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OPENNESS, INCLUSION AND SELF-AFFIRMATION: INDIGENOUS KNOWLEDGE IN OPEN KNOWLEDGE PROJECTS

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This paper is based on an action research project (Greenwood and Levin, 1998) conducted in 2016-2017 in partnership with the Atikamekw Nehirowisiw Nation and Wikimedia Canada. Built into the educational curriculum of a secondary school on the Manawan reserve, the project led to the launch of a Wikipedia encyclopaedia in the Atikamekw Nehirowisiw language. We discuss the results of the project by examining the challenges and opportunities raised in the collaborative process of creating Wikimedia content in the Atikamekw Nehirowisiw language. What are the conditions of inclusion of Indigenous and traditional knowledge in open projects? What are the cultural and political dimensions of empowerment in this relationship between openness and inclusion? How do the processes of inclusion and negotiation of openness affect Indigenous skills and worlding processes? Drawing from media studies, indigenous studies and science and technology studies, we adopt an ecological perspective (Star, 2010) to analyse the complex relationships and interactions between knowledge practices, ecosystems and infrastructures. The material presented in this paper is the result of the group of participants' collective reflection digested by one Atikamekw Nehirowisiw and two settlers. Each co-writer then brings his/her own expertise and speaks from what he or she knows and has been trained for.

Keywords: Wikimedia, Indigenous, knowledge, openness

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INTRODUCTION

In 2017, the Wikimedia Foundation launched a broad discussion within the Wikimedia movement to define is strategic goals for the next decade. The lack of diversity of contributors to Wikimedia projects was among the most discussed topics. By including more non-Western knowledge, the Wikimedia platform would move closer to the goal of collecting "the sum of all knowledge." The process of engaging in a collaborative online encyclopaedia can be empowering for Indigenous peoples. It is an opportunity to create online educational resources in their native language. Yet the imperative to diversify sources of knowledge and to make *all* non-Western knowledge and heritage accessible online can also create tensions.

This paper is based on an action research project (Greenwood and Levin, 1998) conducted in 2016-2017 in partnership with the Atikamekw Nehirowisiw Nation and Wikimedia Canada. Built into the educational curriculum of a secondary school on the Manawan reserve, the project led to the launch of a Wikipedia encyclopaedia in the Atikamekw Nehirowisiw language. We discuss the results of the project by examining the challenges and opportunities raised in the collaborative process of creating Wikimedia content in the Atikamekw Nehirowisiw language. What are the conditions of inclusion of Indigenous and traditional knowledge in open projects? What are the cultural and political dimensions of empowerment in this relationship between openness and inclusion? How do the processes of inclusion and negotiation of openness affect Indigenous skills and worlding processes? Drawing from media studies, indigenous studies and science and technology studies, we adopt an

ecological perspective (Star, 2010) to analyse the complex relationships and interactions between knowledge practices, ecosystems and infrastructures. The material presented in this paper is the result of the group of participants' collective reflection digested by one Atikamekw Nehirowisiw and two settlers. Each cowriter then brings his/her own expertise and speaks from what he or she knows and has been trained for.

The first section of the paper frames our project at the interface between the knowledge practices of Indigenous communities (especially the Atikamekw Nehirowisiwok) and the knowledge practices of Wikimedia communities. The second section critically assesses the activities and outcomes of our project through the lens of social, political and onto-epistemological conditions of inclusion. We then move the focus beyond inclusion to examine the outcomes of the project in terms of self-reinforcement of Indigenous communities. Finally, we show how the Wikimedia platform is connected to an ecology of nested spheres of knowledge practices, articulated by inner boundary objects and outer boundary objects, positioned on a continuum of open/closed frames.

KNOWLEDGE PRACTICES AT THE INTERFACE OF INDIGENOUS AND WIKIMEDIA COMMUNITIES

Openness and empowerment

Knowledge as practice

Knowledge can be conceptualised as a manifestation of awareness, understanding or method in the process of living and world making. Much more than a fixed catalogue of resources, knowledge is both a vector and a result of action, meaning making, empowerment and the exercise of power. We embrace a definition of knowledge as a practice (Star, 2010) that is situated in socio-historical configurations. More precisely, we understand knowledge practices as embodied and organized arrays of activities. They unfold through interactions between members of a community and their material environment (natural, built, technological). Interwoven in broader nexuses of practices, arranged into orders of people, artefacts and things (Schatzki, 2005), knowledge practices are shaped by institutions (including copyright laws and traditional customs) as well as cultures (symbolic forms, languages, beliefs, social patterns) and frames of everyday experience. There is a great diversity of knowledge practices spanning across work communities, scientific disciplines, digital communities, social worlds and cultures. These communities of knowledge develop, enforce and actualise various principles and protocols of knowledge production, application organisation and transmission.

This paper explores the boundaries, interfaces and gaps between the different principles and protocols in two communities of knowledge: the Atikamekw Nehirowisiwok Nation and the Wikimedia movement. Acknowledging that boundaries between and within these communities matter (Stengers, 2005) and that gaps (discontinuities) between frames of action cannot simply be filled, we set out to explore the challenges of articulating these knowledge practices around a common goal of knowledge transmission (what Jones and Jenkins call a hyphen; 2008), while maintaining the possibility for each of them to simultaneously pursue other collective goals particular to each of them – open knowledge development for the Wikimedia movement; self-affirmation for the Atikamekw Nehirowisiw Nation.

Wikimedia and open knowledge principles

The Wikimedia platform is made of a large-scale digital information system comprising hundreds of websites (one for each project) intensively interconnected among themselves: the 291 linguistic editions of the Wikipedia encyclopaedia, the 172 linguistic editions of the Wiktionary dictionary, the central multimedia database Wikimedia Commons and many more. We frame this platform as a knowledge ecology in the sense that it consists of "numerous systems, each with unique origins and goals, which are made to interoperate by means of standards, socket layers, social practices,

norms, and individual behaviours that smooth out the connections among them" (Karasti et al., 2016: 7). Around each of these projects, a subcommunity of contributors develops rules and guidelines tailored to its own goals and social composition, distributing roles and rights into a semi-flexible organisational structure.

Regarding open knowledge and its specific implementation in the context of Wikimedia, it embraces openness as a set of principles broadly entailing the following elements: free access to content (at no cost); the construction of common pools of knowledge resources (content voluntarily donated by contributors or fallen into the public domain after copyright expired) reusable by anyone, even for commercial purposes; collaborative edition, implying that contents can be edited and modified by anyone; the opportunity for virtually any contributor to participate in the platform governance (participation in discussions about guidelines and politics, applying to be elected as an administrator); transparency and accountability (publicness of discussions, grant applications and activity reports). The Wikimedia movement employs legal tools such as copyleft licenses to embed these principles both in the infrastructure of the platform (via the open-source software Mediawiki) and to frame the possible reuses of contents published on the platform (Jemielniak, 2014; Tkacz, 2015). How is empowerment understood in this context? It assumes that enriching and sustaining common knowledge resources is a lever for autonomy, self-determination and emancipation on both the individual and the collective level for a broad diversity of social groups.

Following Jamie King (2006), we argue that the generally accepted moral stance on the positivity of openness should be questioned. Should everything that is closed necessarily be open? Who benefits from open commons? Claiming that knowledge infrastructures both enable and reflect a moral and political order where some communities of knowledge are dominant, and others are marginalised, our analysis focuses on the political and ethical consequences of "opening up" Indigenous knowledge.

The Atikamekw Nehirowisiw Nation and Indigenous knowledge principles

The Atikamekw Nehirowisiwok are part of the Algonquian linguistic and cultural family as are many other Canadian First Nations. The term Nehirowisiw (Nehirowisiwok, in its plural form) is the ethnonym that the Atikamekw Nehirowisiwok have always used to designate themselves. Numbering just over 7,700, they are mainly located in the Lanaudière and Haute-Mauricie regions of central Quebec, occupying an ancestral territory called Nitaskinan. During the first half of the 20th century, for various reasons beyond their control, the Atikamekw Nehirowisiwok, who used to be semi-nomadic hunter-fishers-gatherers, established themselves in three communities named Manawan, Opitciwan and Wemotaci. Before this settlement, they lived in family groups, practicing their traditional activities in their respective territories. However, traditional hunting, fishing and gathering activities are still widely practiced in all three communities. The Atikamekw language is also still very much alive. According to a 2014 survey by the Language Services of the *Conseil de la Nation Atikamekw* (Atikamekw Nation Council, CNA), 96% of Atikamekw Nehirowisiwok still speak their language, which is the highest retention rate of Canada's Indigenous languages.[1] Members of the Atikamekw Nehirowisiw Nation tend to share the common goals of political affirmation, cultural resurgence and language revitalisation. Dwelling on ancestral lands before the European settlement, they consider themselves distinct from dominant sectors of Canadian society. Their descendants resolved to maintain a continuity in their own social, economic, cultural and political institutions.

Indigenous knowledge includes not only traditional knowledge (long-established, customary practices) but also contemporary and future knowledge, such as new expressions produced and distributed in digital environments. This knowledge is produced individually and collectively by Indigenous peoples.

Although the claim of a clear dichotomy between Western and Indigenous knowledge is contested (Awori, 2015), Indigenous onto-epistemologies present some fundamental differences with Western ones. Their knowledge ecology relies on culturally distinct practices, classification models and frameworks, all structured upon Indigenous world representations. And all these representations are reflected in linguistic, legal and spiritual systems as well as in social interactions. Most of Indigenous knowledge practices rely mainly on oral transmission and valorise the role of Elders as knowledge and language keepers.

Indigenous traditional knowledge is linked to skills individuals have learned through practice (Éthier, 2014). More than an environmental knowledge, it includes a broad spectrum of skills to interact with all entities of the territory (Poirier & Laurent, 2014). These entities could be animate (animals, plants, moon or sun) or inanimate (rock, wind) but they all bear the same legal duties towards each other. All of them have to preserve a balanced environment so each entity, animate and inanimate, can keep working for the preservation of the system as a whole (holism). Knowledge is thus a co-production between all entities and a result of this dynamic system. This is why, for most Indigenous peoples, knowledge is collectively shared and possessed. Traditional Indigenous knowledge is the knowledge of the territory, understood as the space where all these entities are living and interacting to preserve a balanced world and order (Éthier, 2017).

Indigenous resurgence and the digital environment

The literature shows that more and more Indigenous communities around the world use digital technologies to foster cultural resurgence and political affirmation (Perley et al., 2016; Galla, 2016). In the context of decolonization movements, many marginalized groups are taking a positive and proactive (instead of passive and reactive) position towards the digital environment. This is the case of the Atikamekw Nehirowisiw Nation which is experimenting with the potential of digital technologies to restore autonomy in its communication media, to gain control over the representation of its communities, and to provide for a flexible environment for social interaction.

One of these needs is language revitalisation (Galla, 2009, 2012). Colonial assimilationist policies led to Indigenous identity denial and the marginalisation of Indigenous languages (Manuel and Poslun, 1974). Protecting and strengthening Indigenous languages is crucial for the cultural resurgence of Indigenous communities because language is a vehicle for identity structures, knowledge, values and world representations (Perley, 2016: 23). It should not come as a surprise that the CNA decided to make language revitalisation a top priority in the Declaration of Self-Determination it issued in 2014. This position is aligned with article 15 of the *United Nations Declaration on the Rights of Indigenous Peoples* (2007).

The CNA and the local councils launched several digital initiatives to document and enhance the Atikamekw Nehirowisiw language, with a special focus on young speakers. In 2015, the *Institut linguistique Atikamekw* (Atikamekw Linguistic Institute) launched a smartphone and table application to support conversations in the Atikamekw Nehirowisiw language. It is now developing a linguistic atlas and a dictionary that will be accessible online. Digital technologies are seen as an appealing environment for younger generations in which Indigenous languages can gain visibility and credibility and be incorporated into daily discursive practices and activities. They could also contribute to breaking down barriers between categories of speakers (advanced and less advanced) by making them interact more genuinely and broadly on casual topics (Henry et al., 2017).

From inclusion to self-affirmation: building boundary objects

Bearing in mind the specificities of Indigenous knowledge systems, Kimberly Christen puts forward a thorough critique of the goal of unrestricted

sharing on open platforms. She argues that "the commons was never a place of inclusion" and that open knowledge advocates "have been guilty of a cultural blindness around the contours of access and openness" (2012: 2876-2878). There is indeed a tension between maximalist perspectives and Indigenous perspectives on open knowledge. Maximalist perspectives can be illustrated by Wikimedia's liberal and universalist vision in which every human being can freely share in the sum of all knowledge and make it accessible for anyone. In the context of opening up Indigenous knowledge online, the issue with maximalist perspectives is twofold: it indicates a lack of consideration of (1) the culturally specific ecologies of Indigenous peoples' knowledge practices and (2) of the socio-historical configuration of the settler-colonial relationship.

First, maximalist perspectives fail to take the pre-existing practices of Indigenous knowledge transmission into account, considering that they may restrict what and with whom knowledge can be shared. Among many Indigenous peoples, including the Atikamekw Nehirowisiwok, some elements of traditional knowledge are considered "common" and may be freely shared with all, within and outside of the community. Others are considered specific to a family or a designated individual (e.g. crafts, location of natural resources on the land, use of medicinal plants) or sacred and secret, such as rituals that may be restricted to members of an age group or gender. Overall, the general organisation of knowledge on the Wikimedia platform mostly reflects a Western perspective on knowledge. This can be observed in the choice of the encyclopaedia form, its focus on written sources, the internal structure of the articles (compartmentalised thematic sections) and its system of article classification (choice of categories). According to Jeannette Coocoo, an elder involved in translating the Mediawiki user interface, the word "category" was one of the most difficult words to translate into her language. Even the idea that contributions to the wiki should be signed by individuals is at odds with many traditional societies where knowledge expression is mainly collective, not individualised (Gallert et al., 2016).

Second, maximalist perspectives not do take pre-existing asymmetrical power relations between Canadian Indigenous peoples and settlers into consideration. The Indigenous relationships to Western institutions such as property laws (including the derivative copyleft licenses) and the market are still a politically contentious issue. For populations coping with the effects of organised dispossession of lands and culture, and whose political consciousness is shaped by struggles to reclaim control over their collective rights, the prospect of openly sharing the sum of their knowledge resources and relinquishing control over this collective property may be interpreted as another form of dispossession. Whereas the Wikimedia community's understanding of the commons is globalised and deterritorialised, the Atikamekw Nehirowisiw Nation presents a local and territorialised perspective on knowledge. In this perspective, traditional customs are extended into the digital environment, orality remains the medium of authority, sensitive information should be protected and political self-affirmation is necessarily part of the equation. Since 2016, a global campaign called *Whose Knowledge?* has been active in the Wikimedia movement with the aim to set up "empowering, participatory processes where communities map their own knowledge instead of Wikipedians doing it on behalf of a given community or topic" (Whose Knowledge?, 2016). "Don't write about us without us!" plead the founders of this initiative (Sengupta and Bouterse, 2017).

We claim that the main condition for "opening up" Indigenous knowledge in the commons is the inclusion of Indigenous Peoples in the process of building theses commons. By inclusion we mean the material, social, onto-epistemological and political conditions that would allow Indigenous contributors to participate in open knowledge practices according to their political and cultural goals. In order to get empowered, Indigenous Peoples should be allowed to express their political and cultural subjectivities. This process should allow them to decide on the modalities of this opening, and allow

them to potentially exclude some material from the commons.

But there are important limits in such processes of inclusion in the sense that they generally consist of bringing the expression of the margins into the dominant frame, at the risk of assimilation. Beyond inclusion, Indigenous subjectivities are also in need of self-affirmation within their own spheres and frames of practice (Coulthard, 2007: iv). We argue that the process of building an Indigenous Wikipedia may provide some opportunities for self-affirmation. It would include both an appropriation of digital tools for the purpose of language revitalisation and the activation of traditional symbolic imaginaries to create new meanings for a digitally mediated future. Finally, to analyse the dynamics between the Wikimedia movement and the Atikamekw Nehirowisiw Nation, we propose to mobilise the notion of the boundary object (Star, 2010).

BUILDING AN INDIGENOUS WIKIPEDIA

Indigenous languages and knowledge on the Wikimedia platform

To date, eleven American Indigenous Languages have a fully operating Wikipedia. With a wide pool of speakers, Latin American Indigenous languages have the most active presence on Wikipedia among the continent (the largest Indigenous Wikipedia of the Americas is the one in Quechua, with 19,900 articles). In Canada, there are only three Indigenous Wikipedias.[2] More modest in size and scope, they include the Wikipedia in Atikamekw Nehirowisiw,[3] currently the most developed (464 articles), in Inuktitut (404 articles), and in Cree (129 articles). Several Canadian Indigenous Wikipedias are currently in the Incubator, a separate project space where new encyclopaedias are developed. When our project started in 2016, the Wikipedia in Atikamekw Nehirowisiw had been in the Incubator for three years.

Even in Wikipedias written in Indigenous languages, Indigenous contributors are often a minority amongst the contributors. A survey of Latin America Indigenous Wikipedia (Pérez Ramírez, 2017) showed that all the twelve encyclopaedias included in the survey were initiated by non-indigenous users. Several of them were started by linguists from foreign countries, who had little or no ties with the Indigenous group. Pérez Ramírez also shows that Indigenous speakers tend to not be very active in content creation and to be absent from decision-making bodies (few administrators are Indigenous). As a result, important topics such as article quality and intellectual property are rarely discussed within these projects. Another problem highlighted in the survey is the fact that much of the content is translated from other articles existing in non-Indigenous languages.

In a project conducted with the OvaHerero people of rural Namibia, a team of computer science and pedagogy researchers from South Africa studied the inclusion of Indigenous knowledge into Wikipedia from a human-computer interaction for development perspective. They found that technology design on the Wikimedia platform embeds Western cultural logics and onto-epistemologies, establishing “a conflict between values inherent to current Wikipedia implementations and those of Indigenous communities” (Gallert et al., 2016). One of the main conclusions of their experiment with the OvaHerero people is that it fell short of creating a language edition mirroring the knowledge representation of the Indigenous community, one that could allow for the inclusion of more audio-visual content (rather than textual), as well as the citation of oral sources and the co-development of governance frameworks with communities (Gallert and van der Velden, 2015). In a postcolonial context, participatory design approaches to technology are indeed political processes that can aim at actively involving local forms of knowledge – not only to mirror them but to act as a vector of social transformation, world making and futurity. Our project in a sense picked up where the OvaHerero one fell short, with the goal of developing a Wikipedia in the Atikamekw Nehirowisiw language, tailored to its traditional and contemporary knowledge practices.

Project description

We worked in a collective project composed of members and collaborators of the Atikamekw Nehirowisiw Nation, board members of Wikimedia Canada and researchers. Funded by the Wikimedia Foundation over one year (2016-2017), our project's main goal was to take the Atikamekw Nehirowisiw Wikipedia out of the Incubator. This implied translating the Mediawiki software interface into the Atikamekw Nehirowisiw language, creating new articles and visual content, developing and training a pool of contributors and administrators and last but not least, establishing the rules of the Atikamekw Nehirowisiw Wikipedia. The latter implied developing modes of governance at the intersection of Wikimedia's and Atikamekw Nehirowisiw's knowledge practices. As the Atikamekw Nehirowisiwok participants repeatedly pointed to language revitalisation as a key target, Wikimedia Canada also worked on adding Atikamekw Nehirowisiw terms to the Wiktionary (the dictionary project of the Wikimedia platform) and on recording various pronunciations of these words with the software Lingua Libre.

The education team of the Otapi secondary school in Manawan played a central role in the project as local coordinators (especially computer science and language teachers). Among the other key participants were employees of the Atikamekw Council of Manawan (education and multimedia services), employees of the Council of the Atikamekw Nation in La Tuque (cultural services and Institute of the Atikamekw language), an elder from Manawan (a language keeper who acted as a community coordinator and was paid by way of the project grant), and an Elder and former teacher from the Wemotaci reserve. Other volunteers joined in, including a German linguist who initiated a previous phase of the project. [4] Our involvement started with signing a Memorandum of Understanding with the local and central political representatives of the Nation to establish the research relationship, agree on the terms of the projects and the outcomes. From October 2016 to June 2017, we organised three field trips to provide training and hold discussion groups, as well as one workshop in Montreal dedicated to copyleft licenses and Indigenous knowledge protection. Additional meetings and training sessions were provided via videoconference, and Facebook was a tool of choice for daily communication and work coordination (through private discussion groups) and for outreach in the community (via a public group).

Over the span of one year, two computer science teachers at Otapi school trained about 20 students to write articles for the Wikipetcia Atikamekw Nehiromowin.[5] The students also participated in a photographic "hunt" to create visual material (photographs of the territory, portraits, scenes of craft making). A group of Elders translated the Mediawiki interface, and Wikimedia Canada provided technical training and assistance. The role of the researchers consisted in organizing the meetings, facilitating the discussions about governance issues and documenting the project. The Wikipetcia Atikamekw Nehiromowin was launched on National Indigenous Peoples Day on June 2017. [6] We also published a toolbox (Casemajor and Gentelet, 2017) as well as a reference guide for creating Indigenous Wikipedias (Rochon et al., 2016).

Social inclusion

The issue of social inclusion is threefold: 1) participation in open knowledge projects requires material access to the Web; 2) traditional knowledge and mastering of the Atikamekw Nehirowisiw language is unevenly distributed among members of the Nation; and 3) there are discrepancies in the distribution of digitals skills necessary to contribute to Wikipedia. Differences in the distribution of these resources and capacities can limit social inclusion in open knowledge projects.

Broadband access to the Internet can be an issue in rural and Indigenous communities of Canada (Perley et al., 2016). The Manawan reserve (where most of our collaborators were based) actively invested in

developing its Internet infrastructure since 1999, but the infrastructure in the two other reserves does not yet include a high speed home Internet connection. As for equipment, while most members of the three Atikamekw Nehirowisiw communities have smartphones, not all of them have access to a computer at home. Our workshops took place in an Otapi school classroom fully equipped with computers. Several participants had access to a computer only at work (using phones and tablets at home), which at times slowed down the collaboration process. More fundamentally, there are regular power outages in Atikamekw Nehirowisiw communities – one almost caused the cancellation of a workshop.

Regarding access to traditional knowledge, it varies depending on sub-communities and their physical access to the Land, which can be impeded by the presence of dams, logging companies or national parks. Most families live on the reserves because of service constraints such as schooling. As a consequence their knowledge of the territory and of the ancient words associated with hunting and crafting may be more limited. For some families, knowledge of the territory and hunting and crafting techniques are still part of their habitus. They still follow a traditional annual six-season calendar to plan visits to their different camps during weekends and vacation, or for seasonal activities such as collecting birch bark or berry picking.

Gender and age are two other differentiation factors in access to traditional knowledge. Various ceremonies and crafting techniques are gender-based, such as the *Octockahawsowin* (puberty rite for young girls) and the *Witchi astoskewin* (initiation of young hunters by their uncle). As for territorial governance, the role of women is still underestimated and barely documented (Basile, 2017). Progress is underway, with a growing inclusion of women in training activities around traditional knowledge, but major gaps remain. On the Wikipetcia Atikamekw Nehiromowin, most biographies focus on Atikamekw Nehirowisiwok men (Chiefs, Educators, Elders). This gender gap is common across all linguistic editions of Wikipedia. During our project we tried to encourage the creation of articles about Atikamekw Nehirowisiwok women, but so far only 22% of the biographies on the Wikipetcia Atikamekw Nehiromowin focus on women.

As for the generational factor, it impacts both the relationship to language and to traditional knowledge. According to Christian Awashish, Opitciwan chief, “a CNA study showed that seniors have a high mastery of the language; middle-aged groups under 50 have a lower yet still very good level; but the young mix in a lot of French, resulting in a creolised Atikamekw Nehirowisiw jargon” (cited in Scarpino, 2017). Young people who are raised and educated on reserves often have limited contact with the territory and its related traditional knowledge. Most of the schooling system and the knowledge practices that they are trained in are influenced by Western standards, whereas many Elders tend to maintain a stronger connection to traditional knowledge. A last factor of inclusion concerns digital skills, which tend to vary with profession and education level. The adult participants who were most familiar with digital technology and could act as administrators on the Wikipetcia Atikamekw Nehiromowin work in education, public services and administration.

Social inclusion in open knowledge projects can therefore be impeded by material, socioeconomic, political and sociodemographic factors. It should not be assumed that all voices within Indigenous communities can easily be heard. Elders and educated members of the community made up the active core of the project, and as in most other Wikipedias, male figures tend to be overrepresented in the articles. Social exclusion effects are at play not only between Indigenous and settler groups, but also within Indigenous communities. And the governance models developed in open knowledge projects could reproduce these internal social hierarchies. However, we argue that such projects can also be a vector of collective empowerment by allowing participants to invent a specific Indigenous

way to govern open knowledge projects.

Governance and inclusion of Indigenous onto-epistemology

Project governance has been the subject of much discussion from the very beginning of the initiative. It culminated with the establishment of rules for the Wikipetcia Atikamekw Nehiromowin. These rules had to match the needs and goals of the Atikamekw Nehirowisiw People while respecting the basic open knowledge principles of the Wikimedia platform.

Some of the rules the participants agreed to were designed to acknowledge the onto-epistemological specificities of Indigenous knowledge. More precisely, they decided that oral sources would be accepted. This allows mentioning the name of the Elder who told a story reported in an article as a warranty of the reference's authenticity. Another rule tailored to Indigenous onto-epistemology is the acceptance of articles written in the narrative form of a story rather than imposing thematic sections. For example on the English Wikipedia the article about caribou would be organised into sections such as etymology, taxonomy, anatomy, biology, etc. The Atikamekw Nehirowisiw article can instead feature a story that situates the caribou in the Atikamekw Nehirowisiw cosmology. Furthermore, the criteria for deciding if a topic is noteworthy enough to deserve an encyclopaedia article is not quantitative as in many other Wikipedias. The Atikamekw Nehirowisiw criteria for eligibility is instead based on a traditional notion of cultural relevance according to the Atikamekw Nehirowisiw worldview. Finally, in adherence to language preservation goals, it was decided that all the content would ultimately have to be in the Atikamekw Nehirowisiw language only, and that no French words or creolised forms would be accepted in the articles.

Another rule intends to mitigate the effects of openness by acknowledging the necessity of protecting sensitive information. According to this rule, sacred and secret information should not be published in the encyclopaedia. Sensitive information concerns topics such as the location of medicinal plants on the territory as well as the recipes for their therapeutic use, spiritual rituals and the "deep meaning" of some words. These restrictions are ways to cope with the risks of appropriation of natural resources and original pharmaceutical formulas by private sectors for commercial use without consent or any compensation for the Atikamekw Nehirowisiwok. They also allow for a form of collective intimacy around spiritual topics for members of the community. This contributes to self-affirmation and pride restoration to counter the historical demonisation of Indigenous rituals by Church representatives.

Atikamekw Nehirowisiwok participants accepted several compromises in order to be in line with the mandatory open knowledge principles and protocols of the Wikimedia platform. At first opposed to the copyleft principle (especially the authorisation of commercial use) and to the principle of open collaboration (the fact that anyone can create and modify an article without having to ask for authorisation), participants changed their position once the protection of sensitive information was established. This was a major leap of faith considering that the Atikamekw Nehirowisiw perception of what openness on digital platforms might mean is informed by a history of abuses of Indigenous collective property rights and by the ongoing prevalence of abusive and racist comments against members of Indigenous peoples online. Participants tried to find a balance between the risks of exploitative and abusive behaviours and the positive potentials of sharing knowledge online.

Atikamekw Nehirowisiwok participants framed an original conception of openness that takes the specific principles and protocols that govern their knowledge practices into account. Yet the overall informational architecture of the platform is still organised around Western epistemologies, political and cultural norms. It does not provide a context for beginning an open knowledge project from an Indigenous worldview; rather, Indigenous knowledge

practices have to adopt and adapt the Western structure of Wikimedia to their needs. And this process of adaptation to deep alterity is limited by the fact that the ontological overlap between Indigenous and Western knowledge is only partial (Ludwig, 2016). Acknowledging ontological divergence means accepting that some elements of Indigenous knowledge practices, such as the performative dimension of interpersonal exchange and land practices, resist inclusion on the Wikimedia platform. Such a resistance can also be a vector of self-affirmation for Indigenous communities.

Self-affirmation: skilling and worlding for the digital environment

A first way in which open knowledge projects can contribute to the reinforcement and self-affirmation of Indigenous communities is by providing training sessions that contribute to the development of digital literacy skills. In our project's context, this skilling process sought to provide participants with a deeper understanding of copyright and copyleft in the digital environment. We also adopted a "train the trainers" approach aimed at fostering self-sufficiency in imparting abilities to contribute texts and images to the platform, and support the administrators of the Wikipetcia.

A second vector of self-affirmation is the reworlding effect of appropriating the digital environment through an Indigenous worldview. This reworlding process occurred mainly in the work of translating the Wikimedia interface into the Atikamekw Nehirowisiw language. Not only did the participants have to create new words to name various elements of the digital reality, they also had to find ways to express concepts that do not exist in the Atikamekw Nehirowisiw linguistic ecosystem. To do so, they systematically mobilised the Atikamekw Nehirowisiw onto-epistemological framework, such as the difference between animate and inanimate things. After naming their Wikipedia *Atikamekw Nehirowisiw Wikipetcia*, the participants decided to consider it as an animate entity. The Indigenous framing of the project is also visible in the choice of the term photographic "hunt" instead of "contest", which draws from a traditional land practice rather than from a mode of evaluation perceived as Western.

Furthermore, instead of using literal translations to describe the technological environment, they mobilised the traditional imagination and culturally specific symbolic forms associated with the territory. For example, the word "mouse" was translated as "pressure tool" and not through a reference to the animal. The expression "horizontal line" was very difficult to translate because this geometrical abstraction doesn't exist in the Atikamekw Nehirowisiw language. The Elders considered several options, such as referring to the image of the horizon or the tree line. They finally decided to use the image of a "stick that delineates a space". A last modality of self-affirmation through digital worlding is the restoration of the meanings of words that were damaged during the colonial period. For example, the closest equivalent to the word "user" was given a sexual meaning during the evangelization period. Elders decided nonetheless to include this word on the interface as a statement that restores its dignity.

A third means of agency reinforcement we addressed in the project is the production of visual documents in which the Atikamekw Nehirowisiwok could decide how to represent themselves. When we started the project, the rare photographs of the community available on Wikimedia Commons dated from the 19th century and the 1970s, conveying a backward-looking image of the Nation—and an external perspective, as none of the photographers were members of or even known by the Atikamekw Nehirowisiwok. The photographic hunt made it possible to actualise and diversify the collection of images on the platform.

A fourth and last vector of self-reinforcement is language transmission, which contributes to the reinforcement of intergenerational bonds. Some students were shy to write in Atikamekw Nehirowisiw, feeling that their level of mastery and the type of language they speak were not adequate

for knowledge transmission. Elders collaborated with teachers to revise the linguistic quality of articles and to educate students about traditional knowledge and its sensitivity. Alongside the work with Wikipetcia, the Otapi school regularly organises short trips on the Land with Elders so that students can have face to face interactions with them and learn directly from their experiences of the territory.

INFORMATION INFRASTRUCTURES, DIGITAL ECOSYSTEMS AND KNOWLEDGE ECOLOGIES

Inner and outer boundary objects on the Wikimedia platform

A boundary object is a shared space that allows different communities of practice to work together without consensus, thanks to flexible practical arrangements that emerge in the process of collaboration (Star and Griesemer, 1989). Boundary objects have three main dimensions: *interpretive flexibility* (an overlap of different meanings which can be tailored and mobilised depending on work process needs); the *material/organisational structure* of the object (in the case of the Wikimedia platform, it takes the form of a knowledge repository); and the question of scale/granularity, referring here to the way the Wikimedia platform is organised into interconnected subspheres of practice. The concept of the boundary object appears useful for our analysis considering that it is a space for the intersection of different worldviews and a space of collaboration between members affiliated to different communities of knowledge practice. The Wikipetcia Atikamekw Nehiromowin can be understood as a boundary infrastructure (Bowker and Star, 2000) where Indigenous contributors can invent original solutions to bridge the liberal, universalist and maximalist endeavour of open knowledge projects with their own goals of political empowerment and cultural resurgence.

We argue however that it would insufficient to only focus the analysis on the boundaries that lie between the Atikamekw Nehirowisiw community and the Wikimedia community. Within each of them, members share a common set of principles and protocols of knowledge practice, but these communities are not internally homogeneous. Therefore boundaries within communities of practice also call for negotiation and arrangements. We propose the concept of *inner boundary object* (a boundary object that operates on the inner boundaries of a community of practice) to complement Star's model with a consideration of these inner boundary dynamics. Focusing on the articulation between inner boundaries (within a community of practice, composed of various local groups) and outer boundaries (between different communities of practice), we examine how the stakes of openness and inclusion call for boundary arrangements at different scales of the platform.

First we can observe how some these inner boundaries are managed at the scale of the article page within the Wikipetcia Atikamekw Nehiromowin. The way in which contents are structured on the page displays the characteristics of an *inner* boundary object in which *inclusion* is at stake. Because there is no consensus among members of the Atikamekw Nehirowisiw nation as to the spelling of some words, the articles were divided into three sections, one for each subcommunity. This is quite unusual by Wikipedia standards, but it allowed the participants to move forward with the creation of contents without imposing the linguistic forms of one subcommunity (e.g. the Manawan reserve) as a dominant standard. When more contributors from a second one (the Wemotaci reserve) got involved later in the project, an agreement emerged regarding the similarities between these two subcommunities' dialects: the participants decided to merge their two sections in several of the articles. As for the third subcommunity (the Opitciwan reserve), its designated sections remained separated: no participant from this subcommunity was involved in the project at the time, and its dialect presents some significant differences from the other two. This arrangement shows that the space of the Wikipedia article can function as an inner boundary object between the different groups

that make up the Atikamekw Nehirowisiw community.

At the scale of the whole Atikamekw Nehiromowin Wikipetcia, the rules of the encyclopaedia present some characteristics of an *outer* boundary object where both *openness* and *inclusion* are at stake. As mentioned in the previous sections, the rules of this Wikipedia operate as an inclusion mechanism, because the Atikamekw Nehirowisiwok participants are sovereign in maintaining and changing them, and because they take the main cultural particularities of Atikamekw Nehirowisiw knowledge practices into account. Yet the Wikipetcia Atikamekw Nehiromowin remains open to any contributor and it should not be viewed as a sheltered space: its administrators have had to deal with some vandalism (however limited). For example, over the course of the project an unknown contributor created a page about pop singer Britney Spears and others added contents in other languages than Atikamekw, which were promptly deleted by the administrators.

At the scale of the Wikimedia platform, the interconnection of hundreds of subprojects and the participation of hundreds of thousands of contributors around the world compose an infrastructure in which inner and outer boundary objects play a central role. As for linguistic heterogeneity, some tools of the platform allow for its inclusion outside of the dedicated Indigenous Wikipedias. Wikimedia Canada used the software Lingua Libre to record pronunciations of hundreds of words by Atikamekw Nehirowisiwok participants from the three reserves. This software makes it possible to geolocate recordings so that the same word indexed in the Wiktionary can be simultaneously linked to different areas of the territory, thus expressing the internal multiplicity of Atikamekw Nehirowisiw language practices. However subspaces with rules allowing the expression of Indigenous knowledge practices are rare across the platform—they are even an exception. Several demands to adapt the English Wikipedia to Indigenous onto-epistemological frames failed in recent years. In 2012, a campaign for the acceptance of oral references on the English Wikipedia did not manage to gain support. And in 2014, a request by a Tasmanian Indigenous language centre to suppress an article about a sacred language (*palawa kani*) was interpreted as an act of censorship and rejected (Shun-Ling Chen, 2015). These examples illustrate that outside of dedicated Indigenous Wikipedias, Western onto-epistemologies tend to be hegemonic.

If inclusion brings Indigenous contributors within the frame of Wikimedia, and if self-affirmation brings Wikimedia tools into an Indigenous worlding, boundary objects straddle the interface of both communities, building connections while allowing the gap to exist. Operating on the two complementary levels of inner and outer boundaries, boundary objects play a decisive part in the empowerment strategy of Atikamekw Nehirowisiwok contributors. They enable Indigenous contributors to invent original solutions that bridge the liberal, universalist and maximalist endeavour of open knowledge projects with their own goals of political empowerment and cultural resurgence.

Yet their conditions of emergence are limited to specific subspaces and do not extend to the overall platform governance.

An ecosystem of open and closed spheres of knowledge practice

It is crucial to remember that the digital environment is only one limited realm of expression of knowledge practices, and that Indigenous knowledge is inseparable from interactions with the ancestral land and its natural environment. In this final section we consider a diversity of Atikamekw Nehirowisiw self-governed spheres of practice in order to situate the Wikimedia platform within the broader scope of knowledge ecologies. This ecological perspective encompasses a constellation of digital as well as non digital spheres. All the elements making up this knowledge ecosystem are interwoven by embodied activities, social use,

interactions, lived experiences – in other words, practices.

The digital branch of the Atikamekw Nehirowisiw knowledge ecosystem is mainly comprised of official websites as well as social media pages. Our analysis focuses on two contrasting instances of this network: a public group on Facebook and a closed community website. The private Facebook group *Atikamekw Nehirowisiw Arimowewin* (Atikamekw Language) was created in 2014 by an Atikamekw Nehirowisiwok user with the goal of sharing language expertise with other members of the network. At first only accessible to Atikamekw Nehirowisiwok users by invitation, it became progressively open to non-Atikamekw Nehirowisiwok users, and later fully public. Participants use it to discuss linguistic differences between the three reserves, wondering for example why in Opitciwan a snowmobile is labelled as animate whereas it is viewed as inanimate in Wemotaci. The format of the Facebook group allows for easy interaction as well as control over the access of inner community members and outsiders. Yet the infrastructure is privately owned by Facebook, and the company controls the overall governance of the website. The second case is a website called *Atikamekw Kinokewin* (Atikamekw Living Memory).[7] Because it contains culturally and politically sensitive elements, the representatives of the Nation decided to keep this website closed and make it only accessible to members of the Nation via a password.

Much of the material displayed on the *Atikamekw Kinokewin* website comes from another central element of the Atikamekw Nehirowisiw knowledge ecosystem: the CNA archive, which is not accessible online. This archive was assembled in the 1980s to support the territorial claims of the Nation during the negotiation over a global land claim with the federal government. The archive is made up of audio and written records of Elders' testimonies, maps, manuscripts, print documents as well as cultural artefacts. Given that this negotiation is still underway, access to this material is partially closed, even for members of the Nation who need to ask the Grand Chief's authorisation to consult it.

Acknowledging the consubstantial relationship between knowledge, language and territory was a very important dimension that the Atikamekw Nehirowisiwok participants wanted to implement within their Wikipetcia. They felt that young people, language learners and every single person who consults the Wikipetcia should understand that the ancestral Land is a key element of the Atikamekw Nehirowisiw identity. This emphasis is tied to a strong willingness to document the Land, to preserve the Atikamekw Nehirowisiw language and to use native terminology as a way to express Atikamekw Nehirowisiw worldviews and culture. Throughout the duration of our project, Atikamekw Nehirowisiwok participants also insisted on the central importance of what is *not* on Wikipedia. Online content is only an invitation to go talk to an Elder, travel on the Land, hunt, sing and dance.

CONCLUSION

Indigenising an open knowledge platform is much more than adding an Indigenous flavour to an existing tool. It requires a deep engagement of the communities concerned so that their knowledge practices can be embedded in the platform, according to their own goals and needs. Considering the historical background of colonial assimilation of Indigenous peoples, the indigenisation process is in fact much of a decolonisation process. The political stake of self-determination is always the backbone of any digital and open knowledge project in this context.

We proposed a framework to analyse the conditions of empowering Indigenous communities by including them in the design of open knowledge projects. We argued that an acknowledgement of the cultural logics and power configurations at play in large knowledge infrastructures call for a renewed critical discussion of the notions of openness, copyleft and the commons. Indigenous contributors need to be included and given the possibility to define on what terms openness can apply to their collective

knowledge. The conditions of this inclusion entail social inclusion, an integration of Indigenous onto-epistemological frameworks and participation in governance. Beyond inclusion, we examined four modalities of self-reinforcement: the acquisition of digital literacy skills, the reworlding effects of creating new words and meaning to describe the digital environment, self-representation through the creation of digital images and language transmission. If digital open environments are challenging for traditional knowledge protection, our paper showed that it is possible to take advantage of open collaboration and free licence opportunities while retaining some control over the most sensitive elements of the group's collective knowledge.

Drafting the concept of inner boundary object to complement Star's model, we proposed an analysis of the inner and outer boundary dynamics of the Wikimedia and the Atikamekw Nehirowisiw communities of practice. We showed that inner boundary arrangements can enable subcommunities to express their linguistic particularities. Outer boundary arrangements make it possible to adapt Wikimedia's protocols to the specificities of Indigenous knowledge practices. But the possibility of building such outer boundary objects are rare outside of Wikimedia spaces governed by Indigenous communities. The overall platform governance and informational infrastructure is mostly organised around Western hegemonic models.

We concluded by situating the Wikimedia platform in a broader ecosystem of interdependent open and closed spheres of practice. The Atikamekw Nehirowisiw knowledge ecosystem is made up of various digital and nondigital spheres of practice operating under separate governance models. These spheres are positioned on an evolving continuum of open and closed modalities of access. Knowledge practices, even traditional one, are constantly adapting to changing environments. And the digital environment with its specific materiality and ecosystemic extensions can be an occasion to actualise these practices. Yet it captures only a fragment of the unbounded and incommensurable lived experiences that interact in the broad dynamics of knowledge ecologies.

ENDNOTES

[1] CNA, "Langue Atikamekw", *atikamekwsipi.com*. URL:http://www.atikamekwsipi.com/la_langue_atikamekw (consulted June 29, 2018).

[2] Compared with the 60 Canadian Indigenous languages grouped into 12 distinct linguistic families.

[3] http://atj.wikipedia.org/wiki/Otitikowin

[4] Our project is a continuation of a previous initiative started in 2013 by a German linguist, a computer science teacher at the Otapi secondary school on the Manawan reserve, and a member of Wikimedia Canada.

[5] See P. Konieczny (2016) for detailed insights on teaching with Wikipedia.

[6] In total the project involved 35 Atikamekw Nehirowisiwok editors who contributed to create 172 new articles in the Wikipetcia Atikamekw Nehiromowin, 220 photographs in the database Wikimedia Commons and 91 audio files added to the Wiktionary, where 513 Atikamekw Nehirowisiw word descriptions were created or improved.

[7] It was launched in 2013 as part of a collaborative research project lead by the anthropologist Sylvie Poirier (2014). The goal of this website is to document and value the traditional knowledge of the Atikamekw Nehirowisiwok and promote its transmission to the younger generation.

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