Jack Hébert emphasizes the importance of logistics in the project planning. The products need to be designed for transportation, as do the tools that are needed for installing the product. Accessibility depends not only on the limited means of transportation, it is also seasonal. Boats can access the village only when the rivers or sea are free of ice. Alternatively, if the material is brought in by airplane, the size of the airfield must be determined. That will give information about what kinds of airplanes can land there, and the decision on logistic methods can be made. Sometimes it is more practical to fly in a house whole instead of in pieces. These villages are expensive to get into also because they are outside of regular flying routes, so just flying a person into the village can cost a thousand dollars. The importance of logistics was noticed also in the dry toilet design case. If something is brought to the village, it cannot be too large or too heavy. If the quantity of the products is high, stackable parts are a suitable option. Overall, logistics plays a significant role in defining the design in the rural Arctic. Aside from the product itself, also people and tools may need to be transported into the village. Jack explained it to be a decision between what costs too much to bring in, and what costs more if it is left out. There are no places to buy the material if something is missing or gets broken, therefore careful planning is essential.

Material selection is also determined by logistics. In the early phase of planning, CCHRC reviews the local material sources with the community. A large part of Arctic is treeless tundra, but if there is forest that could be harvested in a sustainable manner near to the village, that is often more a practical option than shipping in the material. It shouldn't be forgotten that the indigenous people have traditionally got all they need from the land, so *"they know their materials well and display impressive inventiveness in using them to advantage"*[62]. Thereby the community can teach a lot about the materials that are available, materials that perform well for certain purposes and cope with the local environment. Jack Hébert described how processing the material in the village requires creativity, because equipment is limited. It may not always be possible to treat material with modern western technologies, but sometimes the solution can be found from indigenous knowledge. Elsie Mather, Yup'ik elder from Bethel, Alaska, noted that "*Our language had no word for science, yet our tools were so well designed that they allowed us to live in a land no one else would inhabit*[63]." In some cases western technology and

62 Fienup-Riordan, 2007, p. 24
63 Fienup-Riordan, 2007, p. 24

traditional knowledge can even be combined for the best performance; this will be dealt with in more detail in the chapter *6.5 Traditional and Western knowledge*.

The correct material choice is a significant part of the sustainability of the product. The challenge of rural Arctic setting to material life cycle planning is the limited local recycling infrastructure, so it is likely that at the end of the product's lifecycle it will be deposited into nature. Jackie Qataliña Schaeffer noted that before western culture arrived to these villages, the people in the village didn't even know what litter is. Some of the elders lived in a time when everything that they threw away decomposed back to the earth. When the products from the western world were introduced to the village, it wasn't explained how to deal with the waste. Shipping products into the village is expensive, but shipping waste from a village is too expensive.

"Can we design and build systems, that come from that place, so that the materials and things that are available there, near the community, can be used for housing and sort of develop the infrastructure that is needed"

Jack Hébert

5.2 ENERGY SECURITY

The Arctic has a vast amount of natural resources, but most of it is owned by actors outside of the region. Manufacturing in the Arctic is limited, and the economy is based on exporting raw material and importing processed products.[64] Energy, in the form of fossil fuels, is one of the most important exports in the Arctic, even though at the same time the rural Arctic villages are experiencing a lack of energy. Arctic Energy Summit was established in 2007 to discuss the extractive, renewable and rural energy issues in the Arctic. In 2010 the work was finalized and recommendations were made for the Arctic energy sector. The main reasons for rural arctic energy poverty are expensive energy transportation and a lack of technology that operates with the arctic environment, is reliable enough for the remote location and is applicable to small communities and local infrastructure. Shipping fossil fuels to the village is expensive; one third of the energy is used only for transportation. Nevertheless, the fossil fuels are seen as a reliable energy source. Renewables can be produced in the village, and thereby the energy does not depend on transportation, limited by the season, but the availability of energy depends on environmental factors, such as wind and sunlight. Indigenous

64 *AHDR*, 2004, pp. 71-74.

people have a close relationship to nature and the environment, and causing harm to nature impairs the subsistence lifestyle and health. This supports the use of renewable energies.[65]

Within the dry toilet design case, we made a prototype of a drying toilet that used an electric fan to dry solids. The fan had to be powerful enough to guide the air from the room, to dry the solids, and then back into the room through a filter. The fan also had to be small enough to not use too much electricity. It was known that power cuts are common in the village, so the toilet should somehow be able to operate also without electricity. It was challenging to find a balance of strong enough airflow and low enough energy use, which describes well the energy situation in the village and what it requires from design. Energy is tremendously expensive in the rural Arctic, and with poor design it may cause significant issues. Jackie Qataliña Schaeffer is working on regional energy plans for rural Alaska, and her work covers the Alaskan rural villages north of Anchorage. She has visited several villages and learned about design, especially in the housing sector, that doesn't cope with the arctic environment, and also about limited access to energy. Jackie described her visit to a house which was lacking cupboards, because the winter had been so cold that the residents had to burn all the wood to heat the house. Temperature in the Arctic may drop below -50°, which means that the design may need to operate in extreme cold, but be affordable to use. When dealing with something as crucial for survival as heating, an alternative power or heat source needs to be ensured.

5.3 CLIMATE CHANGE

Climate change is already reshaping the environment, ecosystems and population dynamics in the Arctic. Coastal villages are the most affected, and already have difficulties with the consequences of the warming Arctic. In a number of villages, the environment has changed so dramatically that it makes them *imminently threatened*, which means that a part, or a whole village, needs to be relocated in the future. Climate change is seen in reduced sea-ice, which reduces protection from fall, spring and winter storms. Ice used to pack on the coast and block storms and water, but now when that ice is gone, water washes onto the shore and floods are more aggressive. Rising sea level, increased wave action and extreme weather events have all became more common due to climate change, and if there is no ice to cover the village from these events, the resilience of the village is threatened. In addition, thawing permafrost changes the soil, which has serious impacts on permanent

65 Hemsath, 2010, p. 5-23

structures. All this leads to erosion, which may not leave enough land to live on safely.[66] For design, this means new challenges. A design has to cope with the harsh environment, but also be able to adapt to changing circumstances and possibly be easily relocated.

"...when pack ice disappears and storms that come in the fall or in the spring, that used to have ice out beyond the village near the shore to calm the wave action down, that ice is gone. So now when the storm comes in it starts to erode the very place the village is on, because in many cases these locations at least had people occupying them seasonally, were stable for thousands of years. They're not anymore, and they're literally disappearing, so the village needs to move."

Jack Hébert

5.3.1 THAWING PERMAFROST

ACIA predicts 10-20% permafrost decrease over the 21st century. This means that the permafrost will withdraw hundreds of kilometers to the north, and vast amounts of water will discharge into the land, rivers and sea. Thawing permafrost will create new drainage networks and wetlands on low-lying lands, and cause drying of slopes and higher grounds. Water flows will release nutrients from the soil, which will alter the biochemistry of soil and water systems. Clearly, this will affect the behavior of flora and fauna in the area, but it will also have an impact on man-made structures. For permanent infrastructure, thawing permafrost basically means unstable ground. Buildings, roads and underground structures, such as sanitation systems, may get damaged as the ground moves. This means not only impairment of the structures, but also a risk of environmental hazard if the structures contain toxins. The contaminants from sewage lagoons, landfill and tail ponds are in danger of blending with ground and water, if the system is based on permafrost that is now thawing.[67]

Permafrost is the primary reason why several rural Alaskan villages don't have a sanitary system. Structures built in permafrost are not only tremendously expensive, but also unstable. The framing of the sanitation system design case excluded options that would require permanent structures or underground installations. This limited the options remarkably, because sanitation systems are usually underground systems. Design on permafrost often requires reframing the problem and reframing the solution. Permanent solutions for a land that is constantly moving may require either adjustable solutions or solutions that move with the land. CCHRC has worked on this issue in the housing sector, and

66 *ACIA*, 2005, p. 999-1000
67 *ACIA*, 2005, p. 998-1000

developed a foundation on adjustable poles that are deep in the ground. As permafrost thaws and ground moves, the house can be balanced by adjusting the poles. This approach frames the problem as *how to allow a permanent structure to move with the land, and how to make the building cooperate with the environment?* Jackie Qataliña Schaeffer reminds that nomadic people didn't have problems with moving ground, because their buildings were not permanent. They used earth as floor, so the structures moved with the earth. This framing suggests that instead of maintaining the permanent nature of the structure, it could be considered non-permanent and constantly changing. Therefore the question framing is based on the idea of a temporary shelter, instead of a permanent structure. Even though the location of a village doesn't necessarily change, the environment around the village changes rapidly, so the question is *how to make elements that can be rebuilt easily, if the environment changes*. Neither approach is necessarily more correct than the other. In the end, it is a question of resilience: a decision about how much it is reasonable for design to adapt, and in what point it is more reasonable to change strategy, instead of adapting.

"We try to consider all the things, that we're aware of"… "we have to think about how the foundation is designed to allow for the ground to thaw"

Jack Hébert

"The nomadic homes, they don't really have a floor. They use the Earth as a floor, so the structure moves with the Earth. Earth was a foundation. So, how do you take a solid foundation on this (?) moving land, and make it work?"

Jackie Qataliña Schaeffer

Newtok, Alaska, 2016. Thawing permafrost causes the village to sink, and exposes the site to erosion. The ground is now too wet to walk on so the village is connected with boardwalks. Newtok is in the process of relocation. (www.facebook.com/cchrc)

5.3.2 CHANGES IN CLIMATE AND EXTREME WEATHER EVENTS

Indigenous people all over the Arctic have observed the weather patterns changing so fast that the traditional methods of prediction are no longer valid. The changes are not limited to weather; the climate has changed. Winters are shorter and warmer, snow and ice cover is diminishing, and the animals and environment are already reacting to the changes. Indigenous people of Alaska have reported an increased number of *storms and fewer calm days*, and *increased coastal erosion due to storms and lack of ice*. Extreme weather events are more severe and frequent than in the past, but the development of these events is hard to predict.[68]

If extreme weather events are difficult to predict, how then can design prepare for them? Jack Hébert explains that they have built houses in a village that experienced worse flooding than ever in its history. From tree trunks, they were able to indicate the flooding history of the region, and it demonstrated that the most recent flood was over 1 meter higher than any other flood in the previous 100 years. This means that extreme weather events are now more severe, and design cannot base decisions only on past events. Nevertheless, Jack reminds that adaptation is possible with certain limits.

"We have to think about what's coming. If we're seeing that a flood event, because of the way the rivers freeze, or break up in the spring, that it's possible that a flood event will be greater, than any flood event that has occurred in that village before. Then we have to design the house to stand that kind of flood events."

Jack Hébert

5.3.3 [RE]LOCATION

A number of Arctic coastal villages, especially in the Russian Far East, Alaska and Northwestern Canada, are classified as imminently threatened[69]. In 2003, United States Government Accountability Office (GAO) reported that 184 of 213 Alaskan Native villages were affected by erosion and flooding due to climate change[70]. In 2009, 31 of these villages were identified as imminently threatened, and 12 of them have made the decision to relocate[71]. Until a formal education system was introduced to the native villages in the late 19th century, these communities were nomadic or seminomadic, and able to relocate due to

68 *ACIA*, 2005, p. 993-994
69 *ACIA*, 2005, pp. 998-1000
70 Government Accountability Office [GAO], 2003, p. 2
71 Government Accountability Office [GAO], 2009, p. 12

changing circumstances such as flooding or diminishing food resources. Adaptation and seasonal mobility were reasons why those communities survived in the Arctic. The sites where the villages are currently located were used only part of the year[72], but the establishment of schools led the communities to abandon the migratory lifestyle. The reasons for moving near to schools weren't so much about gaining a western education, but schools brought with them trading, employment and provisions, which made them a considerable source of income.[73] Whereas the native communities selected sites based on access to food sources[74], the schools were built on a site that was accessible to transportation to bring in building material[75]. The shift to permanent housing not only limited the capability of the community to adapt to a changing environment, but it also established dependence on the government concerning relocation.[76]

In 2013 ice jam in Yukon River caused flooding that destroyed 90% of the buildings in the 400 people native village, Galena. The flood was a consequence of rapid thawing after a cold spring, and it led to the rebuilding of the whole village. (Text: http://indiancountrytodaymedianetwork.com/2013/06/17/galena-alaska-struggles-rebuild-after-yukon-river-ice-jam-causes-devastating-flood-149945 Picture: http://www.ci.galena.ak.us/)

72 Berardi, 1999, pp. 329
73 Ducker, 1996, pp. 43-71, UCLA
74 Berardi, 1999, p. 330. [Orig. source: Joint Federal-State Commission on Policies and Programs Affecting Alaska Natives, 1994]
75 Bronen & Chapin, 2013, p.9321. [Orig. source: USACE (2008) Project Fact Sheet (US Army Corps of Engineers, Anchorage, AK).]
76 Bronen & Chapin, 2013, p. 9321.

Robin Bronen and F. Stuart Chapin analyze the relocation of Alaskan native communities in the article *Adaptive governance and institutional strategies for climate-induced community relocations in Alaska* (2013). One of the challenges is that U.S. authorities have not [2013] reacted to the necessity to relocate entire villages because of climate change and erosion, and therefore there are no agencies or institutional framework to be in charge of funding, planning and execution of relocation.[77] The Alaskan communities which have chosen to relocate have difficulties to meet the requirements of federal hazard mitigation funding, because it does not favor remote villages with a small population due to low benefit-to-cost ratios[78]. In addition, the villages are struggling with erosion, which is not listed as an environmental reason for presidential disaster declaration, even though it is a primary reason for relocation of the Alaskan coastal villages. Instead, a great amount of money is spent for post-disaster rebuilding and strengthening infrastructure in the old location, unless the village is reported no longer habitable, which means that the community is eligible neither for rebuilding or relocating support.[79] Bronen and Chapin suggests, that *adaptive governance framework* is needed to be able to respond to the new challenges related to climate change, such as *post-disaster recovery, protection in place (seawall/shoreline protection), hazard mitigation, and relocation*[80]. The procedures, such as whether to rebuild or relocate a village, should be defined by need, not by available funding programs.

Kivalina is an Inupiaq Eskimo village with a population of around 400. It is an island in the Northwest of Alaska, listed as imminently threatened, and is planned to be relocated. Severe erosion, flooding and storms are shrinking the size of the village, leading to overcrowded households. This, combined with poor sanitation, means health and wellbeing are at risk. In addition to poor living conditions, there is reason to believe that annual flooding raised by fall storms may someday cover the entire village.[81] The background research for the dry toilet case included discussion with Dan Boccia (2013). With ANTHC, he is part of a planning group for a better sanitation system for Kivalina residents. Boccia described that because the whole island is about to disappear, no one wants to invest there and develop a better sewage system. Still, there are hundreds of people that are in need of a better sanitation system than honey buckets. The honey buckets are not only a health risk inside the house, but flooding may also spread raw sewage from lagoons to all over the village. Discussion with Boccia brought up an important question

77 Bronen & Chapin, 2013, p. 9320
78 GAO, 2009, p. 22
79 Bronen, 2011, p. 5
80 Bronen & Chapin, 2013, pp. 9320–9325
81 Government Accountability Office [GAO], 2003, p.29-30

for design to consider: Does the design need to be able to operate in extreme events, such as flooding, or is there a backup plan for such events? That led to considering if the design should be planned to be relocated with the community, instead of considering it as a permanent structure.

CCHRC has experience in designing and building houses that need to be relocated in the future. Jack Hébert noted that they need to take into consideration not only relocation of the house, but also relocation of the whole infrastructure that is connected to the house. The infrastructure includes electricity, waste management and water and sanitation system, but is not limited to these. Sometimes the features of the new location or implementations of infrastructure cannot be predicted, and therefore it is suggested that design ought to be flexible enough for changes in the environment and infrastructure. Clearly, not everything can be predicted, but awareness of change is required in arctic design.

"That house is on a foundation that allows us to move it to another location. So the infrastructure, the water and the sewer system, of course that is going to be in this house, has to be with the house. So if the house moves, so does the infrastructure with it."

Jack Hébert

5.3.4 RESILIENCE/ADAPTATION

Climate change is stressing the resilience of the planet, and the concern is that the change may be too great to stay within the limits of resilience, which may lead to a collapse of some systems and species. An alternative possibility is *adaptation* to new circumstances. Indigenous people have observed that the changes in snow and ice structures and formation are already affecting caribou. Caribous have changed their migration routes because lack of ice on rivers and lakes, and the snow is too hard to dig through for food. Also, new species and diseases are migrating to the Arctic; for instance new insects have been found that weaken caribou's strength. For plants and animals, relocating is one response to changes in the environment, but if the distinct Arctic areas disappear, for some species there will be no place to relocate to. It is challenging to create future scenarios about the Arctic, because Arctic systems are very closely linked, and change in one system can create a significant change in another system. For many arctic indigenous groups, hunting, fishing or herding at the core of their culture and subsistence, and thereby climate change can be a *matter of cultural survival.* The culture and economy are so tightly related to those activities that losing their traditional food source may lead losing their traditional knowledge and subsistence

lifestyle.[82]
The severe changes in the arctic environment and climate are stressing the resilience of arctic villages in many ways. Nonetheless, the resilience of arctic villages shouldn't be mistaken for resilience of arctic communities. In this research, *village* is used as a term for people, infrastructure and actions in a fixed location, such as housing and economy. The term *community* covers the people and their connections, such as culture, relationships and interests. Therefore, considering imminently threatened villages, for instance, there is a difference between aiming to strengthen the resilience of the villages, or of the communities. If we want to make the villages more resilient, it means that the goal is to save the buildings and infrastructure and the systems that stem from the location. For an imminently threatened village, maintaining the resilience of the village means supporting it to cope with the changes. Instead, if we want to strengthen the resilience of the communities, the goal is the viability of the community and wellbeing of the people. This may mean that for community resilience it is not beneficial to remain in a village that is under huge environmental stress due to climate change, and therefore the better option is to relocate the community. A resilient village fosters the resilience of the community, but setting all the efforts to save the village may still lead to the collapse of the community. Sometimes, the collapse of an ill system, in this case a village, is more beneficial than saving it. In addition, Bronen and Chapin (2013) suggest that *community relocation provides an opportunity to address these* [poor infrastructure, such as housing, inadequate sewage and water system, expensive and insecure energy] *multiple societal issues to foster long-term sustainability in the process of relocating communities.* This means that for an imminently threatened village, relocation may strengthen community resilience and viability.

Community resilience is suggested to be considered ahead of village resilience. This doesn't exclude the option to design the village to be resilient to change, and that way empower the community. Nomadic settlements, as well as CCHRC's example of adjustable and relocatable housing, suggest that the resilience of a village can be somewhat planned to overcome environmental changes. Nevertheless, resilience always has limits[83] and so does design. As Jack Hébert notes, they can design a house to withstand wind, storms and high energy costs, but designing a house that withstands forest fires, which are more common due to climate change, may not be possible. Defining the correct system to empower, as well as defining the correct limits of resilience of the design, are therefore proposed to be important in arctic design problem framing. Design for Arctic requires flexibility from a product, service or a system, but the question is how much it is reasonable to adapt to change?

82 *ACIA*, 2005, pp. 997; 1000-1001
83 Meadows & Wright, 2008, p.76

5.4 DESIGN FOR RURAL ARCTIC - CONCLUSION

"The fish coming every year, the winter coming, the caribou moving in and out, the budding of the plants in the spring, it sings the song of rebirth and sustainability. You have to be pretty insulated from our world not to feel that song, not to hear it. Because there it is. It is true in Finland as well. Winter will come, and so will spring. The trees will grow and they will die, and they will become this and they will become that."

Jack Hébert

The Arctic environment is in constant change, both seasonal and climatic. Arctic flora and fauna follow the seasonal cycle, and traditionally so have Arctic indigenous people. Frank Andrew, a Yup'ik elder, describes in Fienup-Riordan's book (2007) how Yup'ik life is divided to a seasonal cycle of activities. He says: "*Those of us who subsist know that when one subsistence activity is over, others start, and we move on to those activities*." Hunting, fishing and harvesting are the primary activities that guide the cycle, but just as important are the preparations for those activities, and the social system that enables learning and practicing the skills and knowledge that are required for subsistence life in the Arctic.[84] In contrast, the weakness and strength of western culture is to enable similar days, similar activities, and similar products throughout the year despite the circumstances. This enables mass production and freedom of activities, but the solutions are often unsustainable. McDonough and Braungart, in their book Cradle to Cradle (2002), discuss *one size fits all* design, which is often design for a *worst-case scenario*. As an example, they give a laundry detergent that is sold all over the world, no matter of the water type, community needs and differing sewage treatment systems. The detergent is designed to remove dirt and kill germs, which has a significant impact when released into ecosystems. The laundry detergent is designed for the worst-case scenario, which means that it is designed to remove extreme dirt, and for regions with hard water type, requiring more soap than soft water. This places an unnecessary chemical burden on the environment, and destabilizes ecosystems.[85] As indicated earlier, the arctic environment is in constant change, it is suggested that this be taken into account in design. Maybe, for instance, a dry toilet system could have different strategies to deal with waste depending on the season? Cold air has different advantages than warm air, why not benefit from both? What if a house would be designed not with standards for the worst case scenarios throughout the year, but instead starting from designing a house for each of the four seasons, and then creating a solution for those. Why to do fixed design for a constantly changing world?

84 Fienup-Riordan, 2007, p. 7
85 McDonough & Braungart, 2002, pp. 28-30

In sum, it is safe to state that design for the rural Arctic is not only design for a cold climate. Design for rural Arctic is design for a variety of climates, weather events and infrastructures. It was learnt through the dry toilet design case that lack of manufacturing, logistics, remote location and unstable environment were the biggest location-related challenges for the design. The usual solutions often don't work, so a designer needs to constantly look for alternative ways of doing. Design for such a challenging environment as the rural Arctic also includes failures, and a designer needs to accept that. Jack Hébert mentioned several times during the interview that there are always surprises. Therefore, a designer must let go of the idea of a perfect design, and not be afraid of failing. Of course, this doesn't mean reduced responsibility over design - risky design in the Arctic may have serious consequences - but more the importance of prototyping and learning by doing. When asked *what a designer should know about Arctic environment?* from Hébert, he suggested to not just think about it and beat concepts to death, but to go camping in the Arctic in December. He explained that it will bring you more understanding about the Arctic, and what is needed in the Arctic, than you can learn from any book.

"Go camping in December. Really. Think about what you'll need to be comfortable and survive in Arctic December night, or a week. Put those things together, and go do it. You will learn more about the shelter, and living in a cold environment, that any book will ever teach you. So, that will be my message. Don't talk about it, don't think about it, don't beat the concepts to death and think that somehow you can intellectualize those concepts. Go out on the land in the wintertime, and live out there. For a short time, or a month. Take a semester. You will have learnt a great lesson about how to design for a cold climate."

Jack Hébert

6 DESIGN WITH ARCTIC INDIGENOUS COMMUNITY

"Who are the best designers in the world?"..."Yet if we define design as finding working solutions that are immediately applicable to problems in the real world, the answer - or my answer at least - is readily apparent: Inuit are the best designers."

Victor Papanek (1995, p. 223)

I mapped out existing toilet designs for rural Alaskan villages, and learned about a case that brought up an interesting point about the importance of the human aspect in design. The case was a disaster relief housing project for rural Alaska. The budget was limited, but at the end of the project the budget allowed for the installation of a dry toilet instead of a honey bucket. The house was well insulated and ventilation was carefully calculated. The toilet system was designed to work the way that air from the room flows into the toilet, dries the solids, and flows out through the pipe. The toilet had a small fan to guide the air in the correct direction. The village was difficult to access, so meeting each homeowner and instructing them in the use of toilet and ventilation was not possible. When the follow-up trip was done, it was noticed that the separating toilets had been replaced with a honey buckets. The residents explained that a cold, smelly draught came through the toilet into the house - the toilet operated poorly in those circumstances. It was discovered that in winter the air that came through the inlets was cold, so the residents closed them with duct tape and cardboard. That created high negative pressure in the house, and left the toilet outlet to be the only passage for air to enter the house. The small fan was not powerful enough to drive the air out, and the result was that cold air came into the house through the toilet with the smell of sewage.[86] This example demonstrates how design can work well with the environment, but if it is not understood by the users, the overall performance is poor. Designing for other cultures requires understanding their mindset, explaining

86 Analysis of Crooked Creek Toilet Issue, 2012

your own, and being aware of the differences. It should not be assumed that someone is unintelligent, if their reaction to the design does not meet the designer's expectations. Rather, it is a sign of a cultural differences, and different ways of knowing and problem-solving. This chapter examines the issues and solutions for designing for and with a culture that differs from your own. I am explaining this from a westerner's point of view, but the principles work both ways.

6.1 DESIGN FOR A POST-COLONIAL REGION

Dictionary defines colonialism as *the control or governing influence of a nation over a dependent country, territory, or people*[87]. Colonization and decolonization occurred in different time periods and different stages in Russia, Fennoscandia, Greenland, Canada and Alaska. Access to some parts of the Arctic is difficult, and this slowed down the colonization. Miners, missionaries and traders were the first ones reaching the Arctic indigenous land. For centuries, this was limited to relatively easily accessible areas, such as coastal regions and riverside villages. The introduction of new religions, and building of nations, political structures and education systems led to tighter control over indigenous lands and people. This was fiercest after World War II, which prompted military activity in the Arctic and forced assimilation of indigenous cultures.[88] Colonization was visible not only as a rapid cultural and political change, but also in how material culture in the indigenous villages came to change. The following sections describe how, despite the radical changes the communities were put through, indigenous people were not included in planning. In design, the cultural aspects were taken into account as little as the environmental aspects.

6.1.1 RADICAL CULTURAL CHANGES IN A SHORT PERIOD OF TIME

Within just a few generations the arctic indigenous communities have gone through radical changes which have reformed the culture - the way of living. During colonization, the governments supported replacement of indigenous languages with the majority language of the Nation. The change of language was carried out by the formal schooling system, which often separated children from their families, as they were sent to boarding schools elsewhere. The school system changed not only the language, but also the social structures. Elders, the experts of traditional knowledge, have traditionally been the principal source of information

87 http://www.dictionary.com/browse/colonialism?s=t, 18.3.2016
88 *ADHR*, 2004, p. 85-87

and the decision makers of the community. The schooling system elevated the status of western knowledge, and reduced the influence of traditional knowledge and cultural identity. The result of this is that the higher positions in the village are often held by outsiders, and the community, that used to be independent, is now dependent on the Nation. The reduced contact with traditional culture obviously resulted in a reduction in the practice of traditional culture. Self-subsistence, such as hunting and fishing, is still important in rural Arctic villages, because of the remote location. Nonetheless, the diminishing connection to traditional knowledge, and radical changes in the environment are eroding the practice of subsistence activities. Subsistence doesn't include only the necessary activities to survive, but also *a number of related social arrangements, beliefs and cultural traditions that enable the society to function.* For the indigenous cultures, subsistence is a core of the cultural identity, and therefore the wellbeing and resilience of the community are directly related to the possibility of practicing subsistence activities. Alcohol and drug abuse, domestic violence and suicides are more common in the communities with reduced subsistence, indicating the importance of a strong cultural identity and supporting activities.[89]

Change in material culture

The material culture of the villages has also gone through a transformation. Resilience and vulnerability studies in ACIA's report indicates how satellites, television, internet and telephones reshaped communication and information availability, and how snowmobiles, ATVs, and motorboats were adopted for mobility, subsistence and recreational purposes. Utilizing modern technology and western knowledge can strengthen community resilience, but also the eroding effect on the culture is addressed.[90] Traditionally, the products from indigenous cultures are an outcome of the complex cultural system that is developed over generations by trial and error, and where one action is always related to another. Sámi handicraft, *duodji*, indicates this well. In order to make duodji, the craftsman needs to know how to use the natural resources in such a way that the resources will renew year after year, and support the wellbeing of the community instead of just an individual. This requires knowledge of what can be harvested locally, how and when, and within social rules. The knowledge is passed from one generation to another in the form of beliefs, and practice of duodji. The language possesses descriptive words for nature, culture and culture-related actions, which therefore cannot be described with any other language. Duodji requires close relations in the community in order to get raw material, which means participating in the roundup of reindeer and other herding actions. Besides the practical importance of duodji, it also has a strong position in expressing

89 Freeman, 2000, pp. xi-xix
90 *ACIA*, 2005, p. 952

and strengthening cultural identity. The decorations of duodji are inherited in a family, and carry information about origin, marital status and wealth.[91] It is commonly known that the indigenous communities with strong cultural identity and practice of subsistence activities are happier and more resilient than the communities where the continuity of the culture has been damaged. As the example of duodji indicated, the traditional knowledge is dependant on the material culture, and therefore if the material culture changes, the overall culture also changes. It is justifiable to claim that preserving traditional material culture enhances the resilience of a community, but on the other hand, adopting and developing new methods can also add value to the culture. Community viability and adaptation chapter in ADHR II discusses how social media has become extremely popular within the Arctic communities. Social media connects young Sámi, and it has become a channel to express and build cultural identity as well as create connections to other communities. Pictures of traditional clothes, discussions about culture-related topics and use of traditional languages are all a sign of rebuilding cultural identity.[92]

How the change happened in Alaska

In the mid-18th century, traders came from Russia to the south-western part of Alaska to search for furs. Indigenous people had developed excellent methods for hunting, and soon the newcomers took advantage of this by kidnapping the best hunters from the native communities. That was the beginning of the exploitation of Alaska Natives, and with diseases brought by new demographics, the number of indigenous began to decline. The U.S. bought Alaska in 1867, which was an even greater shock for the indigenous population, because it came to affect the culture, from language to the freedom to select site(s) to live on.[93] Alaskan Statehood in 1959 was a remarkable event for the rights of the indigenous population, because it initiated the indigenous land claims, and led to founding a political organization, Alaska Native Claims Settlement Act (ANCSA), in 1971.[94] Whereas the political recognition of indigenous people increased in the 20th century, the Cold War (1948-1988) era started the exploitation of non-renewable resources and paternalistic welfare policies. In the mid-20th century, education became mandatory, and for many families it meant sending their children to boarding schools. Many of them lost their language in the process, and were alienated both from their families and cultures. Health care services were also improved, and wage employment became more common. The communities were now settled, and subsistence activities in the economy

91 Markkula & Helander-Renvall, 2014, pp. 13-14
92 *AHDR-II*, 2014, pp. 462-463
93 Freeman, 2000, p.1-2
94 *AHDR*, 2004, pp. 89-90

decreased.[95] Jack Hébert describes how the culture and housing changed very rapidly, within less than one generation. The communities were nomadic or semi-nomadic, made their living off the land, and lived in sod houses or tents. As part of government welfare policy, permanent, western housing was brought to the villages, and people were moved into those houses. Designs did not come from the village, or even from the North. Houses were designed neither for the arctic environment, nor the people who were inhabiting them.

6.1.2 CULTURAL ADAPTATION

The societies and cultures chapter in the first ADHR included a discussion on how the cultural change in the Arctic is identified as *culture loss*, *culture gain* or *culture creation*[96]. The difference is significant for design, because it defines whether the direction of design is past, present or future. This research follows the definition of culture by ADHR II, which emphasizes culture as non-static and evolving[97]. Resulting from the rapid social change, the people in the Arctic have become so diverse that any attempt to categorize them into cultures and cultural identities is difficult. The clearest division of arctic people is dividing them into two groups: *indigenous groups* who have inhabited Arctic for thousands of years, and groups with *European background* who are more recent and have connections to the societies in a global scale. The differences between indigenous groups are so remarkable, that the term *cultural identity* is often more appropriate than *culture*. ADHR (2004) defines that "*identity refers to the ways in which individuals and groups perceive and act upon the social and cultural traditions they inhabit*".[98] Identity is formed by individual experiences, but is also socially constructed, and reflects the relationship between individual and the society. The changes within the Arctic indigenous communities have led to cultural identities that vary considerably within the generations, even though the community is small and geographically isolated.[99] Therefore, *cultural identity* may differ a lot from the *culture*.

Arctic indigenous cultures have shown incredible ability to adapt into the environment. Adaptation is usually a good strategy for survival if the old system is no longer viable, but not all adaptation is necessarily positive. Jackie Qataliña Schaeffer describes how life in her community has gone through radical changes. The community used to be nomadic, and all housing was temporary. Her mother lived in a sod hut. There was

95 *AHDR*, 2004, p. 48
96 *AHDR*, 2004, p. 45
97 *AHDR-II*, 2014, p. 105
98 *AHDR*, 2004, p. 45
99 *AHDR-II*, 2014, pp. 127-128

no waste in the community, because everything went back to the earth. When the western culture came, they adapted, but the the dilemma is that they also adapted to live with negative things, such as lack of waste management, lack of proper sanitation, and expensive heating. Qataliña Schaeffer demonstrates this as "*we'll take what we can, but if we don't get it, we'll just adapt!*".

Adaptation is different not only within communities, but also within families – more precisely, between men and women. Gender roles in Arctic communities have traditionally differed, but have been *complementary rather than opposing*, which is important to keep in mind in order to not mistakenly interpret the culture from a western (feminist) point of view. The unemployment, suicide and life expectancy rates of arctic indigenous men and women suggests that women have adapted better to contemporary society.[100]

6.1.3 THE PEOPLE ARE NOT PART OF DESIGNS

"Indigenous peoples have the right to determine and develop priorities and strategies for exercising their right to development. In particular, indigenous peoples have the right to be actively involved in developing and determining health, housing and other economic and social programmes affecting them and, as far as possible, to administer such programmes through their own institutions."

Article 23. United Nations Declaration on the Rights of Indigenous Peoples

The attempts to fit western design into indigenous communities have not often been successful. Jack Hébert notes that in the past, the indigenous perspective was completely left out in housing design. Indigenous people have inhabited the North for thousands of years, but still they were treated in a paternalistic manner, and no one asked their opinion or validated their knowledge. Arctic rural communities don't have very good experiences of design brought from elsewhere, and therefore a designer should have an understanding of how design was done in the past, to avoid repeating the same mistakes, but also have an understanding of the challenges of cross-cultural relations. Jackie Qataliña Schaeffer recounts how for an architectural engineering company, the client is often a government agency, even though the design is for a community. Then, design is done for the client, not for the user. This means that even today, in a post-colonial era, a designer does not necessary have the possibility to interact with the people the design is really for, and therefore the people cannot be involved in the design process, and design cannot take into account the culture and the context where it will be used. As

100 *AHDR*, 2004, p. 187

Qataliña Schaeffer describes, *the human factors are removed from the design process.* Article 23 of the UN declaration on the rights of indigenous people obligates involvement of indigenous people in the development projects which are for them. The negative impact of leaving the people out of the design process has been proven all around the Arctic, and though in general it is no longer an approved method, it is still practiced. The reason may be the rigid economic and governing systems that are not flexible enough to fill the differing needs of the minorities, or the lack of tools to involve people in design. The common understanding between the designers and people is often missing.

Additional standards to Human Development Index (HDI)
In order to strengthen the resilience of the village and enhance people's wellbeing, the designer should understand what wellbeing means for the villagers. As mentioned in the chapter *Systems Approach for Sustainable Design Solutions,* Human Development Index cannot be unambiguously applied to measuring the wellbeing of Arctic indigenous communities. It is suggested that this be applied also to design standards - it cannot be assumed that the needs of the community are the same in an arctic rural indigenous community as in a western city. Arctic Human Development Report identifies three additional dimensions over HDI, that the Arctic residents - both indigenous and settlers - appreciate and experience as meaningful. Those dimensions are:

1. Controlling one's own destiny (fate control)
2. Maintaining cultural identity
3. Living close to nature

Controlling one's own destiny, fate control, is one of the key factors of individual resilience. Those who don't believe that they can themselves change their own destiny will generally become either passive or aggressive members of a community. Instead, those who feel that they can affect their lives do take initiative and are able to find means to improve their quality of life. The importance of *maintaining cultural identity* lies also in resilience. Cultural identity provides meaning to life and skills to succeed in the culture-related environment, whereas lack of cultural identity puts stress on resilience and erodes social rules within a community. Being part of a group and sharing the culture-related activities with other members of the community provides guidance to a person's life. *Living close to nature* is important to every indigenous group, because their subsistence has always been directly related to the local environment. Detachment from nature is therefore detachment from culture.[101] Involving people in the design process is an opportunity to affect all three dimensions of human wellbeing in the Arctic.

101 *AHDR*, 2004, p. 240

The level of indigenous communities' participation in development projects differs within the Arctic countries. Bruce Forbes, the leader of ENSINOR project that brought oil companies and Nenets together to discuss coexistence in the Russian Arctic, explains that the indigenous groups in Russia do not have high expectations of being involved in decision making about land use. They do their best to survive and also want Russia to succeed, but especially in the regions where reindeer herders are minorities, their cultural needs are not prioritized. In practice, the oil companies can to do whatever they want. Florian Stammler, a social anthropologist with Arctic Centre who also worked with ENSINOR, wrote about oil companies' land use policy in the article *Oil without conflict? The Anthropology of Industrialisation in Northern Russia*. The article begins with a story told by Alexander, a reindeer herder from Yamal, of a public hearing about land use. An oil company told to the herders that *the losses of territory are inevitable.* One of the herders, Nyadmanesia, listened carefully, but remained silent. Soon after, he committed suicide. Stammler explains that *avoiding open conflict* is a common response by Northern indigenous people towards industrialization, and suicide is just one of the ways to do this.[102] Besides demonstrating the reindeer herders' way of responding to the changes, the example demonstrates the importance of land and the traditional way of living to the people. Committing to plans which don't take those aspects into account, which don't take people into account, are then evidently destructive.

6.2 GUEST OR INTRUDER?

"You have to be invited, not just go there. So, you're already a guest, and when someone invites you to a place, and is hosting you, there's is an attitude that you're not invading them - which has been the past with western people, they come in, they go, they come, they go, nobody invites them, they just show up."

Jack Hébert

Both Jack Hébert and Svetlana Usenyuk emphasize the importance of local, personal contacts in order to carry out a project in a community. Hébert underlines the importance of being invited. The postcolonial regions have a negative history with westerners, so just appearing in the community is not a respectable way to operate. Hébert also mentions that it is an advantage to have a local contact to introduce you to the people who invited you. Svetlana Usenyuk prefers creating the contacts herself, personally. She sees establishing a network as similar to establishing friendship, and several times in the interview she actually refers

102 Behrends, Reyna, & Schlee, 2011, pp. 243-269

to the contacts as friends. Usenyuk recalls an Arctic conference where she met a person from a Norwegian Sámi village who connected her with the whole community, and enabled her to join reindeer herders in the tundra for research purposes. That is an informal way to connect with the community, which is powerful, but also requires a good understanding of ethics from the researcher or designer. This informal way is sufficient if going to a community alone, but a more official approach is recommended for a group, Usenyuk surmises.

When Elina Helander-Renvall was asked about how to make contact with Sámi in the first place, she noted that, in contrast to Canada, there is no official board or organization in Finland that could advise researchers or businesses on ethical questions or direct them to Sámi representatives. She herself receives several such inquiries, but she can only direct the people to appropriate organizations, such as Sámi Parliament or Sámi Duodji ry, or to some individuals who are experts on the inquired subject. She also advises to look for the local administration that could help with finding the right contacts, and ask the best way to operate in the region, such as whether to ask people directly, or the best way to approach. The Arctic Council has six NGOs as permanent participants alongside the member states. Those NGOs are representatives of arctic indigenous groups, and often a good first contact, if local contacts have not been established yet.

6.2.1 CONNECTING WITH THE COMMUNITY

"I think that if the intent is clear, and you're not feeling sorry for them - not rescuing them, you just want to be part of the solution for all of us - if that intent is there, that makes all the difference."

Jack Hébert

The rural Arctic indigenous communities are struggling with the social and cultural changes that were introduced by westerners. Some of the changes were made with good intentions, some of the actions had selfish reasons in the background. Gigi Berardi from Western Washington University claims that introducing a better sanitation system to early rural Alaskan villages was "*considered by educators to be a central part of their broad mission to improve the life of the Native population.*" In reality, she concludes, the sanitary problems were actually caused by the shift to stationary settlements, which was initiated by the educators. The sites were appropriate for temporary use, but were inappropriate for year-round use.[103] The educators created a sanitation problem when they thought that they were solving one. Therefore, Jack Hébert's advice to not go

103 Berardi, 1999, p. 329

into a village with preconceived ideas is well justified. Instead of arriving in a village with answers, it is better to consider yourself just a part of a solution. Hébert describes that it may be difficult to connect immediately with the people, but listening and openness are valuable tools for engaging with the community. Clear intention may sound obvious, but it is something that is good to be aware of - if you go to a rural Arctic community with an attitude that you are going to rescue them, your attitude is the same as the early missionaries and educators, who also prioritized the western knowledge above the traditional.

Svetlana Usenyuk's example of a research project with the Russian Academy of Science complements Hébert's experience. She was part of a research group, so the project proceeded in an official way right from the beginning, rather than using personal contacts. She described that in the beginning it was impossible to understand what the people were doing in the tundra, before they actually discussed with the herders face to face. No authority knows what the herders' life is like - it can be found out only from the herders themselves, and by experiencing it with them in the tundra. The first step is to contact the authorities to access the region and establish contacts, but the second step is to meet the actual people, with an open mind, because it is impossible to plan anything fully without people.

6.3 CROSS-CULTURAL UNDERSTANDING

"I hear a lot from the agency side that [the natives are] just dependent. They expect things, they expect service, they expect that, they feel entitled to it. To me that's unfair."

Jackie Qataliña-Schaeffer

Above is a quote from Jackie Qataliña-Schaeffer. She explains that the people in the native communities have neither the right tools nor the knowledge to use those tools to improve their lives. The "agency side" may be correct by saying that the people are expecting the agency to improve life in a community, but they may lack the understanding that the feeling of inability to control one's own destiny is making people passive, and they have no tools to change that. Cross-cultural design requires the ability to see the forest from the trees - to look beyond individual behavior, and understand the surrounding system[104]. In this case, the agency may experience that people are lazy and ungrateful, because if people from their own culture and background are acting like that, they are considered as lazy and ungrateful. What they are missing,

104 Quesenbery & Szuc, 2012, p.35

is the *context* and the reason for the behavior, which could help them to understand that the people need empowering, and the tools to make the change themselves. For cross-cultural understanding, it is crucial to recognize the differences *and* the similarities between one's own culture and the other[105]. The challenge is that the Arctic indigenous cultures have gone through a massive social change, which is transforming the cultures and cultural identities,[106] and therefore understanding, or even recognizing, the new variations of cultures and mixed cultural identities is not straightforward.

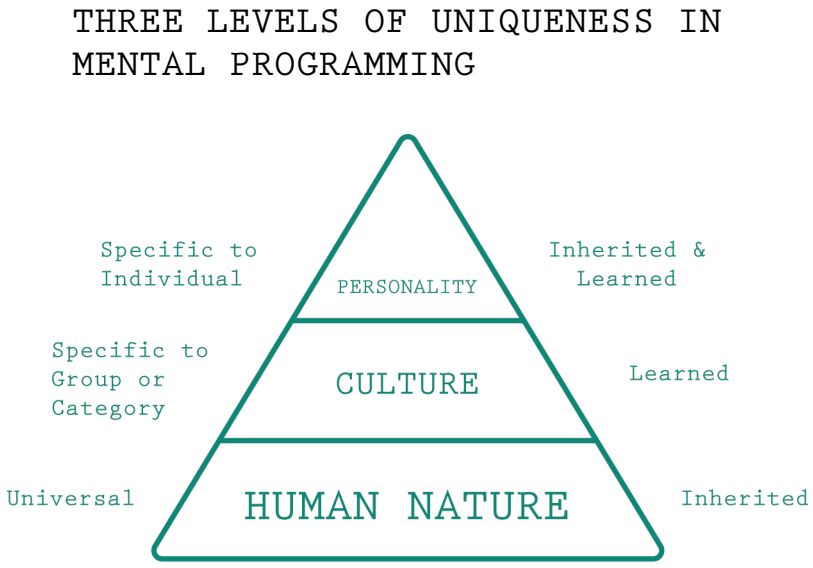


Image 3. (Hofstede, Hofstede & Minkow, 2010, p. 6)

In the book *Cultures and Organizations - Software of the mind* (2010), Geert Hofstede, Gert Jan Hofstede and Michael Minkow discuss intercultural cooperation. They suggest, that *"one of the reasons why so many solutions do not work or cannot be implemented is that differences in thinking among the partners have been ignored"*. Mutual understanding can be reached through understanding those differences. Hofstede et al. divided the differences into three levels: *Personality, Culture* and *Human nature*. Image 3, *Three levels of Uniqueness in Mental Programming,*

105 Quesenbery & Szuc, 2012, p.35
106 *AHDR*, 2004, p.141

illustrates those levels. P*ersonality* includes individual differences that are partly developed through personal experiences and partly related to genes. C*ulture*, in a western context, is often defined as civilization, but for social anthropology, culture encompasses a much broader view. It is more like a *mental program* that guides individuals' choices, and is learned from a social environment. *Human nature* describes the similarities within every human being, that do not depend on culture, education or nationality. In the same way that the newborn babies are alike, so is human nature in each of us.[107] This section suggests that cross-cultural communication and design should not only concentrate on the personal level, but also involve understanding at the cultural and human nature levels. Underrating cultural differences both in design and communication has been the strategy of colonization, and has led to forced assimilation. Awareness of the differences, and applying the cultural aspect to design, is a necessary step for the social resilience of the communities. The human nature level, then, is a neutral ground for communication and bridging the cultures, because it includes the similarities in everyone.

6.3.1 CULTURAL DIFFERENCES

Elina Helander-Renvall describes that the differences between Sámi and Finnish people are rooted in their ways of seeing the world, in differing worldviews. It is easy to get the false impression that Sámi and Finnish cultures are alike, because the languages have the same root, Finnish people also herd reindeers, and both cultures live in similar houses, she describes. Sámi culture has gone through assimilation to Finnish culture, and as a result, if you meet a Sámi person in a Finnish city, and have a casual conversation about daily things over a coffee, you may not even notice that you are talking with a Sámi, not a Finnish person. Underestimating the differences may lead to misinterpretations. For instance, these two cultures have two different approaches to nature protection, Helander-Renvall explains. The Finnish way to balance human and nature is having natural parks, which are protected from all human impact, whereas some areas are highly exposed to human influence. Sámi rather live in balance with nature. They experience themselves as a part of nature instead of a facilitator of nature, which is commonly the western approach. The differences are rooted in worldview level, culture level, instead of being personal opinions, and so if the cultural differences are not understood, it is difficult to have a logical cooperation. Svetlana Usenyuk's experience with Nomads in Northern Russia supplements Helander-Renvall's view. Regarding perception of time, Usenyuk got surprised by responses such as *ok, it can't happen today, it can happen in two or three weeks. Not in two or three hours, not days, but even weeks,*

107 Hofstede, Hofstede, & Minkov, 2010, p. 4-7

is how she described the difference, which sometimes doubled the time she had planned to spend on the field work. That is how she learned that nothing strict can be planned in advance for field work, because people have different understandings of time and space.

Not all cultural differences matter in design, and it is not even necessary to understand every detail, rather it is important to have a sense of cultural differences and the ability to react to them when necessary[108]. Jackie Qataliña Schaeffer describes her role as often being the channel between the community and state authorities. She comes from a village, and knows the circumstances there, so it is easy for people to talk to her. The designer's role is often to be a channel between the stakeholders, and with cross-cultural design a designer needs to acquire a basic understanding of culture, and how to recognize the cultural differences from the personal differences. As Jack Hébert noted, *you need to have someone from the village in your team*. That person is the link between designer and community. Understanding all cultural nuances is a long process, but if a designer has an understanding of the concept of cultural differences, it is more likely that the designer can ask the right questions and review the right working methods in advance with the link person. Geert Hofstede's cultural dimensions are often cited in academia, and they are a source for basic cultural understanding. In the first edition of *Cultures and Organizations* (1994), he defines four dimensions of national cultures. The third edition of the book (2010) adds fifth and sixth dimensions of cultural differences. He has concentrated on the differences between national cultures and organizational cultures, and although this differs from Arctic indigenous communities, Hofstede's work is valuable for emerging cultural sensibility. Below are short descriptions of the cultural dimensions:

Hofstede's six dimensions of national culture (2010):

1. ***Power Distance Index (PDI)*** measures how the power is distributed between the authorities and their respondents. In a culture with *high power distance*, an authority makes decisions in a paternalistic, autocratic manner, and the respondents may be afraid or not see it as appropriate to counter the decisions – but instead of opposing, the respondents value this type of leader. In a culture with a *low power distance*, the authority is more like a consultant, and the respondents have an active role in decision making. (p.60-61)
2. ***Individualism versus collectivism (IDV)***. In an *individualist* culture a person is entitled primarily to take care of herself and her immediate family, whereas in a *collectivist* culture people are part of a larger group. (p.90-91)
3. ***Masculinity versus Femininity (MAS).*** The *masculine* cultures

108 Quesenbery & Szuc, 2012, pp. 44-45

appreciate competitiveness, and aims, for instance, for high earnings and recognition, while *feminine* cultures search for softer values such as cooperation and security. (p.138-144)

4. ***Uncertainty avoidance (UAI)*** measures culture's attitude to uncertainty. The cultures with high tolerance to uncertainty are more comfortable with ambiguity, whereas the cultures with low tolerance to uncertainty are punctual. The cultures with low UAI make the effort to plan their future accurately, while the cultures with high UAI have a more relaxed relationship with the future and they are more open to new ideas. (p.187-195)
5. ***Long Term Orientation versus Short Term Nomination (LTO)***. The long-term oriented cultures are future-centered and value persistence and thrift, whereas the short-term oriented are more concerned with past and present, which includes *respect for traditions and fulfilling social obligations.* (p. 235-239)
6. The core of ***Indulgence versus Restraint (IND)*** is happiness, or subjective well-being. This is the newest dimension, and it explains how some cultures can be happier within less than the others. The reason is that some societies allow happiness more easily than others. This index is measured by 1. Happiness 2. Life control (comparable to *fate control*) 3. Importance of leisure.

As mentioned, these dimensions are good for surfacing understanding of cultural differences, but should not be treated as rigid truth. Hofstede's dimensions cannot be directly applied to design, because of the top-down nature, but the work is beneficial in bridging the gap in intercultural communication.[109] Regarding intercultural communication, Hofstede presents three ideas: *Awareness* of the differences, *knowledge* of the particular culture and *skills* to work with that information[110]. As a framework, it seems to be suitable, but adding the cultural dimensions makes it rather stiff. Listening, engaging and approaching the culture through people is a more open approach than categorizing them. Elina Helander-Renvall emphasized the meaning of continuous reviewing of the work with a person from another culture. She described the working process of an author who wrote a book about traditional hunting methods, and who reviewed the text and selected pictures with the interviewee and interviewee's family, and engaged the whole community and Sámi authorities in the work. Openness throughout the process and presenting the results to the community was experienced as a good practice, and a successful method to bridge the cultural gaps.

109 Quesenbery & Szuc, 2012, pp. 46-47

110 Hofstede, Hofstede, & Minkov, 2010, p. 419-420

6.3.2 SIMILARITIES ACROSS THE CULTURES - CONNECTING IN HUMAN NATURE LEVEL

"The reason people like to go camping, the reason why people like to go canoeing or skiing and be outdoors, is because it reminds them who they are, and what their relationship is with the Earth, and when you go into an indigenous community that connection is much more regular."

Jack Hébert

One way of reaching a common understanding is putting cultural differences aside, and communicating at the level of human nature, understanding each other though the similarities. This doesn't mean that the differences should be forgotten in design or in communication, rather it is about genuine communication between humans. Jack Hébert explains this through people's relationship to nature. Before he founded the CCHRC, he lived for years in a simple house and lived off the land. That experience created empathic understanding between him and the indigenous cultures with whom he later worked. Therefore, understanding the similarities may be as useful as understanding the differences, but sometimes in order to understand the similarities, one must first understand the differences.

6.4 COMMUNICATION

The interviews indicated that in order to create common trust and understanding, the relationships with the communities need to be established personally in a community, but after that the communication can be maintained remotely. Awareness of differences - and similarities - between the cultures are beneficial in cross-cultural communication. Language, even if both would speak English, has culture-related meanings, and sometimes it is good to have an interpreter not only for translating language, but also for translating culture. Verbal communication is only one form of communication. Svetlana Usenyuk notes that what people say and what people actually do are not always the same, so observations often helps to understand the cultural activities better. Apart from classic ethnographic methods, she benefits from artistic methods that are typical for designers. These methods include visual communication and information through experience.

Remote locations set some challenges in maintaining contact with rural Arctic communities, but phone, e-mail and social networks are useful, while visiting is often too expensive, the interviewees describe. The importance of regular communication emerged repeatedly during the interviews. It is the best way to learn how the people live with the design,

and it is a source of mutual trust. In this stage the relationship is often informal, comparable to friendship. To this, Bruce Forbes adds *mutually shared experiences, interests and goals.* Researchers from his working group have had contacts in the communities for many years, and this has formed firm trust between the individuals. There is also statewide communication among Native Alaskan communities, Jack Hébert explains. CCHRC is aware of that, and they used their first housing project in Anaktuvik Pass to spark a discussion within this network. Some of the other communities agreed with the completed design and some didn't. The common thing was that it started a dialogue, which was positive, because when CCHRC entered another village, the people had already started considering their opinions of that design, and how they would do it differently - what would work best in their community.

6.4.1 LANGUAGE

"In many cases there are interpreters if the local language is strong, even if they understand English, we like to have interpreters to speak in their native language at the same time so that it is interpreted, because there are words and context in a one language that can't be expressed in another. And there is familiarity to hear your own language. And also that expresses, communicates, respect, because one of the first thing that a western society did when they came in was trying to take people's language away. So if it can be in their language, it shows respect."

Jack Hébert justifies CCHRC's practice to not use the national language with the communities.

Language possesses multiple culture-related nuances, which may be difficult to address for a person from another culture and language group[111]. Jack Hébert explained that instead of communicating in English, CCHRC prefers to interpret the local language, because it is a gesture of respect, but it also enables people to express themselves better and it reduces misunderstandings. The language used for communication therefore impacts the result of research or design, and need to be selected consciously. Jackie Qataliña-Schaeffer notes, that even the English that the communities use should be translated. The language is not learned at school, and some words have completely different meanings in American English. The same language may have remarkable cultural flavors, which can be very easy to misinterpret. Related to that, Hébert mentions a word *home.* In western context home is a house, but for many indigenous cultures with nomadic roots, the home is the whole region they live on. Then, designing home has very different meanings from indigenous and western perspectives.

111 Quesenbery & Szuc, 2012, p. 51

Sometimes not understanding the language can be also a benefit. Svetlana Usenyuk researched Northern Sámi. She did the research alone in the field, and no interpreter was involved. Communication was done mainly in English with the young generation, who spoke English well. The language was not a limiting factor, she described, because not understanding every word, she was able to concentrate better on observing what people were doing, and not get distracted. In addition, it was natural to ask for detailed explanations, because she was clearly in the role of a foreigner, of a student. Learning some words from the local language was seen as good practice among the interviewees. Hébert said that CCHRC names the rooms in their houses with local language to bridge the understanding about use of space. Usenyuk recommends to learn basic "icebreaker" vocabulary with the local language, such as greeting and telling who you are and what you are doing in their community. Learning a few words from the language may not help to communicate fluently with the community, but it shows respect and awareness of the meanings in language.

Languages retain specific information about culture and local environment. If local language disappears, the information disappears, because the vocabulary develops over time to describe culture-related activities and observations. Elina Helander-Renvall explains that there are approximately three hundred words for snow in Sámi language. The snow vocabulary is closely related to reindeer herding, and often includes information how are reindeers able to get food, lichen, through the snow, or how are reindeers able to move on that type of snow. For instance, *sievlla* is a word for snow that forms in spring and it is wet and sinking, so for the reindeers it is hard to walk on. There is no equivalent word in any other language.[112] If the communication language is English, then, these small but remarkable nuances fade out.

6.4.2 NON-VERBAL COMMUNICATION BRIDGING COMMUNICATION

In 2013 I took part in course Participatory methods and facilitation skills at Aalto University. As the name states, we practiced facilitation skills and methods for how to engage every participant in a team. It was learned that some people express themselves much better by drawing or modelling 3-d prototypes, than verbally. The dynamics of the group work changed completely, if we were told to be silent and use visual or bodily way of expression. Suddenly, the loudest or the most verbally talented person was not anymore the most visible in the group, but maybe

112 Markkula & Helander-Renvall, 2014, pp. 22-24

the shyest and the quietest person took the lead. It was shocking to realize how the smart ideas and valuable input of the less-verbal persons would have never got through, if the communication would have been based only on conversation.
Author 12.4.2016

Besides offering an alternative channel for communication, drawing also reduces cultural and hierarchical barriers. Nigel Cross (Design Thinking. 2001) concluded that by using drawing as a tool of communication, everyone is able to participate in reviewing an idea and give their suggestions, whereas in verbal communication language can be a barrier for understanding the idea, and therefore a hindrance to cross-cultural or cross-disciplinary communication.[113] Svetlana Usenyuk discovered that the indigenous people in Russia are good at drawing, and perhaps more importantly, they don't hesitate to draw. In her study about traditional vehicles, she was pleased to hear stories with drawings from the people, because it included different voices that she wouldn't have reached by only asking what kind of vehicle they prefer. Drawing is also a good way to engage people, Usenyuk states, because people are interested to see drawings, and it can work as an icebreaker. There is knowledge hidden in images that is difficult to reveal only by verbal communication. Usenyuk explained that she visited a reindeer herding community and brought a drawing made by her professor in the same region 30 years ago. The people were able to identify the particular place, where it was drawn, because there was a sledge in the picture that was built the same way as the people from that place build their sledges.

Another way of bridging the understanding is experiencing. Svetlana Usenyuk recommended to listen and try the suggestions of the locals. Once, she arrived to a community, and the locals said that her clothes are not proper for the environment, so they offered her clothes and she accepted. The people in tundra know the circumstances in tundra the best, and accepting their suggestions means also accepting their knowledge. Experience is, then, a way to connect and a way to communicate knowledge.

6.5 TRADITIONAL AND WESTERN KNOWLEDGE

In 2015 I participated to Traditions and Innovations workshop, hosted by University of Lapland, and arranged by Cirrus Nordic-Baltic Art and Design education program. We visited a Sámi reindeer herder in Vuotso, where we heard insights of both past and contemporary Sámi

113 Cross, 2011, p. 74-75

culture. One thing from that conversation remarkably broadened my understanding: "Reindeer is the center of everything", she, a Sámi woman, explained. Western worldview is often very human-centered, or even economy-centered, but in the Sámi worldview the culture, subsistence, beliefs, social relationships, traditional knowledge - everything is built around a reindeer.

Author, 16.4.2015, Traditions and Innovations workshop in Northern Finland

The worldview of a culture whose center is reindeer is very different from the worldview of a culture whose center is human, or economy. That worldview conducts the knowledge that is validated within each culture. The knowledge that stems from these two cultures is, then, very different. Sámi Parliament's *Program of Sustainable development* (Saamelaisten kestävän kehityksen ohjelma. 2006) explains the traditional knowledge accumulating from living off the land, and continuously evolving methods to do that. A crucial part of that is taking care of nature, because nature provides a living for the people. Traditional knowledge is passed on orally from one generation to another, and is based on experiences. It contains knowledge from thousands of years ago, but it also evolves, and currently includes even modern methods for practicing traditional ways of living. If the languages, songs and practitioners of the culture disappear, the traditional knowledge also disappears, because it is rarely written down.[114]

The value of traditional knowledge is often underrated, and is rarely treated as a valid source of reference.[115] Traditional knowledge is underrated also in northern design created by western culture. Jack Hébert describes how the indigenous Alaskans have a great understanding of a location, which accumulates from inhabiting and living off from the region for generations. Therefore, it is suggested, that if one wants to learn about a region, one should learn how the shelters have been built in the past. What shape they were, if they were close to ground or elevated from the ground. By learning from the design principles of traditional knowledge, it is possible to get comprehensive information about the location from a long timespan, Hébert sums up.

6.5.1 TRADITIONAL *OR* WESTERN KNOWLEDGE

Traditional knowledge is used with good results in mental health care and empowering programs. An article by Mary Annette Pember describes how traditional knowledge is used to treat trauma in an Alaskan Yup'ik village. The Calcicaraq [Healthy Living] team is formed by western behavioral health experts, but it also includes elders, who have

114 Saamelaiskäräjät, 2006, pp. 10-11
115 Saamelaiskäräjät, 2006, pp. 11-12

traditionally been highest the source of knowledge in a Yup'ik society. It works under a tribal organization, Yukon-Kuskokwim Health Corporation. All of the team members are Yup'ik. In one case, to overcome the trauma resulting from a murder, they visited the home of the attacker and the victim and applied the Yup'ik way of healing. Kahonial [unconditional love and understanding] is a Yup'ik way to cope with struggles, and keep the community together after trauma. In this case, it helped the victim's father to find hope from the traditional ways of living, and the father of the attacker to open up. The power of the Yup'ik way of healing is that it is rooted in the culture, and people believe in it, contrary to western health care programs, which people mistrust.[116] The traditional knowledge of wellbeing and community engagement fosters community resilience, and it is experienced to work better than introducing a western health care system. The programs for health and wellbeing, such as a substance abuse program, have emphasized the social aspect in treatment - the assistance is not only for the person who is in need of help, but also for the whole network to support the person.[117] These examples from the healthcare sector indicate that traditional knowledge is often the most effective way to solve the problems in a native community. Design is still a step behind in understanding the value of traditional knowledge and applying it, but it definitely is a remarkable resource.

6.5.2 TRADITIONAL *AND* WESTERN KNOWLEDGE IN DESIGN

"[The community] wanted [houses] to be warm as they were in the past, but they didn't want to have some of the other problems, that were related with the sod house like poor indoor air quality. In the old houses, they had a seal oil lamp, or burned wood inside the house itself, which didn't made for very good air quality, so how do we bring in systems, mechanical systems, that don't use a lot of energy, that are addressing the air quality?"

Jack Hébert

CCHRC is one of the few housing organizations in the Arctic which combines traditional knowledge and modern western technology in their design. Jack Hébert explains that the benefits of applying indigenous wisdom to design is not only because the design can function well in the environment, but also because there is cultural familiarity in it. The quote above describes the baseline for one of CCHRC's early housing designs for an Alaskan Native community. They aimed to replicate the feeling of a traditional sod house, but improve the negative aspects

116 Pember, 2015
117 *AHDR*, 2004, p. 159

with western knowledge. In some cases the traditional wisdom, such as patterns and shapes, can be replicated with new materials or technology, but also new materials can be worked with traditional methods, which can sometimes be the only option in a remote community. Even though the housing design aims to replicate the feel of sod house, the change in the culture needs to be acknowledged. The cultural change reshapes the concept of a house in people's minds. If three generations are asked to describe or draw a house, the answer from each may be very different. Instead of designing for the past, the house has to respond to current requirements, with an eye to the future. Electricity is one of the new requirements, and the challenge is to design these new requirements to function efficiently in the rural village. Maybe the answer for new challenges could be found from traditional knowledge?

Svetlana Usenyuk's approach is to learn from traditional knowledge and apply that to western design. Her research is for better mobility methods in the Arctic and it is targeted to newcomers in the North. From Usenyuk's point of view, the westerners should not even be allowed to design for the indigenous people, because "they've [natives] been living there for ages, and they know what is best for them, definitely, and as we can see now how they are treating new technologies that are coming to their places, they are super practical". She describes that the indigenous people know exactly what kind of technology they need for their activities and circumstances. Usenyuk concludes, that the design for the village cannot come from somewhere other than from those circumstances and from long-term experience of those circumstances.

6.5.3 COPYRIGHTS AND FAIR REWARD

Intellectual property rights protect designers, and innovations can be protected with patents, but protecting rights for traditional knowledge is not as straightforward. The copyright system is designed for western culture and to protect western knowledge. The nature of traditional knowledge is very different. Often, it is not the output of one person, but the whole community throughout generations[118]. When adapting design from a community, that community should be acknowledged. Convention on Biological Diversity created guidelines for responsible use of traditional knowledge. The ethical guidelines, *Tkarihwaié:ri - Code of Ethical Conduct to Ensure Respect for the Cultural and Intellectual Heritage of Indigenous and Local Communities Relevant to the Conservation and Sustainable Use of Biological Diversity,* emphasizes transparency, genuine informing throughout the process, inter-cultural respect, safeguarding of intellectual and collective rights for knowledge, but is not limited only to these[119].

118 Markkula & Helander-Renvall, 2014, p. 56
119 Secretariat of the Convention on Biological Diversity, 2011

Awareness of the rights over traditional knowledge varies between the Arctic indigenous groups. Svetlana Usenyuk describes that in Russia she never encountered concerns over the knowledge the people shared with her, which tells the general attitude in the country. In Finland, by contrast, she was asked to explain what she will do with the photographs and the rest of the material she obtained from there. People were educated to discuss about copyrights. According to her experience, it may be a national difference, because the Sámi groups in Norway were more open and relaxed about the information they shared. Elina Helander-Renvall explains that traditional knowledge has become somewhat politicized. She led a project *Traditional Ecological Knowledge in the Sámi Homeland Region of Finland,* and noted that Sámi people hesitated to share the traditional knowledge about Sámi handicraft, duodji. They explained the concerns about information drifting to tourism, and other purposes which would benefit non-Sámi and distort the image of Sámi culture. Both Usenyuk and Helander-Renvall noted that the subject of traditional knowledge makes a difference to whether people are willing to share the information or not. Usenyuk described, that if the information was something very practical, such as sledges they used in everyday life, people were more open about it. Helander-Renvall clarified that the attitude towards climate change research is overall more positive than towards duodji research within Sámi community, even though both are about learning from traditional knowledge. Duodji is strongly related to culture, unlike weather, which can be discussed quite neutrally. Climate change researchers and indigenous groups have established long-term cooperation, where people have been treated with respect. The reindeer herders themselves also benefit from climate research, while duodji designs have been stolen for mass production of fake Sámi products.

There are no strict guidelines on how to reward traditional knowledge that is used in design, and until there are, the best practice according to the interviewees and ethical guidelines is openness, transparency and information-sharing.

6.6 DESIGN FOR CULTURAL CONTEXT

"Their resources are not just mineral and gas, their resources are fire and food. And these communities that, you sit down and talk about their house, and they all give you a list of complaints, you sit down and talk to the same person about their culture and their subsistence lifestyle, what have you done this year to provide for your family, and they have all positives, and all the blessings of the bringing home food and water and all this for their family so it's still very segregated. Very separate."

Jackie Qataliña Schaeffer

The quote above by Jackie Qataliña Schaeffer describes how the objects from western culture are part of everyday life in the indigenous villages, but are still separated from the culture and lifestyle. Qataliña Schaeffer addresses both in the interview and in her report on *Sustainable Housing Needs Assessment Study*, that insufficient understanding of cultural needs in design is a reason for serious problems in the indigenous communities[120]. She continues, that in the communities in Alaska North Slope, as much as 85% of food is subsistence food, but the western design doesn't include opportunities to store the food properly, and this brings health risks. The meaning of subsistence food for the indigenous communities is twofold; it is healthy nutrient, but it also part of cultural identity and strengthens the relationship to nature[121]. Arctic indigenous cultures are built around subsistence, such as hunting, fishing and herding, and these directly affect the viability of traditional cultures. Additional threats for subsistence lifestyle, besides social and environmental change, are contaminants in traditional food, hunting regulations, and groups supporting subsistence animal rights[122]. Restatinging Qataliña Schaffer's observations, a design that doesn't include the people and culture can justifiably be considered a possible threat for subsistence activities. Due to the lack of a proper storage place, she explains, "most people store subsistence foods in, or on, boxes in the entryway of the homes, next to fuel and garbage". In a western city, the problem would be easy to solve by buying a big freezer from the local electronics store, but in a rural village there are no electronics stores, the electricity is tremendously expensive and power cuts are common. Qataliña Schaeffer concludes that the designer needs to ask, needs to discover the activities that the families do the most, and then create a house around that.

For the report of sustainable housing Qataliña Schaeffer visited 22 homes in 3 different villages, and a common thing was that the structure, the

120 Qataliña Schaeffer, 2012
121 *Arctic Social Indicators*, 2010, p. 109
122 *AHDR*, 2004, p. 161

house, had no connection to the people. Besides improper storage for subsistence food and other culture-related items, the houses had very poor ventilation and they were overcrowded. 15 of these 22 homes had more inhabitants than they were designed for, sometimes even 16 people in 3 bedroom house. The layout of the houses was also intended for western culture, so instead of a spacious room for people, everything was now separated. Qataliña Schaeffer describes this as "chopping up people's life". Symptoms of improper ventilation are bad air quality, mold, moisture and rot. The reason for improper ventilation, though, is lack of education about the importance of ventilation in modern houses. In some homes the Heat Recovery Ventilator (HRV) is disassembled, and the hole is covered with plastic. Designing permanent structures for a culture that is based on a nomadic lifestyle, needs to provide understanding about the permanent structures. These homes, Qataliña Shaeffer sums up, have become a remarkable stress factor.[123]

6.7 CONCLUSION

"[Natives] also admit that they cannot predict what kind of consequences will be with snowmobiles for example or with other kind of new technologies coming there. So maybe that's a.. It's something just to keep in mind, and of course it's not the point when we should think like, no, let's leave all these old school way. No, of course not, people do want to live comfortably."

Svetlana Usenyuk

The arctic indigenous groups did not initiate either the cultural or environmental change they are going through, but they are dealing with the consequences. There is no returning to the past, but as long as the cultures are alive, methods for community resilience can be found from them - from traditional knowledge. It is improbable that the western influence would disappear from the village. The western education system, Internet, electricity, motorized vehicles and other western inventions are part of many contemporary arctic indigenous villages, so the question is one of the role of western culture in people's life, and who defines that. What is the correct balance between western and traditional culture in design, and from whom should the design come? There is a difference between adding traditional elements to western design, and adding western elements to traditional design. In the chapter *6.1.3 The people are no part of designs*, we discussed three additional dimensions to HDI. Those were: *Controlling one's own destiny* (fate control), *Maintaining cultural identity* and *Living close to nature*. The question is, how would the design be, if these three dimensions formed the design priorities?

123 Qataliña Schaeffer, 2012

7 SYSTEMS APPROACH TO THE WICKED PROBLEMS IN THE RURAL ARCTIC

In the previous chapters, 6 and 7, environmental and social criteria for design were discussed. The focus of this chapter is *how* to design for rural Arctic indigenous villages, concentrating on the wicked problems. The rural arctic communities have a complex network of problems, which cannot be solved one-by-one, but rather by looking them from a holistic point of view, and understanding their relations to each other with systems perspective. This chapter is not a step-by-step guide to solve arctic wicked problems, it rather examines how it could be done and by whom.

7.1 APPROACHING WICKED PROBLEMS OF ARCTIC WITH HOLISTIC UNDERSTANDING

"We realized very early on in the housing research center when we were working in rural Alaska, that we cannot isolate the home from anything else, or the house from the everything else"

Jack Hébert

Jack Hébert and Jackie Qataliña Schaeffer cooperate in a long-term project to solve systemic problems in a small rural Alaskan village, Oscarville. Qataliña Schaeffer is a project coordinator and facilitator, and Jack Hébert represents the housing sector with CCHRC. The project involves experts from business, public health, tribal affairs, energy and housing sectors, and the method is called *A holistic approach to Sustainable*

Northern Communities. The approach addresses the problems from a holistic point of view, and the stakeholders cooperate in finding the leverage points for change. The aim is not only to help Oscarville, but also create a template that would help Arctic indigenous communities. It is a first-of-a-kind project, and the results are expected to be seen in a rather long time span. The problems in Oscarville are like in many other Arctic villages. Unemployment, lack of clean water, no sewage system, high energy costs, poor quality of housing stock and difficult access are some of the challenges in this community of 70 inhabitants. Despite the challenges, even the young community members would rather stay than leave. It is their home, and they enjoy the traditional activities, such as hunting, that their village enables.[124]

"A holistic approach to sustainable Northern communities" is "taking into consideration all the different elements that make for a sustainable community", Hébert explains in the interview. Both Hébert and Qataliña Schaeffer have observed the pattern of problems that the permanent housing stock brought into the communities. Qataliña Schaeffer addresses the connection between ill-designed homes, stress and social problems. People struggle to stay warm. In some cases three quarters of income is used only to heat the home. Continuous struggle for the basic needs - food, shelter and water, causes stress and leads to social problems, such as alcohol and drug abuse, Qataliña Schaeffer sums up. Besides observing the pattern of problems, Qataliña Schaeffer and Hébert indicated a lack of collaboration. In development projects, everything is siloed, even in the housing sector, and no one has a comprehensive understanding of the problem. Qataliña Schaeffer emphasizes the importance of long-term projects. Rural Arctic has a history of short-term projects, where people come and go, fixing one thing, and not educating people to operate the system. A lot of resources have been used for small implementations, which have failed.

The wicked problems of the rural Arctic communities have been treated as tame problems, which may have made the problems more complex instead of solving them. A holistic approach to sustainable Northern communities addresses that the problem cannot be solved by chronologically starting from fixing one thing and then the next one, but rather looking at the whole community from a systems point of view and acknowledging the connections between the problems. For its model T in 1913, the Ford motor company revolutionized mass production by dividing manufacturing process into tasks on an assembly line, instead of having a group working on one car at a time. The change decreased production time, the price of the car, and enabled employing unskilled

124 Demer, 2015, "By improving life in one village, team aims to solve systemic problems in rural Alaska"

workers[125]. Western knowledge often follows this pattern by being experts on one particular thing, at the cost of losing the connection to holistic understanding[126]. Holistic approach may be new for many western agencies, but the holistic worldview is already present in Arctic indigenous cultures. The nature of traditional knowledge is holistic[127], just as the example of duodji in the section *7.1.1 Radical cultural changes in a short period of time* indicated. Sámi handicraft includes language, social relationship, religion, understanding of nature, and materials. Therefore, common understanding is important to connect western resources and expert knowledge with traditional, holistic understanding.

7.2 HOLISTIC PROBLEM UNDERSTANDING

"Lots of questions. And, conversely, many answers. Some are the best answers, some are not so good. There also has to be a realization that, with any approach, with anything we do, that there are lessons to be learned. So when we do this this way this time, how can we do it better next time?"

Jack Hébert

Once the connection to the community is established, and agreement of cooperation is made, planning can begin. The first step is understanding the problem. If the problem is tame, it can be treated as a "normal" design problem and be solved, but if the nature of the problem is wicked, it is more complicated. As Rittel & Webber (1973) addresses, an idea of solving the wicked problem frames the information that is acquired to understand the problem. If we believe that the problem is housing, then we find information related to housing, but as indicated, the problems in the Arctic communities are more diverse than that, and developing only housing is just one plausible solution. Wicked problems have no stopping rule, so the solution will not directly solve the problem, it changes the situation. If it is a correct solution, it will change it for the better. *Solutions emerge gradually among participants,* and therefore problem defining and solution finding cannot proceed chronologically. The project ends either when the resources run out or the situation has improved enough.[128]

125 http://www.ford.co.uk/experience-ford/Heritage/EvolutionOfMassProduction
126 Meadows & Wright, 2008, p.4
127 Markkula & Helander-Renvall, 2014, pp. 12-13
128 Rittel & Webber, 1973

7.2.1 SETTING THE BOUNDARIES FOR DESIGN

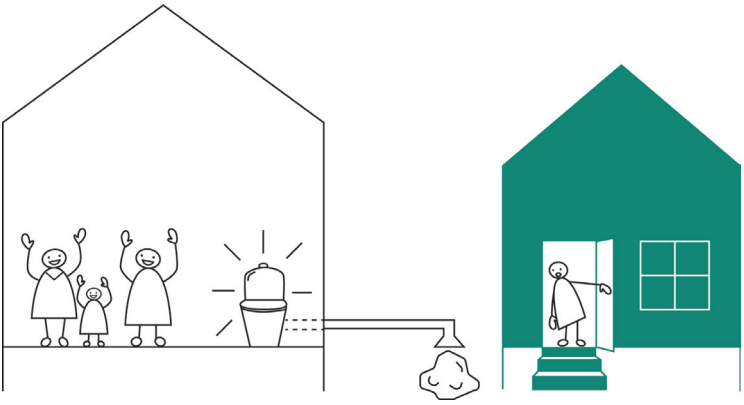


Image 4. Setting the correct boundaries for design.

The lesson learnt through the design case was that a designer cannot design a sustainable product if there is no sustainable system to fit the product into. It was acknowledged at an early stage that it is not enough to only design a toilet seat, but the task requires also considering the design of a whole sewage system. If the toilet seat is designed before the system, it defines the system, and makes the sanitation issue even more complicated. Therefore, it was decided that design should begin with framing possible sewage system options for the context, which means considering environmental limitations and cultural preferences. The sanitation system design case considered the challenges in all rural Alaskan villages, instead of designing a solution for one village. It was a difficult decision, and it can be argued whether it was correct or not, because selecting only one village would have made it possible to come up with a more specific plan of sanitary solutions. The justification for including the whole of Alaska was having limited resources to actually carry out the design within 3 months, and limited possibility to design with the community members. Selecting one village would have led to decisions that shouldn't be made without the community, such as whether the design is for one house or the whole community. For sanitation system design, it makes a big difference whether the solution serves the whole community or only one house. If the design is for the whole community, possibilities such as turning the waste into electricity can be worth implementing. If the design is for one house, maybe composting is a better option. Besides considering the boundaries within the system, it should also be considered which other systems are relevant for the case (see image 5). If the sanitary system requires electricity to function, then the electricity system should be included. If electricity is a scarce resource in

the village, could the system be also a source of electricity, and maintain at least it's own energy demand? If the design includes tangible products, the boundaries of the material cycle also need to be considered.

The system mapping can continue until it covers the whole planet, but that is unnecessary. Horst & Webber (1973) reminds that there is no requirement that all possible solutions have been considered, nor are there criteria for judging them. What sectors to include and how much depends on the planning team's judgement.[129] Donella Meadows (2008) warns that making boundaries too tight is a mistake, but making them too large is a trap. The correct boundaries also rarely meet the boundaries of an academic discipline or anthropogenic borders. Therefore the boundaries should not be decided only within one discipline, rather in collaboration.[130]

Image 5. Sanitary system is connected to other systems in the village, and the challenge is to define which one of them are relevant to include.

7.2.2 DEFINING STAKEHOLDERS AND ROLES

"The priority may not be housing. The priority may be a medical clinic in a village to take care of the health issues. The priority may be an emergency evacuation center, so if there is a catastrophic or a major event, climatic event, the people have somewhere to go. So it may not involve us, it may involve a piece of us, but may not involve all of us, so it needs to be a multi-agency set of partners, again beginning with the people."

Jack Hébert

129 Rittel & Webber, 1973
130 Meadows & Wright, 2008, pp. 95-99

The boundaries of the design case define the stakeholders. Again, a biologist will most likely draw different boundaries to the sanitary case than an engineer will, which would then lead to a different set of stakeholders. Therefore, stakeholder mapping and boundary setting need to overlap, at least partially. In the quote above, Jack Hébert describes that in some cases *the priority may not even be housing*, which is CCHRC's expertise, and if so, the task need to be addressed to the right people instead of trying to solve it only from a housing perspective. Jackie Qataliña Schaeffer also highlights the importance of recognizing and involving the right partners, or as she calls it, a network of support. In Oscarville, the group of stakeholders was defined before problem definition, only the level of participation was unclear. The advantage of that approach is that the boundaries can be defined together. Qataliña Schaeffer compares this approach to the projects that had been done from a one-discipline point of view. The latter category includes projects that "improve one component on a broad scale and then ten years later are still trying to hang on onto that component". For instance, state weatherization programs work in such chronological order. If the funding ends, they will stop the work, and they may have only windows done, she declares. If you approach the problem holistically, create the network of support, and create the boundaries all together, then it is possible to "share the responsibility and bring in the benefits from each stakeholder", Qataliña Schaeffer concludes.

The most important stakeholder is the community. Decisions about the community have to to made in the community and with the community. No one else knows the circumstances there better, so going to the community, *experiencing* the community with the locals, and discussing together about life there will create common understanding about the problem and implementations. The methods for creating common understanding will be discussed more deeply in section *7.3. How to carry a project with holistic approach.* Besides considering the role of the other stakeholders, the role of the community should also be addressed. They should not be considered only as a source of information, but also an active part of the implementation process. The more the community is engaged in the process, the more resilient they will become, because they can maintain the implementations themselves. Part of CCHRC's practice is to employ as many locals as possible for the building process, which includes training the workforce. This is good not only because it improves the local economy, but also because it teaches people to understand the buildings.

7.2.3 CORRECT GOALS FOR DESIGN

"If you define the goal of a society as GNP, that society will do its best to produce GNP. It will not produce welfare, equity, justice, or efficiency unless you define a goal and regularly measure and report the state of welfare, equity, justice, or efficiency."

Donella Meadows (2008, p. 140)

If we look at those houses that were built 50 years ago in the rural Arctic villages, and are now considered a stress factor to their inhabitants, we can only imagine the goal of the building process. We could go even further back in time and consider the goals of introducing western education system to the indigenous communities. The question is, did the implementations fail to meet their goals, or were the goals ill-defined? As it was discussed in the section *6.1.3 The people are not part of designs,* the HDI doesn't reflect the wellbeing of arctic indigenous communities, and therefore the indicators it represents cannot work as a goal for the design. Instead, if we set the three additional dimensions - *1. Controlling one's own destiny, 2. Maintaining cultural identity, 3. Living close to nature* - to be the ultimate goals of design, the results will be very different. Jack Hébert emphasizes the community's participatory role in the goal-definition process. Ideas that are created together, are developed, and again brought back to the community to be reviewed and then developed and iterated again. If considering for instance the design of a sanitary system, it may seem vague to have those three goals, but discussion with a community may bring up points such as how a to create a sanitation system that doesn't make the community dependent on the nation?

"They look at the school as one issue and mental health as another and physical as another, and everything is separated, but if you take all those issues, they all come back to people, because human behavior is a key factor."

Jackie Qataliña Schaeffer

Water, food shelter - the basics first

The section *7.3.2 Similarities across the cultures - connecting in human nature level* brought up the similarities in every human being. These similarities can bring cross-cultural understanding, but are also a justified starting point for defining the goals for design. Jack Hébert and Jackie Qataliña Schaeffer both suggest to start the design from the basics - *water, food and shelter.* In Oscarville, Qataliña Schaeffer explains, the stakeholders came up with a long list of goals. For eight hours, the community and the experts tried to clarify wants and needs with no results. At the end, going back to basics helped them to prioritize the real needs of the community. It turned out that the community did not have access to clean water. Qataliña Schaeffer describes, that "the water source was a river, which was downriver from where they discharge sewage". Landfills and sewage dumps were in multiple locations without waste processing systems. People had lived under those circumstances for so long, that they have adapted, which was the reason they did not address this as a priority problem. Westerners often assume that people have access to the basic needs. Once the priorities were addressed, multiple agencies began their work for the most important implementations simultaneously.

Sewage dump in Newtok, Alaska, 2016. "Lack of infrastructure has led to a serious sanitation crisis in Newtok. Residents dump honey buckets of human waste into the river, creeks, and ponds around Newtok. Erosion and tides have caused the contaminated water to spread throughout the village." (www.facebook.com/cchrc)

Resilient and vital communities

Fulfilling basic needs is the first necessary step to be taken, but represent only the physical needs of a human being, and it is long way from those principles to wellbeing and vital and resilient communities. The solution that is implemented to fulfil the basic needs can either contradict or complement the resilience of the community. The contradicting model is based on non-sustainable systems, and strengthens the community's dependency on the nation. An example of this is non-renewable-based energy solutions, which makes people dependent on oil. A complementary model could be based on local renewable resources, and emphasize the traditional way to live in the North in balance with the Nation and western influence. The arctic indigenous cultures have learned to live in the North self-sufficiently, and they still have that knowledge, but the cultures have changed and people's wants have changed, along with the environment. The challenge is to design for these new standards, but not consider them static. Qataliña Schaeffer observed, by interviewing the community members, that often even the people themselves "didn't know what they wanted or what they needed, because they were just thankful to have something". The system has been poor long enough that it has affected people's expectations. Meadows (2008) calls this *drift to low performance*. She explains that "the lower the perceived system state, the lower the desired state. The lower the desired state, the less discrepancy, and the less corrective action is taken." Meadows compares this to the old story of a frog that is put into a cold water. If the temperature is lifted gradually, the frog doesn't notice the difference in the temperature until it boils, but if the frog is placed straight into boiling water, it fights back.[131]

7.3 HOW TO CARRY OUT A PROJECT WITH HOLISTIC APPROACH - PARTICIPATORY METHODS AND FACILITATION

"It takes a faith and a vision. It takes faith and understanding and seeing, or takes faith and at least the belief that you can see how all those pieces work together. All these different disciplines, economics, sociology, anthropology, human behaviour, psychology, architecture, engineering, all of those pieces, how they all fit together. Again, in a holistic way, and realize that you're learning all the time. You know that you may miss something, It's very very important. Next time you won't."

Jack Hébert

131 Meadows & Wright, 2008, pp. 121-123

Above, Jack Hébert explains project management in CCHRC's housing projects. As he describes, it requires both faith in success and the courage to fail. These are also characteristics that everyone dealing with wicked problems needs to acquire. As Rittel & Webber (1973) addressed *There is no definitive formulation of a wicked problem*, and therefore managing a wicked problem-solving process requires an ability to rely on one's own judgement and senses, instead of on a definitive logical process. A project manager is actively involved in solution-making, unlike a facilitator. A facilitator has to reach equally the community and the agencies, Qataliña Schaffer clarifies. The facilitator is always impartial[132]. It was indicated in this research that there are gaps between design and the people and environment, and those gaps need to be bridged. A holistic process requires someone to mediate the discussion, engage and coordinate the long-term process. There is no one way to carry the process, methods can be mixed, and different disciplines may apply one method in different ways. This research suggests facilitation and participatory design to be effective ways to foster the holistic design process, but since all wicked problems are unique, it doesn't emphasize one over another.

7.3.1 METHODS TO COORDINATE A HOLISTIC APPROACH

Below is example of two methods, *facilitation* and *participatory design*, to carry a project with holistic approach. These methods have a lot in common, but the definitions have slight differences. Facilitator is always absolutely impartial, when participatory designer may have more active role in the design.

Facilitation. Daniels & Walker (2001) define the facilitator's role as that of a guide to "constructive communication, information exchange, learning and constructive negotiation". Impartiality, fairness and credibility are central for good facilitating. Although the facilitator needs to be familiar with the topic and the parties, she must be "impartial for the issues, parties and the possible improvements".[133] Facilitator does not participate into the design process at all, but rather gives tools and creates common understanding between the participants.

Participatory design. Participatory design is a channel for the local people to take part in the design process of their own lives. The effect of participatory design is empowering, but it also creates local commitment and ownership both of the issue and the solution[134]. Everyone can recognize the good, empowering feeling that follows finding a solution to a problem. Besides the positive feeling, often an urge to foster the solution

132 Daniels & Walker, 2001, p. 177
133 Daniels & Walker, 2001, p. 177
134 Braa, 1996, p. 15

emerges. The relationship to the solution is not the same, if someone else hands out the solution - ownership is missing. In addition, including locals in the design process ensures that the design is suitable for the place and people[135]. In the context of rural Alaskan indigenous communities, participatory design is a potential method for learning about the environment, culture and embedding traditional ways of knowing in the design.

7.3.2 ENROLLING STAKEHOLDERS

In some cases, enrolling stakeholders requires persistent long-term work and evidence to get stakeholders to participate. In Oscarville, all the stakeholders participated voluntarily, and were eager to find a solution that will improve life in the village. Bruce Forbes's experience with Russian administration and Oil Company was slightly more complicated. His team had long term relationships with the reindeer herders, but because of changes in Russian administration in the early 2000s, they had lost the connection to regional administrators. The new administration did not see the point in allowing foreign researchers to enter the region, nor the benefit of participating in the workshops that were arranged at the Arctic Centre. The further away the administrative workers were from the reindeer herders, the less they understood the connection between their work and the life of the herders. It was also difficult to get the oil and gas industry involved from the top level, because as Forbes described, "They are not companies in the western sense". They have no international shareholders, so they are following national rather than international rules. Basically, they have the option to do what they want.

In other words, Bruce Forbes and his team started engaging the stakeholders from scratch. They were very active in contacting the stakeholders. They made extra effort to visit the administrator's office and oil and gas industry office to keep them informed about the research they did in the field. Research was done with both the Nenets and with oil and gas field workers. They were more accommodating, because both groups understood the connection, the need for open discussion about coexistence in the region. The turning point was when they presented the results of their work in Russian oil and gas annual meeting, and the report was received well. In Russia, change begins from the top, and through this research the superiors started to see the value of mutual coexistence in the region. Before the research, people couldn't visualize their part in the project, but seeing the results helped to establish cooperation for future work. It is arguable whether the oil and gas industry should exist at all in the region, but it does, and it is better to have an open discussion about how to coexist as responsibly as possible.

135 Howard, 2004, p. 42

7.3.3 ENGAGING STAKEHOLDERS - LONG- AND SHORT TERM GOALS

The holistic projects are long-term implementation projects, and require long-term engagement from the stakeholders. Jack Hébert says that in Oscarville, they are driving change, but not instant fixes[136]. Jackie Qataliña Schaeffer emphasizes the importance of regular meetings and setting both short- and long-term goals for the project. Within the Oscarville project, the stakeholders meet every few months and primarily in the community. Community participation in those meetings is also important. In a long-term project the ultimate goals are not reached easily; it is good to have *markers of success* on the way to foster stakeholders' interest in the project. The markers, short term goals towards the long term goals, are also good points for re-evaluating the actions. Horst and Webber (1973) discussed that the implementations of solutions to wicked problems cannot be tested, and therefore evaluations throughout the process are useful to track how the situation in the village changes when new solutions are introduced.

7.3.4 FOLLOW UP

As it was discussed in the chapter *7.2 Guest or Intruder*, the interviewees have long-term connections to the communities. Even when a project ends, the connection remains, though it is often more casual. Whether it is research or an implementation project, at least some level of follow-up is required. Both Jack Hébert and Qataliña Schaeffer expressed their frustration about projects, where designs have been just "dumped" to the community, and no one has asked later on if the solutions worked or not. This is not only polite, but an essential opportunity for a designer to learn from mistakes and successes. CCHRC monitors their projects, if not by visit, at least remotely. Hébert clarifies that they monitor both the physical and mental side. Asking how people feel living in the house will give you very different information than asking if the house is warm.

136 Demer, 2015

7.4 "EVERY WICKED PROBLEM IS ESSENTIALLY UNIQUE"

"There's no cookie cutter in the Arctic. Everything is unique and one of a kind and unfortunately it's never been approached that way."
Jackie Qataliña Schaeffer

The research includes examples from rural indigenous villages all over the Arctic. There are a lot of similarities within these villages, but it is important to remember that there are also significant differences between the indigenous groups, and the communities. Jack Hébert explains that even villages in the same region can be very different. One village may be very engaged in a project, but the next one is not. For someone who is not from the village, these differences can be difficult to understand. Every wicked problem needs to be treated as unique, and even though the problem would seem similar, the differing dynamics of the village may require a different approach[137].

"Sustainability in New York is a very different thing from sustainability in Kotzebue, Alaska." Jackie Qataliña Schaeffer explains. Every community is unique, and understanding what makes it unique is the first thing to do if designing for those communities. It is one thing to learn about the culture and environment from books, another to actually go there and experience those together with the locals.

7.5 DESIGNER'S ROLE IN THE ARCTIC

"It's the ability.. like a professional ability of designer to facilitate these changes materially, like to provide actually tools, and actual things, that then can help people, support people's intention change their living to adapt the new conditions and so on. That's what I think one of the purposes of Arctic design may be in general."
Svetlana Usenyuk

The studies to understand the characteristics of *Design for rural Arctic* (chapter 5) and *Design with Arctic Indigenous community* (chapter 6) indicated that the implementations introduced to the arctic indigenous communities by people from another culture lacked understanding of the location and people. These gaps in cross-cultural understanding, and understanding of the extremely challenging arctic environment with deficient infrastructure, created a net of bad designs, causing problems that

137 Rittel & Webber, 1973

now need to be solved. Klaus Krippendorff (2006) describes that "Design is making sense of things". This can be interpreted as design makes things understandable for people, but also design as a "sense-creating activity".[138] Ezio Manzini (2015) explains design with similar terms; he divides design activity into *problem-solving* and *sense-making* (see image 6). Design as a *problem-solver* works with physical and biological world, which within the scope of this research is solving how arctic environment, rural arctic community and material world ought to cooperate in harmony. For instance, how to provide food, water and shelter for the community. Design as a *sense-maker,* again, is work in an intangible world, in the world of ideas and conversations, which in this case could be a discussion about how to strengthen a community's fate control, cultural identity and life close to nature. These two approaches, problem-solving and sense-making, coexist and interact. In housing design, designing a house is problem-solving, and discussion about home is sense-making. The early western designs for arctic indigenous villages were problem-solving, and the mistake they made was not to include people's wants and needs, related to their culture and lifestyle, in the design. Good design activity, in contrast, understands the relationships between these two worlds.

The role of a designer in arctic wicked problem-solving can vary. A designer with an emphasis on sense-making can work as a coordinator of ideas, such as facilitator, whereas a designer with an emphasis on problem-solving can work as a planner of a physical implementation. Having the understanding and toolset for joining these two worlds, design can be a significant resource for bridging the gaps in rural Arctic community implementation projects. A designer's strength in solving wicked problems that design thinking is already similar to systems thinking. Nigel Cross researched the designer's way of working in the book Design Thinking (2001), and he observed that designers are rarely happy with the given brief, instead they always look beyond it, and aim at finding the real problem. Clarifying the problem often takes a good part of the time used in the design process, and it is normally developed together with the solution.[139] Svetlana Usenyuk experienced that a designer should not design for the Arctic indigenous communities, because the locals know best what works there and what not, but a designer could "employ the skills that they already have". Therefore, Usenyuk advocates the designer's capability to provide tools and support the locals to make changes themselves.

138 Krippendorff, 2006, Introduction
139 Cross, 2011, pp. 122-123

DESIGN ACTIVITY

Image 6. Ezio Manzini divides design activity to *Problem solving* and *Sense making*. Design can emerge in either end of the axis, in the middle, or have an emphasis on either side.

7.6 CONCLUSION

The roots of wicked arctic design problems are often in planning that has defined the problem too narrowly, in other words, excluded rural arctic environment and people from design. Systems that are related to the problem are also excluded. There is plenty of proof in the Arctic that wicked problems cannot be solved in the same way as tame problems. Systems approach to the wicked problems of the Arctic is rather new, at least for westerners, and therefore the results cannot be evaluated yet, before more information is gained. Nevertheless, at least in theory, it is an appropriate method to approach the wicked problems in most cases. The challenge is, though, that the projects with systems approach require long-term commitment, and it can be hard to find funding from the existing funding structures. As Rittel and Webber (1973) noted, sometimes the solutions for wicked problems can fail, which makes them a risky investment. Still, it is suggested to be a risk worth taking, instead of wasting resources on narrow-view implementations, which only complicate the problem. Again, as Ackoff (2004) said, "The righter we do the wrong thing, the wronger we become.".

PART 3

CONCLU-SION & DISCUS-SION

8 Conclusion & Discussion

8 CONCLUSION & DISCUSSION

8.1 CONCLUSION

In chapter *3.3 Systems Thinking,* it was discussed how systems thinking could support understanding of wicked problems. Meadows and Wright (2008) noted that often it is more effective to impact the system through the *interconnections* or *purpose*, than changing the *elements* of the system. Image 7 is a simplistic systems map of the wicked design problems in the Arctic. Community, western authorities (design and decision makers), designs and local environment are the elements of this system. The arrows describe interconnections between the elements, in this case information flow. Continuous arrows are "working" information flows and dashed lines represent broken information flows. The study indicated that a common feature of bad design in the Arctic is missing information and misinterpretations of rural Arctic circumstances and the lifestyle of the people. When developing projects, the emphasis is often on improving western designs and trying to make them work better, but it is suggested that more important is to first improve the interconnections, and confirm that the information flows are not disturbed. The elements of the diagram are explained below, divided into four sections that summarize the findings from each perspective.

SYSTEM MAP OF THE PROBLEM FRAMING

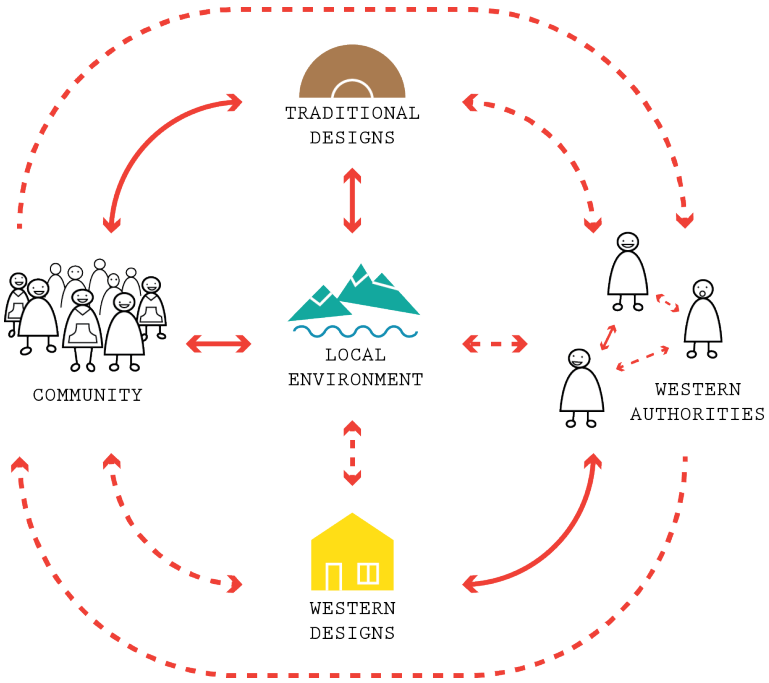


Image 7. Continuous arrows are "working" information flows and dashed lines represent broken information flows.

COMMUNITY - LOCAL ENVIRONMENT - TRADITIONAL DESIGN

Community and traditional designs have developed in, and from, the local environment over thousands of years. The settlements have traditionally been nomadic, which means that all structures were temporary, and the sites are used only during the times of year they can support human life. Arctic summer is very different from arctic winter, and therefore summer shelters are built differently from winter shelters. People's lives are closely connected to nature, and therefore the information flows are intact. The state of the environment directly affects people's livelihood, and this has taught sustainable resource use to Arctic indigenous people. For instance, if a reindeer herder lets his cattle overgraze some region, it will directly weaken his own livelihood. Besides supporting livelihood in the North, traditional design has important social meanings, which are seen in a shelter's floor plan or in the patterns of textiles. Colonialism changed the livelihoods in these villages, and the connections to

traditional knowledge, traditional livelihoods and traditional designs are weakening. The high number of social problems in the communities is also related to the diminished practice of traditional livelihood. Going back to the original designs is a tempting option, but the culture has changed. People have adopted western technologies, such as snowmobiles and modern hunting equipment, which have made them somewhat more resilient to climate change.

TRADITIONAL DESIGN - LOCAL ENVIRONMENT - WESTERN AUTHORITIES

Traditional design and traditional knowledge are resources that western authorities have rarely included in their designs, even though the designs are for the rural communities. Traditional designs are developed for the local environment, and they include thousands of years' worth of knowledge of local circumstances. One of the most significant flaws of western design for rural arctic communities is a lack of understanding of rural Arctic circumstances. Studying local traditional designs could help to bridge that gap. Their inclusion requires responsible use of traditional knowledge, and when dealing with the community, transparency is required throughout the process for fair practice.

WESTERN AUTHORITIES - LOCAL ENVIRONMENT - WESTERN DESIGNS

Western designs have often performed inadequately in rural arctic circumstances. Westerners are professionals in technology and design, but their image of rural arctic community doesn't always match the reality. The specific challenges of Arctic location, such as permafrost, climate change related challenges and extreme weather, together with the challenges of a remote location, such as difficult accessibility, different infrastructure and expensive energy, set specific requirements for design. The solutions that work in the urban Arctic don't necessary work in the rural Arctic, and the solutions that work at Southern latitudes rarely work at all in the Arctic. Western knowledge is based on specialization, which enables deep understanding in a certain field of study, but it challenges the holistic understanding of the situation. A nice toilet doesn't solve the sanitation problem if there is no proper sanitation system to handle the waste. The boundaries of wicked problems often cross academic disciplines, which means that they cannot be solved only from the perspective of one discipline. A systems understanding helps to define the problem boundaries, stakeholders and the possible leverage points. In the diagram, there are dashed lines and continuous lines between the western authorities. This describes how a common understanding is not always reached, even between western agencies. For instance, one agency may see relocation of imminently threatened villages as a priority, but the funding agency may not have a category for that.

WESTERN DESIGNS - LOCAL ENVIRONMENT - COMMUNITY

Western designs have taken root in indigenous communities almost all over the Arctic, especially in the communities that are no longer nomadic. Arctic indigenous communities have showed remarkable ability to adapt to demanding Northern circumstances. During colonialism, the communities adapted to western systems and designs, which was not their choice, but rather forced assimilation. Nevertheless, western designs and systems (whole or partial) are now part of everyday life in rural Arctic communities. The challenges of the location mean that western designs do not always work properly, but the people have adapted to the faults of the western products, which is not always a good thing. Meadows and Wright (2008) calls this drift to low performance, which means adapting to negative circumstances, and perceiving that as standard. Western designs have not often taken into account cultural and environmental needs in the design for rural Arctic communities, but people adapted to this ill-defined design. Western products are delivered to the communities, but there is no waste management to deal with the waste from these products. Western housing is standard in many communities, but the houses are crowded and unsuitable for the cultural needs, such as storing subsistence food. Air vents in the houses are often sealed, because that was how people operated with traditional, nomadic housing, and it was not explained how the western design should be used. Indigenous people have a remarkable understanding of nature and the local environment. Still, the communities are contaminated because of sewage lagoons and landfills. The reason why westerners and indigenous communities use the products differently lies in differing worldviews. Traditional designs operated in harmony with nature, whereas the western relation to nature is rather bipolar, extracting and protecting. Protecting nature and dealing with waste has not been part of indigenous cultures, because their designs worked with nature and they had no waste.

COMMUNITY - WESTERN AUTHORITIES

The broken interconnection between community and western authorities sums up the diagram. It is represented as a dashed line that circles the whole systems map. The challenge with cross-cultural communication is that it is easy to miss the differences between cultures by assuming that the same word or gesture means the same thing in both cultures. Recognizing the differences and similarities between cultures requires a conceptual understanding of *culture*. Awareness that we all connect at a human level is a positive way of connecting cultures, but not a reason to exclude culture from the design. It is probably too optimistic to assume or suggest, that every engineer, administrator, funding agency and all community members would themselves learn about cross-cultural communication, and be able to practice it successfully. Therefore, it is

suggested that all planning projects that include western and rural Arctic community cooperation would be facilitated or coordinated with an emphasis on creating cross-cultural understanding. Design is not the only discipline that can work in the role of facilitator, but the benefit of a designer is an understanding of connections between people and the material world. Cultural background of a facilitator was not examined in this research, but I believe that the facilitator can be from either culture; in the ideal case there are representatives from each. In sum, this research suggests that insufficient cross-cultural understanding is the primary reason for unsuccessful design in the rural Arctic communities. Strengthening this interconnection would strengthen every other interconnection in the systems diagram.

8.2 EVALUATION OF THE RESEARCH QUESTION

Design for arctic indigenous communities is challenging, because the problems are often closely tied together. That makes defining the real problem difficult, and the design process should not begin by obtaining funding to improve one particular thing, because the change may happen only by improving something else. Approaching the distinct challenges of the rural arctic is not straightforward; this is why it was chosen as the topic of this research. The purpose is to suggest a framework that would help a designer to carry out the design process in the arctic indigenous communities in a sustainable manner. Research question:

What kind of framework enables a designer to tackle the wicked problems of arctic indigenous communities?

The results of this thesis indicate that improving communication between stakeholders is a significant leverage point in design for arctic indigenous communities. Systems understanding and holistic view are currently missing from the design process when dealing with Arctic wicked problems, and it is suggested that these problems be tackled by design. Nevertheless, design for rural Arctic villages consists several distinct features, which cannot be dealt with by a designer alone. It is impossible to learn all the needs of the community and the context, so the designer's role is rather to design the design process and enable users to participate in the process in cooperation with other stakeholders.

8.3 REVIEW OF THE RESEARCH PROCESS & FUTURE PROSPECTS

The research was about wicked problems, but it also itself had elements of a wicked problem. There is not a single answer for the question *how the design should be done for the arctic indigenous communities*. Change can be enabled in variety of ways. The design case was challenging, and even though it was narrowed down to the conceptual level, I became aware of the challenges of the context. The difficulty of a wicked problem is, that sometimes it is impossible to narrow down the case. Some problems require a lot of resources and long timespan dedication. Still, the design case enabled learning about the characteristics of design for arctic indigenous communities, and the interviews supplemented the findings. The inductive process was sometimes challenging, because of not knowing what the result will be and what information is important, but for these same reasons it was a valuable method for carrying out this research.

Unfortunately there was not enough time to review the text with the interviewees, or with arctic indigenous communities, so this will need to be done in the future. The research was presented at the Arctic Frontiers conference student forum in January 2016, and was well received by Arctic experts; this gave me confidence in the validity of the work. The weakness of the research is that I do not have a lot of first-hand experience in designing *with* rural Arctic communities, but it is the next step to be taken.

I hope that this research will also bring up more discussion on the possibilities of circumpolar design cooperation. This is not the main topic of this research, but it is relevant because the research brings together data from whole circumpolar region, and experience-sharing of good and bad designs from similar contexts can be a significant contribution to the wellbeing of rural arctic communities.

GLOSSARY

ACIA = Arctic Climate Impact Assessment
AHDR = Arctic Human Development Report
AMAP = Arctic Monitoring Assessment Program
CCHRC = Cold Climate Housing Research Center
HDI = Human Development Index
SDWG = Sustainable Development Working Group

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