First Mile Methodologies in Community Informatics Research: Learning from First Nations

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OVERVIEW

One focus of Community Informatics (CI) is to support communities in gaining long-term benefits from research projects. This concern is shared by Indigenous communities, who have long argued for the need to drive research agendas themselves. Over the years, Indigenous organizations and their partners have developed ways to support communities in retaining ownership, control, access and possession (OCAP) over project data and outcomes. In this paper, we discuss a project with Timiskaming First Nation that involves university-based and community-based researchers collaborating to uphold these OCAP principles. We suggest that our methodology may be useful for CI projects more generally.

In recent years, complexity theory has undermined conceptions of our world as operating according to causal, linear and determinate rules. As reflected in fields as disparate as ecology and economics, uncertainty and unpredictability are the new norm (Walker & Cooper, 2011). Complexity theory explains the evolution of societies in continual *adaptive* cycles of growth, accumulation, restructuring and renewal (ibid). Attention to power inequalities in particular provides researchers means of exploring how these processes are implicated in risks such as financial regulation, disaster management and environmental degradation. Given this focus, some researchers are undertaking projects to identify and leverage how the resources and expertise held by communities to withstand adverse events can drive localized adaptation and enable endogenous development projects (Chandler, 2012).

This focus is also reflected in the work of Indigenous scholars studying settler colonialism and Indigenous resurgence. Their research illustrates how the activities of Indigenous peoples are "determined acts of survival against colonizing states' efforts to eradicate them culturally, politically and physically" (Alfred & Corntassel, 2005, p.598). As such, every-day acts can continually support the renewal of Indigenous communities facing powerful and sustained challenges to their existence (Simpson, 2011). This understanding holds promise for CI research and practice, as for example in Beaton and Campbell's (2014) demonstration of how local ownership and control of information and communication technologies (ICT) by First Nations supports community resilience against settler colonialism through the daily use of online applications, social media and e-services.

Communities, however, face many challenges in securing effective use of ICT, and this has pushed some CI researchers to actively incorporate the voices of community members in research design, data analysis, and proposing solutions to policy or practical challeng-es (see for example Gangadharan & Byrum, 2012; Klein, 2013). That is, rather than 'subjects', this approach positions members of communities as self-determining actors who work with university-based researchers to leverage internal resources and capacities to re-search and solve their ICT challenges. This paper uses the experience of our recent field research to underscore the value and utility of upfront, reciprocal and collaborative engagement with the self-determining community actors who drive project relevance and sustaina-bility.

INDIGENOUS METHODOLOGY, SELF-REFLEXIVITY AND THE FIRST MILE APPROACH

One emerging subfield of CI that applies this kind of methodology is called the First Mile. Proponents of the First Mile argue that locally-managed broadband development, operations, and maintenance can support network sustainability, capacity-building, and community devel-opment, among other benefits (Paisley & Richardson, 1998; Strover, 2000). Methodo-logically, McMahon, Gurstein, Beaton, O'Donnell, and Whiteduck (2014) describe a First Mile model of innovation to frame this activity. This process involves first working with local communities to identify resources and expertise to carry forward

development initiatives. Project collaborators jointly shape the scope, focus and outcomes of research. Next, it involves partnering with regional community intermediary organizations to access expertise, economies of scale, advocacy support and other benefits of larger-scale aggregation. This highlights how First Mile projects emerge from the unique circumstances of diverse commu-nities, while also providing opportunities to scale up local initiatives.

The First Mile approach to CI research is itself strongly influenced by Indigenous methodologies. Self-reflexivity has a place in all research, and particularly so in projects involving Indigenous peoples. This is due to previous practice of researchers extracting informational resources held by Indigenous communities for their own purposes - an increasingly problematic component of both the historic and ongoing process of settler colonialism (Culhane, 1998; Tuhiwai Smith, 1999; Jones & Jenkins, 2008; Menzies, 2004). For example, in a 2011 presentation at the National Conference of the First Nations Information Governance Centre, members of the Havasupai Nation in the U.S. discussed an initiative undertaken by researchers from Arizona State University. Starting in 1990, members of the Havasupai community began giving DNA samples to university researchers. Although they believed the data was being used to support diabetes treatments, it turned out that the blood samples were used to study other things, including theories of the tribe's geographical origins that contradicted traditional knowledge.

Not everyone is on board with the kind of participatory methodologies described in this paper. Critics raise the close relations between 'researchers' and 'researched' as a form of bias. Key informants are seen as overly shaping the scope, focus and outcomes of research, and data is interpreted through co-constructed findings as opposed to 'objective' in-dependent analysis. Critics also raise challenges to the generalizability of findings that emerge from situated case studies. In choosing to foreground examples of innovation and creative agency, the interpretive bias of such studies is also sometimes challenged.

However, field work using the First Mile approach supports our contention that such critiques sustain a problematic dichotomy between university-based researchers and the communities that are framed as the subjects of their work. This separation perpetuates a division between outside 'experts' and community 'subjects' that suggests that knowledge generated from outside a community is more valid and effective than knowledge already held by the community. But knowledge-based development interventions should not only be conceived as a means to transfer external knowledge to a community - they also encompass a long-term, dynamic and iterative process engaging people inside communities who hold and shape knowledge to fit their lived realities. We therefore follow Tuhiwai Smith (1999) in re-jecting this dichotomy and describing community members instead as co-researchers. In our experience, university-based and community-based researchers have fruitfully explored ways to jointly facilitate the conditions that give rise to effective ICT development and use in the first place. This drives self-reflexivity and contributes to the self-determination of com-munities, since it provides the people affected by the research with outcomes in which their own voices are central to research design, interpretation and application. Figure 1 provides a comparison between aspects of First Mile research and more conventional approaches to re-search.

Table 1: Steps in First Mile Research Methodologies

	First Mile research	Conventional research
Research Concep-tualization	Communities as co-researchers who work with university-based researchers to leverage their internal resources and capacities over a period of months	Communities as research sub-jects studied by outside 'experts'
Research Design	Upfront, reciprocal and collaborative engagement with the community actors who drive project relevance and sustainability Case studies and community engagement activities focus on situated processes rather than generalizable findings	Research designed by university-based researchers, sometimes independent from community input Standardized research can support generalizable findings
Data Gathering	Engage community actors in data gathering to facilitate the conditions that give rise to effective ICT development and use	External researchers conduct data-gathering activities
Data Analysis and Synthesis	Actively incorporate the voices of community members in data analysis and proposing solutions to policy or practical challenges Co-constructed findings can support culturally appropriate research and ethical imperatives to reduce harm	Analysis is conducted by institutional experts, typically external from the community This is to maintain objectivity and reduce interpretive bias
Research Outcomes	Communities retain ownership, control, access and possession (OCAP) over project data and outcomes Partnerships with regional community intermediary organizations enables communities to access expertise, economies of scale, advocacy support and other benefits of larger-scale aggregation.	Universities or other research organizations extract informational resources held by Indigenous communities for their own purposes

FIRST NATIONS INNOVATION PROJECT

The First Nation Innovation (FNI) research project - initiated in 2006 as VideoCom and continuing as FNI today - is indicative of this kind of research. Based at the University of New Brunswick (UNB), the FNI project is investigating how remote and rural First Nation communities in Canada are developing and using ICTs. Our ongoing work with the Timiskaming First Nation is one of several FNI initiatives currently underway in Canada. This project comprises a partnership between UNB, the First Nations Education Council in Quebec (FNEC), and the Education Department of Timiskaming First Nation (TFN). TFN's population and infrastructure are both growing, with approximately 700 of the Band's 1,650 registered members living in the territory. While TFN has strong connectivity infrastructure, the com-munity wants to build local capacity to more effectively utilize its ICT systems. In this con-text, the three FNI partners jointly developed a mutually-beneficial CI project. The following section provides more background on the First Mile approach overall and discusses how we are evolving that methodology in our ongoing work for this project.

First Mile Methodology: Learning from Timiskaming First Nation

First Mile research aims to provide for the multi-directional transfer of skills and knowledge between community-based and university-based researchers. This principle of reciprocity includes capacity-building activities that support Indigenous ownership in and con-trol over research data and outcomes. This in turn respects First Nations oral traditions that themselves include a complex set of rights and responsibilities concerning the use of commu-nity knowledge. First Nations in Canada have developed over time the formal OCAP principles to guide this process (Assembly of First Nations, 2007; Schnarch, 2004), and OCAP has now "become the de facto ethical standard not only for conducting research using First Nations data, but also for the collection and management of First Nations information in general" (FNIGC, 2014, p.1). Jurisdiction of this information rests with autonomous First Nations that hold the right to determine how their information is interpreted and shared.

Observing these principles means that university-based and community-based re-searchers must develop protocols based on mutual clarity, respect and trust. Researchers actively shape collaborative projects over time to ensure that all partners are represented from the earliest stages of project conception and design, through to the analysis and dissemination of results. Communities retain ownership of research data and project delivera-bles, and universities formally request permission to use these materials for jointly-authored research and public outreach materials. University-based partners benefit from this process, since the community knowledge they draw on is collected, interpreted

and validated by in-volved people. This supports efforts to conduct culturally appropriate and relevant research. Community-based researchers also offer invaluable logistical support for field visits, connect university-based researchers with local contacts, manage interviews, and act as guides. Fig-ure 2 illustrates the benefits of this multi-directional process.

Table 2: Benefits of First Mile Research Process

	For University-based research-ers	For Community-based re-searchers
Formal Research Proto-cols	Establish relationship based on clarity, respect and trust Clarify roles and responsibilities	Establish relationship based on clarity, respect and trust Clarify roles and responsibilities
Discussions on Nature, Scope, and Focus of Re-search	Organizational and logistical sup-port for field research Connect with local contacts	Benefit from research outcomes Ensure research meets local needs
Involving Community Members in Data Collec-tion and Analysis	Local support for research activi-ties Validation of culturally appropriate research	Capacity-building in research activities Local employment
Guidelines on Collection and Use of Research Data and Outcomes	Fulfill research ethics requirements Generate academic outputs	Retain OCAP over data and out-comes

Drawing on previous experience gained in earlier FNI projects - including using multi-site videoconferencing technologies to support ongoing research discussions (Gratton & O'Donnell, 2011) and field trips to build relationships through activities such as local tours and a community ICT film festival (Gibson, Thomas, O'Donnell, Lockhart & Beaton, 2012) - our Timiskaming project began by establishing a formal relationship between university-based researchers, community leadership, and a community intermediary organization (FNEC). We jointly prepared a project proposal to guide our research, which was formally approved by Chief and Council after a presentation in the community. A local project liaison guided field work planning and helped develop project methods, analysis, interpretation, and deliverables. The total budget for this project was CDN $1,500.

The Timiskaming research project itself began in Summer 2014. The Timiskaming Education Department was interested in gathering data from community members regarding their use of and interest in ICTs and then using the data to inform the community's strategic technology plan. While Timiskaming had good connectivity, availability of local technology support was a challenge. In this context the research project became a natural opportunity to learn about existing capacities and resources held by the community, and to collect information to help develop workshops shaped to local interests and needs. Because the FNEC's primary objective was to establish a baseline on the level of technology infrastructure and use in the community, the research was also seen as helping to determine what services the organization needs to focus on and plan for the future. The UNB researcher sought to develop academic papers related to Indigenous ICT development and use. Following the FNI publication policy, these papers will be co-authored with the community, with the topics, focus and argument of papers determined collaboratively by the partners.

The research methods we employed in this project evolved over the course of on-going discussions. Regular teleconference meetings enabled us to discuss ideas and develop roles and responsibilities, which we formalized in an MOU approved by Chief and Council. FNI researchers are required to develop formal agreements with community partners prior to any field research being conducted. These agreements provide: background on project collaborators; a summary of community and university research interests; project objectives and deliverables; project method and research approach; and a work plan. In the course of our discussions about these project components, we decided to work with local high school students to conduct household surveys about digital literacy, access, connectivity, and effective use of ICTs in Timiskaming. To raise community awareness, we promoted the project in an article in the local Kiwetin school newsletter, and also through word of mouth. The survey was designed as a communication tool as well as a data-gathering instrument, in order to raise awareness about different aspects of effective ICT use in the community.

A field visit in late October 2014 launched the household survey. During the visit we clarified two roles for the student researchers. We engaged 10 high school students to collect data through door-to-door surveys. TFN assigned these students approximately 208 homes (roughly 20 houses each), based on their geographic division of the community. Each student was given an individualized information package that included a brief explanation of the survey and a prize draw ballot for an iPad (as an incentive for respondents). To improve survey reliability, students received individualized versions of the survey. TFN worked with educational staff to manage the students and ensure their

volunteer hours would be accepted as graduation credits. The project offered several other incentives for students, including honoraria; experience in community-based research; a reference letter; and the opportunity to be acknowledged by name (if they wished) in publications resulting from survey data.

Youth researchers also got involved in early-stage data analysis. A co-op student working at the Band office was recruited to input survey data into an online program. This process allowed TFN to retain control of data since the community chose to share these survey results with the university researcher through the online platform. The co-op student also gained training in research methods, which helped speed up data analysis. Data will be analyzed and interpreted in collaboration with FNEC and TFN, and will be made available to support TFN's strategic technology plan and to develop future technology workshops. This approach ensured that the project supported OCAP, and resulted in project deliverables useful to all three partners.

As time passed, some students were unable to complete their household surveys, given other commitments. This further illustrates the need for a flexible, emergent methodology - and the practical challenges that can sometimes arise in the course of this kind of research. As a result of this situation, and at the suggestion of the local liaison, project part-ners decided to engage an adult from the community to distribute the remaining surveys. This person was paid from the project budget.

The project also involved ongoing public outreach activities regarding the effective use of ICTs in the community. We designed survey questions to raise awareness of potential uses of ICT by community members. As well, we presented about the project to audiences including student researchers and local service providers (education and health staff, Band Office employees, and Band Councilors, among others). At each presentation we solicited feedback to ask how to improve the work moving forward. Participants raised several im-portant points, including questions regarding community ownership and control of research data. The visit also finalized the project MOU, which was reviewed and approved by Chief and Council after a presentation led by FNEC. At the request of the TFN partner, we also added an additional research component - a second round of surveys tailored to community services. This data will further support academic research and TFN's community ICT plan-ning. We also completed a second visit to Timiskaming in spring 2015, during which the re-searchers discussed the results of the survey in preparation for a presentation at the annual conference of the Canadian Sociological Association.

CONCLUSION

The dynamic and uncertain nature of social change, as demonstrated through the in-sights of complexity theorists, makes field research a necessarily fluid endeavor. In the field of Community Informatics (CI), the rapid speed of technological innovation often outpaces that of research activity - particularly in projects that aim to provide concrete, sustained benefits for involved communities. In this context, emergent methodologies that build en-gagement among community-based research partners can be a useful approach. As demon-strated through the FNI project, Indigenous methodologies provide strong lessons for how research partners located in universities and communities can generate mutually-beneficial projects. These approaches not only meet ethical imperatives to practice respectful research (such as those highlighted by Canada's major research funding agencies), but through sus-tained engagement over time can also generate high levels of project relevance and sustain-ability among community members. These goals meet the aims of enrolling community par-ticipants as co-researchers in the first place. While practical setbacks can emerge in the course of research, dynamic, reflexive methodologies like the First Mile approach support research partners in identifying and leveraging the resources and capacities held by commu-nities, while actively recognizing and mitigating unequal social relations - including those among 'researchers' and 'researched'. As such, the methodological approaches deployed by FNI projects in Canada might be of interest to researchers working elsewhere.

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ENDNOTES

[i] In her landmark book *Decolonizing Methodologies*, Linda Tuhiwai Smith (1999) provides an extensive critique of these approaches to research, calling for critical understanding of the assumptions, motivations and values that inform projects: researchers should situate their work in particular cultural and social systems, while recognizing that colonial-ism continues to impact Indigenous peoples. Further, Indigenous research necessarily involves community members developing and carrying out their own research agendas. Tuhiwai Smith's work has proven extremely influential and continues to inform research today. A growing number of university-based researchers now partner with community-based researchers to support mutu-ally beneficial projects.

[ii] FNI is a research and outreach project that started in September 2006. It is a partnership between the University of New Brunswick and several regional First Nations technology organizations, including K-Net Services, part of the Keewaytinook Okimakanak tribal council in On-tario, the First Nation Education Council in Quebec, and the Atlantic Canada First Nations Help Desk, part of the Mi'kmaq Kina'matnewey educational organization in Nova Scotia. The project examines broadband communications in remote and rural First Nation communities in Canada, and explores new ways to work together in participatory research when partners are separated by vast distanc-es. For more information, please visit: http://fn-innovation-pn.com/default.aspx

[iii] FNEC represents 22 member communities from eight nations in Quebec (The eight Nations are: Abenaki, Algonquin, Atikamekw, Huron, Malecite, Mi'gmaq, Mohawk, and the Innu community of Mashteulash). As a First Nations community intermediary organization, its mission includes developing, implementing, and executing technology initiatives in ways that realize the needs and priorities of its members, which include TFN.

[iv] In Canada, this focus is also reflected in the ethical conduct required of research-ers by federal funding agencies. For example, Chapter 9 (Research Involving the First Nations, Inuit and Métis peoples of Canada) of the 2nd edition of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* points out the importance of trust, communication, mutually beneficial research goals, appropriate research collaborations or partnerships, and ethical conduct in research with Indigenous peoples (Canadian Institutes of Health Research, Natural Sci-ences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada, 2014).

[v] To read this publication policy, please visit: http://www.fn-innovation-pn.com/publication_policy.aspx

[vi] We recognize the challenges and bias that may emerge through the use of stu-dent researchers. For example, respondents may feel compelled to answer questions. As well, in small, tight-knit communities, respondents may feel uncomfortable answering sensitive ques-tions. That said, our questions avoided sensitive issues, and we told students they would receive credit regardless of whether all their surveys were answered or not. We designed the survey re-search to alleviate these challenges.

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