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Introduction to the Special Issue: The First Mile of Broadband Connectivity in Communities

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In this special issue of the *Journal of Community Informatics*, “First Mile” refers to broadband infrastructure development that puts the needs of local communities first and ahead of the needs of private sector telecommunication corporations. This approach is one that prioritizes community-led solutions that seek to create local economic and social opportunities and to minimize the digital divide between rural and urban users (see: McMahon, O'Donnell, Smith, Walmark, Beaton, & Simmons, 2011). Around the world, broadband infrastructure and networks are rapidly being developed in communities marginalized in the network society. The relationships, structures and agreements put into place at this early development stage will shape how broadband systems are created and managed in the future. First Mile strategies include developing locally owned and managed telecommunication structures and networks.

This special issue profiles First Mile projects and efforts that are as innovative, unique and vibrant as the communities from which they emerge. Further, this issue highlights some of the challenges

facing First Mile initiatives. Several contributions in this issue deal with Canadian cases and others with remote and rural contexts around the world.

The term “First Mile” contrasts with the telecommunications industry’s term “last mile”. The latter term refers to an approach where infrastructure development for remote and rural communities and expenditures on connecting many remote and rural populations to national and regional broadband networks is a “last” priority (Paisley and Richardson, 1998). Telecom service providers typically cite the lack of a “business case” (i.e. the profitable implementation of the service) as the reason for not building infrastructure in what they and regulators call “high cost service areas” - a phrase that neatly characterizes the highly commercial nature of the telecommunications industry.

Notions of the “last mile” focus on profit rather than community needs results in rural communities - and particularly remote communities - being connected much later than urban areas. The experience of many remote and rural First Nations (Indigenous communities) in Canada is that corporate telecommunications providers deliver the minimum level of service at the maximum price possible and only if public resources are available for access and construction. This for-profit process shapes how infrastructures are prioritized, developed, and maintained in communities; negative impacts include lack of service or poor service in addition to the high costs and the abandonment of services when public resources are no longer available for subsidies. Another negative impact of the top-down, commercially-driven model is that the employment created by serving rural and remote communities with broadband is retained within the distanced telecommunications companies, rather than in local communities.

Challenging this “last mile” approach to telecom development, First Mile locally owned and operated broadband systems can create local and regional economic, social, and employment opportunities. Local needs and capacity for connectivity thus become the most important considerations for designing broadband networks. These types of projects appear in various forms: in the work of the United Nations Food and Agriculture Organization (UNFAO), in projects undertaken in U.S. states like New Mexico, and in Canada by rural remote First Nation and Inuit communities as well as cities and towns in peripheral regions. Many First Mile projects emerge from conditions of scarcity. In the Canadian Aboriginal context, First Mile broadband infrastructure reflects the principles of Community Ownership, Control, Access and Possession, or OCAP (see: <http://meeting.knet.ca/mp19/mod/resource/view.php?id=4012>).

First Mile projects involve two distinct but linked definitions of ‘broadband.’ First, broadband is an infrastructure - composed of satellite, wireless transmitters, fibre or cable networks - that interconnects homes, services, businesses and organizations, both inside a community and with the wider world. When controlled by local organizations, the infrastructure can be developed strategically to meet current and future local needs. Second, broadband supports local organizations to deliver various community services, like health, education, economic development, justice, governance and policing. A local organization that owns and operates a network may decide to develop a local telephone service using IP (Internet Protocol) telephones, or even a local cellular telephone network. The First Mile Project, administered by the First Nations

Innovation research initiative, is gathering information about these kinds of applications (see <http://firstmile.ca>).

Figure 1: Two Complementary Descriptions of First Mile Broadband

<p>Description 1:</p> <p>First Mile broadband is a community service infrastructure that local institutions can develop and access with constituent users and other public and private sector</p>	<p>Description 2:</p> <p>First Mile broadband is used and supported by local institutions to support and deliver other services to constituent users, such as health or education.</p>
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A First Mile vision is holistic and focuses on a whole community. In communities with limited resources or small populations, this entails removing the silos separating different organizations and individual users. In small communities, silos create inefficiencies, unnecessary complexity, and challenging lateral communication environments. First Mile projects aim for a simple, easy to operate broadband system that supports practical, efficient, cooperative and collaborative sharing of local resources.

Despite their diversity, First Mile initiatives commonly aim to reduce the relations of dependency associated with traditional corporate broadband systems development. They encourage local ownership and control of infrastructure rather than reliance on external service providers. Several nation-states recognize their citizens' right to broadband (e.g. Finland and Estonia). More commonly, government support remains fragmented and uneven across the globe, particularly in sparsely populated and expensive-to-serve rural and remote regions. First Mile development initiatives introduce broadband opportunities in communities and regions that would otherwise be ignored by the private sector telecom service providers.

Policies and funding programs generated in urban, centralized institutions often ignore the requirements and capacities of people living in the so-called 'periphery'. For example, remote and rural First Nations in Canada are undertaking First Mile projects because of necessity; otherwise, they would be left unserved. For these indigenous communities, the overall choice is ongoing colonialism, paternalistic government policies, foreign corporate ownership and control, an absence of context specific broadband policies, and a lack of required infrastructure; or supporting in the telecom sector the ongoing struggle of de-colonialization to secure self-determination, continued community resilience, local capacity development, innovation, and creativity.

Groups using First Mile initiatives work with local users to explore ways to build on their already-existing capacities, expanding and creating applications that address local and regional needs and priorities. These initiatives recognize that these groups will develop infrastructure and associated applications in ways that reflect their unique contexts. They share examples of demonstration initiatives, challenges, risks, and best practices with others.

First Mile projects posit that if local infrastructure is developed "first" and user groups are involved in its planning and operations, the resulting infrastructure and applications are more sustainable

and better support community needs. Neighbouring remote and rural communities benefit as these broadband infrastructures and human resources are developed and supported throughout the served region. Pricing and human capacity is determined by local champions who understand both the people and the communities being served. Construction strategies are practical and appropriate for the environment, addressing local and regional realities, while utilizing local knowledge and expertise. Locally controlled First Mile development and construction benefits the communities by providing local employment and economic benefits.

First Mile development provides a model for broadband infrastructure and network operations that counters the traditional corporate approach of building from the centre outwards. Too often the centralized construction and development approach has left remote and rural communities unserved or underserved. Too many examples exist where public funding is provided to deliver services in rural and remote regions, only to see telecom providers using these resources to develop their central network and infrastructure, resulting in some communities being left without the anticipated broadband service before the funds are depleted. First Mile development policies and processes provide an alternative innovative approach to inform policy and funding initiatives to leverage these infrastructures to create economic and social opportunities in communities and regions that have been left out in the past. Governments and leaders now have the opportunity to create real changes in these environments by supporting the First Mile model.

It is clear that communities need more resources, capacity, and support to actively engage with processes of decision-making, development, and ongoing operations and maintenance of these networks. First Mile projects are not autonomous; they require public and private sector partners in order to be realized. They are only possible through relationships with government and private partners who contribute funding and technical resources in collaboration with community partners who contribute local know-how and capacity. Working together, these partners demonstrate how collective needs and values can be integrated in the design and use of socio-technical infrastructures. In this sense, they reflect the normative considerations of community informatics (CI), which encourages the development and effective use of ICT according to collaboratively identified goals.

Ideally, the process of forming and maintaining First Mile partnerships will reflect participatory democratic values. Opening a dialogue with local users and community partners, network funders, builders, and operators creates an environment that may more effectively use the variety of funding and other resources. To this end First Mile projects encourage community participation in all stages of design, planning, implementation, and use. Broadband-enabled tools like crowd-sourced data, community mapping, digital media and open-source websites may also contribute to these development processes as well as providing among content, applications, and infrastructure development and use. The First Mile implies that local users have a right to own and control local infrastructure. By retaining the capacity and resources needed to effectively manage networks - and the content, traffic and services that flow through them - users contribute to the ongoing sustainability of these networks. This also supports an active, productive role for constituent users. It foregrounds that being connected is not enough: what, how, and why we connect matters. These

are some of the considerations taken up in the First Mile initiatives discussed in this issue of the Journal of Community Informatics.

Two contributions discuss theory and policy issues related to access to the internet. *Richard Lowenberg's* vision statement discusses the benefits of a First Mile approach to community broadband infrastructure. *Michael Karanicolas* discusses access to internet as a human right and the need to service underserved communities in order to fulfil this commitment.

A number of contributions focus on First Mile research projects undertaken with and by remote and rural First Nations and Inuit communities in Ontario and Quebec, Canada. This special issue was supported and led by researchers and community research partners and associates involved in the First Nations Innovation project (<http://fn-innovation-pn.com>) and First Mile project (<http://firstmile.ca>), both supported by the Social Sciences and Humanities Research Council of Canada. Authors affiliated with these projects include *Rob McMahon, Susan O'Donnell, Duncan Philpot, Brian Beaton, Tim Whiteduck, Anita Tenasco, Gilbert Whiteduck, Emily Lockhart, Crystal Kakekaspan, Brian Walmark, Kerri Gibson, Thomassie Mangiok, Heather Hudson, Lyle Fabian, Peter Campbell and Matthew Kakekaspan*. Their contributions include exploring the discourse framing the relationship between the Canadian government and First Nations in Northern Ontario and the First Mile and e-Community activities in the Keewatinook Okimakanak communities, including remote Fort Severn First Nation on Hudson Bay. In Quebec, two contributions explore how community members of the Kitigan Zibi First Nation have developed ICT to enhance education, health, and policing capacities, and the situation of home use of ICT in the community and its links to educational development. Research in the northern Quebec Inuit territory of Nunavik highlights how the village of Ivujivik is using First Mile concepts to enhance their capacities.

Several contributions focus on other cases of broadband development in Canada outside of a First Nations context. *Nadine Kozak* explores the process of extending the service area of the Alberta SuperNet into previously unserved areas in Alberta. *Allan Bly* also focuses on the Alberta region and outlines some of the challenges faced by rural municipalities in developing rural communication networks. *Mike Richard and Duncan Philpot* explore how a municipal fibre service run by the city of Fredericton, New Brunswick is providing internet as a free public utility.

Contributions from outside Canada include authors writing about First Mile initiatives in Africa, Belarus, Cambodia, Norway, and the United States. *Gertjan van Stam and Darelle van Greunen* explore broadband development initiatives and roadblocks in the African context. *Bill Dutton and Aljona Zorina's* story about alternative internet infrastructure development in Belarus illustrates how local, user-driven solutions can help address digital divides and social exclusions. *Helena Grunfeld's* article explores the iREACH program's role in enhancing use and expansion of sustainable community-led development in Cambodia which use agro-ecological techniques. *Jenifer Sunrise Winter and Richard Buente* report on their research on broadband developments for rural Hawaiian communities. The contribution from Ingjerd Skogseid, Ivar Petter Grøtten, and Geir Liavåg Strand contributes to the development of a staged model for infrastructure development, based on their exploration of how local stakeholders have initiated and sustained the development of broadband access in rural and remote areas of Norway.

Together, this special edition of JoCI presents governments and communities around the world with another option for the development of broadband infrastructure and associated ICT applications. First Mile developments support local and regional needs and priorities rather than the needs of far-away corporate entities. We hope you enjoy these articles and consider sharing your local broadband development stories in other Community Informatics environments.

References

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