



IN PURSUIT OF

Water Health Equity

FOR INDIGENOUS AND
RURAL COMMUNITIES



RESEAU
centre for mobilizing innovation



**One
in six
Canadians**

**OFTEN FACE EXPOSURE
TO NEGATIVE HEALTH
AND SOCIO-ECONOMIC
IMPACTS FROM **UNSAFE
DRINKING WATER.****



In Pursuit of Water Health Equity for Indigenous and Rural Communities

One in six Canadians, including the majority of 1.6 million Indigenous people, live in rural areas and often face exposure to negative health and socio-economic impacts from unsafe drinking water. It's a persistent crisis that has dragged on for decades, a dubious achievement for a rich nation often celebrated as a global humanitarian and human rights leader.

Despite a proliferation in the number of organizations that claim to be working on solutions over the past few years, and even with recurring pledges from government to fix the problem, we are no closer to a comprehensive answer than at any time in our past.

In the 12 years that RESEAU-CMI has cocreated with Indigenous and non-urban (I+NU) communities to solve complex water problems, we've created experimental evidence and learned important lessons about what works and what does not. We've captured and distilled the voices and experiences of communities (elders and local leadership, water operators, general public) and water system stakeholders (government/regulatory, consultants, industry, contractors) into powerful platforms that foster open dialogue and innovation.





OUR BOTTOM LINE



Our partnerships empower individual I+NU communities to define success on their unique terms, while building grassroots trust and confidence in proposed solutions and driving projects from concept to execution and beyond. Together, we have solved several long-standing boil water advisories, redefining sustainability, the economics of drinking water and community health along the way.

There doesn't have to be a trade-off between growing Canada's economy and promoting stakeholder and rightsholder value in I+NU settings.

Let us show you how.



Rethinking Water Health: A Moving Target

In recent years, public aspirations for improving I+NU communities' water systems have risen faster than what governments and industry can realistically achieve. Policy makers have set out targets for the water industry to accomplish, but the industry is largely left to its own devices to figure out how to achieve targets reliably and sustainably within diverse rural contexts and populations.

The primary challenge for solving complex community health issues in these settings is that no single individual or organization possesses all the knowledge needed to truly solve the fundamental problems that are very likely unique to each I+NU community. Nor are they all motivated to do so – currently, less than 1% of the water industry's revenue is generated by serving I+NU communities. Canada struggles with a dearth of relevant university programs and, consequently, a lack of trained professionals who possess the ambition and ability required to build industrial capacity for water health solutions in contexts constrained by climate change, energy, connectivity, self-sufficiency, long-distance and remote resource procurement/recruitment and the heterogeneity of rural communities.



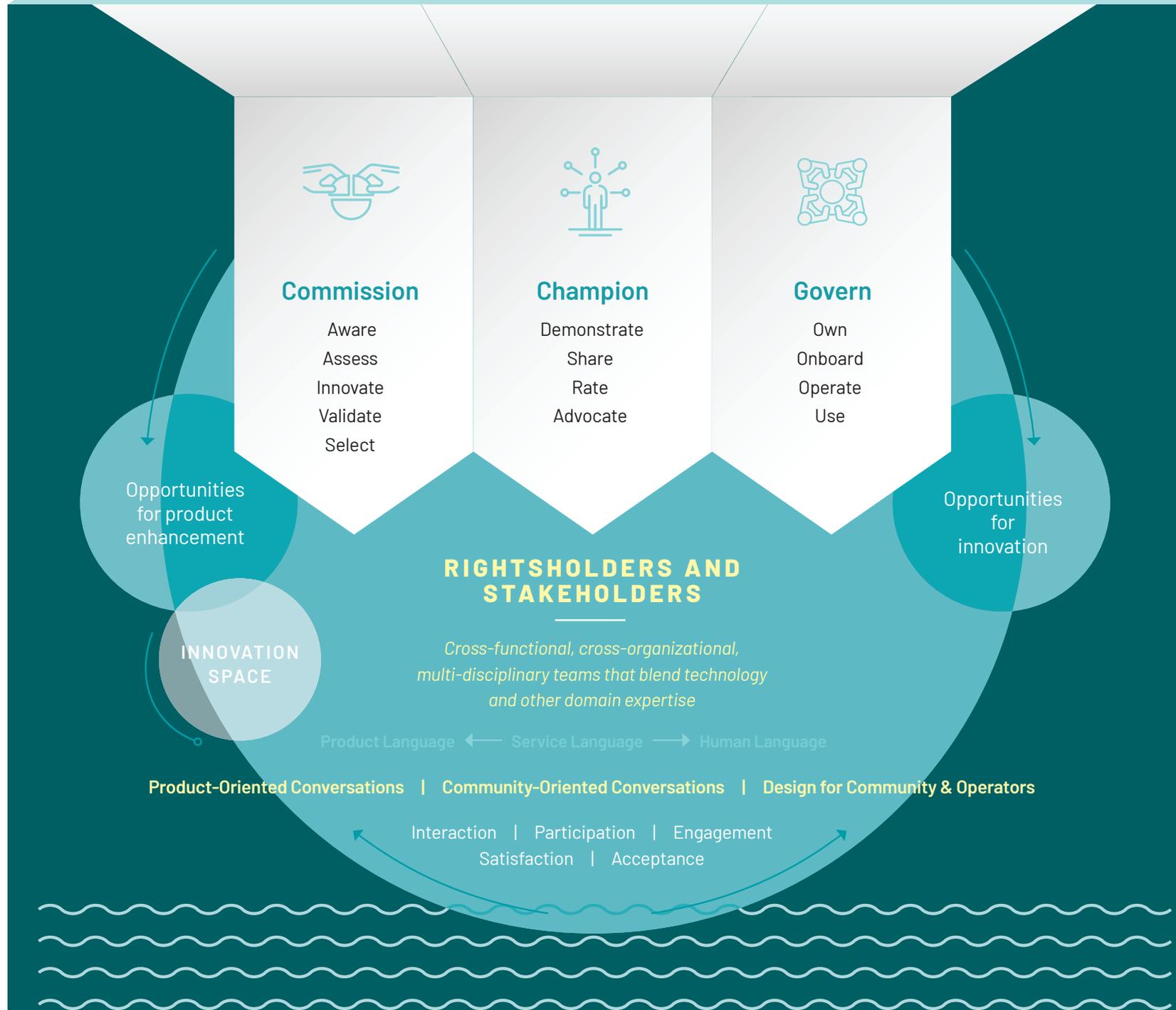
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FIG. 1

External Relationship of an Individual Community

This figure illustrates the range of interactions (both internal and external) as well as the cross-organizational flow of information and value stream fed into the innovation space by all participants throughout the innovation cycle. The experiences of each individual from their respective participating organization influences the total community experience.



The need for generating new knowledge and mobilizing innovation for strengthening and supporting Indigenous communities' self-government and self-determination goals (as well as rural water-health sustainability) is even more pronounced during a pandemic.

Under physical distancing policies and widespread uncertainty, millions have retreated to self-isolation; not surprisingly, many I+NU communities desire to minimize the number of people coming into their communities. Rural communities' governments are small, yet they are responsible for everything that larger governments do at a time of crisis (healthcare, food security, safety, childcare, etc.). That they must do so with diminished resources limits their ability to move vital infrastructure projects forward.

To meet these challenges head-on, we work with like-minded people from diverse public and private organizations, academia and I+NU communities to create ecosystems in which strategic open innovation can thrive. More than 50 national and international, cross-discipline, multi-sector partners with diverse expertise have adopted RESEAU-CMI's Community Circle™ and Streamlined Approach to Implementing Localized Solutions (SAILS)™ models for capacity building and achieving scale for problem-solving and innovation in I+NU communities.



It's a multi-award-winning approach with a proven track record of satisfied communities, engaged stakeholders and a trail of complex problems solved and important lessons learned.



FIG. 2

Achieving Capacity & Scale toward Equitable Innovation in Indigenous and Non-Urban Settings: Community Circle™ + SAILS



THE BIG QUESTIONS

We adopt a deeper look at the concept of scale. The key question we are trying to address is how to scale the acceptable total experience, rather than a specific product. As illustrated in Fig 2., to tackle the question, additional factors come into play and, most notably, we assess how to build in equity in our path to scale.

- 1 What are the appropriate means for accelerating know-how and resource sharing across the collaborative partnership with the communities and other stakeholders?
- 2 How do we assess the equitability of promising innovative solutions and whether they actually work for the communities? Are they helping the communities to achieve the change they seek, and if not, what barriers are there?
- 3 How do we promote and incorporate risk sharing into problem-solving practice?
- 4 How do we know that SAILS is working for each community and under what circumstances?
- 5 Can these changes last? What level of investment and commitment need to be made?
- 6 How can our educational and training programs and institutions be strengthened to create a future economy consistent with rural and Indigenous community's values?
- 7 How significant are industry changes in practices?
- 8 How can we combine knowledge and data from tested design principles with insight about local context to ensure that change achieves the desired ends and stands the test of time?
- 9 How many organizations and communities can be reached?
- 10 What policies will have the most impact on achieving the desirable changes?



FIG. 3

Building Blocks for the Community Circle and SAILS

Phase	Breakthrough	We know we have made it when	Actions needed to get there include	Implementation is driven forward because this
1 Awakening	Membership excitement about the new vision and new direction	Enough of the membership (including the youth) see and feel the urgent need to change	<ul style="list-style-type: none"> • Communicate risks & opportunities • Demystify numbers and dangers • Engage community administrators and coordinators 	<ul style="list-style-type: none"> • Triggers excitement & enthusiasm • Raises level of consciousness • Gets both rational and emotional appeal • Instils passion & positive energy
	Moving away from conventional approach	There is understanding on why and how the Community Circle model is different and more relevant	<ul style="list-style-type: none"> • Provide forum at leadership level • Embed principles as stimulators & guidelines for decision making • Show connection of new principles to benefits for the community 	<ul style="list-style-type: none"> • Encourages new ground to be explored jointly • Aligns perspectives & spirit • Builds a common language
2 Discovery	Articulate community plan and scope of partnership	Agreement is reached on how far to extend aspiration & boundaries	<ul style="list-style-type: none"> • Frame new partnerships around community outcome • Express communication plan across partners • Use elders, perspectives as well as university research, operators, engineers and other expertise including FNHA and ISC 	<ul style="list-style-type: none"> • Makes the direction concrete and easy to communicate • Influences through involvement • Turns positive feelings to action
	Identify the value opportunities	Membership uncover specific values that become the potential for new community improvement and development	<ul style="list-style-type: none"> • Choose key needs and key relevant partners • Weigh in community's priorities • Uncover gaps through unified community experience • Define new value and add opportunities • Show role of each partners and sharing risks 	<ul style="list-style-type: none"> • Boosts confidence & credibility through the Community Circle • Takes ideas from the abstract to the concrete • Fosters both creativity and imagination • Packages unified community concept • Builds community acceptance
3 Story	Build a compelling case	A story unfolds and is told and sold around community about what needs to change	<ul style="list-style-type: none"> • Build cross-partnership picture around community outcome • Identify needed initiatives and projects 	<ul style="list-style-type: none"> • Makes visual & cultural impact • Embeds language & concepts in culture • Allows partners to see where they fit • Gives the Community Circle more meaning and relevance
	Size the outcome	The values reveal growth and wellbeing big enough to warrant the investment (cost effective)	<ul style="list-style-type: none"> • Motivate commitment made on membership time value • Show total value gained by infrastructure investment and reducing health risks 	<ul style="list-style-type: none"> • Stimulates confidence & trust in process • Attracts resources & budget • Lines up thinking and investments behind community value
4 Engagement	Model the Community Circle concept	Community membership, youth and operators validate the Community Circle and values and accept the challenge in getting it right	<ul style="list-style-type: none"> • Invite membership, youth and operators to test and refine work to date inducing new value opportunities • Design and test proof of concept • Pilot solution options 	<ul style="list-style-type: none"> • Collect membership feedback, which leads to heightened credibility and energy • Profiles successes that bolsters community acceptance
	Get people working together	Silos and partners start to work jointly, share risks, and becoming actively involved (ISC, FNHA, engineers, contractors, university researchers, industry)	<ul style="list-style-type: none"> • Involve silos & partners in development, delivery and risk sharing • Deploy best resources • Demonstrate gains all round • Showcase & celebrate victories 	<ul style="list-style-type: none"> • Makes silos work to same goals • Turns motivation to commitment • Grows familiarity & use of Community Circle • Develops new expertise & skills • Enhances community experience and value
5 Reward	Get critical mass	There is compounding take up of Community Circle approach	<ul style="list-style-type: none"> • Gain Community Circle credibility • Invest in youth education • Engage membership, operators and partners throughout the project lifecycle 	<ul style="list-style-type: none"> • Converts insiders & outsiders • Gets more partners/developers to join
	Gather momentum	Rewards begin to be reaped with visible sustainable success	<ul style="list-style-type: none"> • Articulate rewards • Show progress and successes • Factor in intangible gains • Leverage know-how 	<ul style="list-style-type: none"> • Makes Community Circle the new standard • Shows connection between community wellbeing and performance • Reinforces Community Circle approach • Attracts more investment allocation



What Do Communities Want?



Put simply, I+NU communities are seeking solutions to overcome the consequences of their water problem, so they can reap the health, economic and social benefits.



COMMUNITIES WANT TO
OWN AND GOVERN
SOLUTIONS, AND
TAKE PRIDE IN THE
OUTCOMES.



Small differences in the innovation space can substantially affect outcomes, and so careful consideration for human and financial capital, operations and maintenance requirements, source water challenges, future resiliency and sustainability must be made. Communities want to own and govern solutions, and take pride in the outcomes.

Our Philosophy

Equitable Solutions:

- i) Embracing the notion that the core of the relationship between innovators and communities is one of a service and not a product.
- ii) Adopting different strategies to stretch investments by government programs further minimizes risk through implementing prompt and continuous learning and feedback, and validating the service deliveries and enduring operation that makes sense to the communities.

Community Experience:

- i) Emphasizing culture-based perspectives and the natural environment of communities, and open innovation rooted in reconciliation and sustainability.
- ii) Finding ways to stretch the collective activities of academics, government agencies and public- and private-sector actors to fill gaps in various government programs and the communities' experience.





RESEAU's mission translates into an innovation platform, articulated along the regeneration of the technological and socio-economic environments, and four functional evolution streams:

- 1. Community Circle™:** In pursuit of capacity, Community Circle™ creates ecosystems with cross-sector actors participating in strategic open innovation in I+NU settings. Community Circle™ localizes and customizes innovative offerings (knowledge/services/interventions), with decisions, practices, technologies and services tailored to a community's unique needs. Community Circle™ systematically accesses existing knowledge of solutions and decision-making supports, and generates new knowledge by capturing and weighing relevant considerations among actors. Decisions are made based on a deeper understanding of the issues, defining success on the community's terms.
- 2. Streamlined Approach to Implementing Localized Solutions (SAILS)™:** In pursuit of scale, SAILS™ unifies insights about local context, tested design principles, existing best practices and product management approaches to implement solutions that can be further customized to meet functionalities required by end-users. Practitioners within each core area provide expertise, as well as strategic partnership advice and planning support. Collectively, they identify issues, share risks and discuss areas for improvement. In a culture of constant feedback and learning, designers focus on communities' needs, regulators and manufacturers consider alternative fabrication options and solutions and product managers focus on reducing the risk of building the wrong thing.
- 3. Digital Circle™:** Designing innovative training and learning platforms to enhance immersive experience and connectivity among representatives of value chain partners, talent and communities.
- 4. Equity, Diversity and Inclusion (EDI) Orchestration:** Redesigning policies, procedures and incentives to embed ethical guideposts and culturally responsive evaluation metrics within rural water-health innovation.



IN OUR BUSINESS, TRUST IS BOTH THE FOUNDATION
AND CURRENCY FOR SUCCESS. RESEAU BUILDS
LASTING TRUST WITH I+NU COMMUNITIES VIA:



Regular demonstrations of and communications about the nature of the local water problems, potential solutions, data from pilot testing and more via regular community gatherings, reports to community elders and organizers and other channels.



Providing communities with toolsets and resources to empower autonomous decision making (e.g., connecting them with independent domain experts so they better understand key issues).



Open channels for dialogue between and among all partners to ensure all voices are heard and that regular feedback informs the innovation process.



Objective and unbiased comparative analyses of any solutions options.



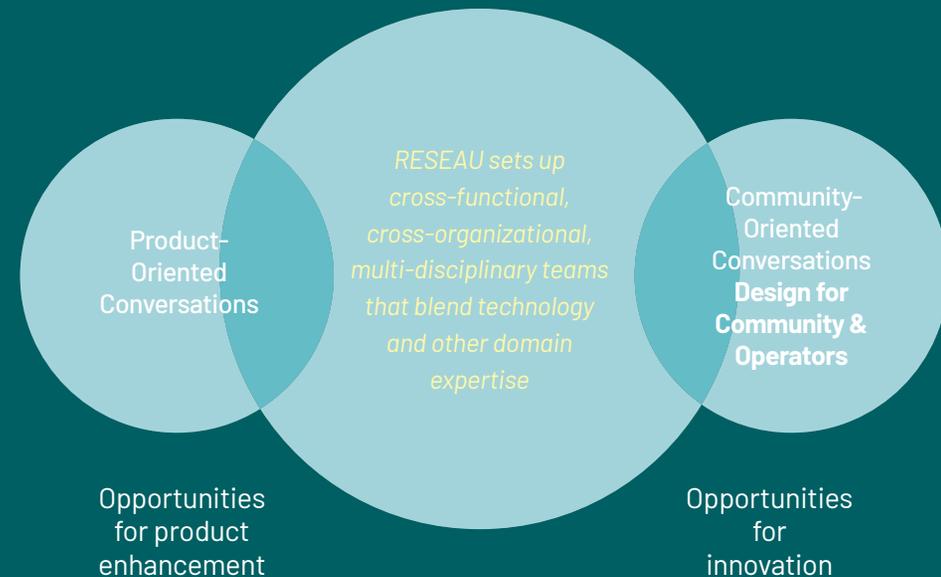
Meet Our Community Champions

Along with several public- and private-sector organizations, we have formed a collaborative, participatory partnership with the communities whose case studies are profiled here (a representative selection of just a few of our community partners to date).

These stories share a common thread – participants' willingness to experiment and to move beyond the dogmatic brand preoccupations of their respective organizations and professions was a predictor of success in every case.

At the onset of each project, conflicting theories and opinions about how to proceed were expressed by project participants. Rather than maintaining blind faith in baked-in assumptions, however, partners put them to the test and took risks in accepting new solutions – recognizing that finding new ways to experiment in a manner that validates our assumptions is an important step for successfully developing products and services.

By collecting these case studies, RESEAU is creating a database of experimental evidence that captures community experiences and reveals nuances about what happens when alternative solutions are explored even for the same goal.



No single individual or organization possesses all the knowledge needed to truly solve the fundamental problems that are specific and very likely unique to each Indigenous and rural community.

Currently, 15 to 20 people from six to 10 different organizations on average are engaged at different stages of each of our community case-study projects. Full-time and part-time teams are built from across different domains and individual skillsets, all focused on achieving community experience objectives.



Case Studies

Discovering Common Ground



CHALLENGE: Two First Nations reserves in British Columbia (IR3 Spintlum and IR11 Yawaucht in the Lytton First Nation) were living under Boil Water Advisories (BWA).

As their water systems served fewer than five homes each, they were considered “individual systems” and were therefore not included in the national assessment conducted by Indigenous Services Canada (ISC), then INAC, between 2009 and 2011.

SOLUTION:

The long-standing BWAs were lifted in January 2017 thanks to a cross-institutional, collaborative problem-solving approach. The project united the efforts of several partnering organizations, including the First Nations Health Authority (FNHA), Indigenous Services Canada, the First Nations’ Operators Water Net for British Columbia & Yukon Territories and private manufacturing, consulting and contracting firms. They worked closely throughout the fourth quarter of 2016 with the Lytton First Nation leadership, dedicated water operators and residents to assess the feasibility of point-of-entry (POE) systems to meet site-specific needs of individual systems.

KEY CONSIDERATIONS:

The partners sought to determine the circumstances under which a POE approach would be cost effective compared with other alternative treatment options. Partners identified site-specific considerations that could impact the system’s effectiveness, such as water quality variations, water demand, test protocols, public education, technology selection, installation, operations, monitoring plans, liabilities, capital and operating and maintenance costs and logistic and administration strategies.



Shifting from Sequential to Simultaneous



CHALLENGE: The Kleekhoot Reserve of the Hupacasath First Nation community, located near Port Alberni, BC, currently has no water treatment system. The community is a block-funded Nation, and so any cost reductions that may be achieved during the project will maximize their limited investment. The community's desires include simplicity of operation, minimal operating and maintenance footprint and continuous training for local operators.



SOLUTION:

The community has been reaching out to innovators and exploring affordable treatment options for their drinking water system. In particular, they have been interested in implementing passive membrane technology, a promising novel solution developed by researchers at UBC. This technology is the first of its kind and has not yet been commercially available.

KEY CONSIDERATIONS:

This initiative is driven by the community in partnership with innovators, manufacturers, FNHA and ISC. Currently, there is no consulting engineering firm involved. At each iteration, the participants prioritize ideas to pursue that are aligned with community vision in the face of limited resources and time.



Breaking with Tradition



CHALLENGE: Siska Indian Band has identified ongoing water issues as a key barrier to the health of their community in the Fraser Canyon region of BC. Of particular urgency, Siska IR 5B faces significant challenges with the capacity of their water system – two homes of the five homes in the community have been recently lost to seasonal fires. Residents of the three remaining homes report very low water pressure and limited storage during periods of high demand. Additionally, the existing system provides no treatment, resulting in intermittent short-term BWAs. Complicating things further are local sentiments of distrust and a historical reluctance to adopt changes for IR 5B, including disinfection technologies as proposed by outsiders to the community.

SOLUTION:

The progression of the Siska Drinking Water Project has hinged on the collaboration developed between the partners, including Siska Indian Band, consulting engineering and manufacturing firms, FNHA, contractors, the local Circuit Rider Training Program representative and ISC. The partners have collectively created a customized drinking water solution, strategically designed for local suitability and process efficiency.

KEY CONSIDERATIONS:

The partners broke with the tradition of creating a request for proposal and enabled Siska leadership to meet with manufacturers and contractors to evaluate and select preferred vendors. Moreover, a consulting firm was able to utilize the insight from the manufacturer and the contractor, reducing its billable hours for the benefit of the community.



Leveraging a Stalemate



CHALLENGE: T'it'q'et's Towinock IR#2 (located in BC's central interior) requires a water system upgrade. A primary concern for the community is that some individuals live with chlorine allergy and object to the use of chlorination for water disinfection as required by regulatory agencies.

SOLUTION:

The community leadership invited the partners to meet with community members on several occasions to discuss treatment options, associated risks and alternative disinfection processes. These included ultraviolet technology and utilizing chlorination only in emergency situations, while removing chlorine residuals at specific homes.

KEY CONSIDERATIONS:

Through conversation, the participants moved toward a collaborative mindset, exploring alternative solutions versus applying the historical "either/or" approach that had historically caused frustration and confrontation.



Studying Best Practices, Together



CHALLENGE: Van Anda Improvement District (VAID) is a community of 500 people living on the Texada Island in BC. The community has been struggling to provide potable water to their residents, resulting in posting several water advisories over the past decade. BWAs are posted frequently during the summer months because coliforms are regularly detected in water samples from the community's distribution system. The community has gone back and forth between pet solutions advocated for by various vendors.



SOLUTION:

The community decided to explore viable practices together. The participants created opportunity to pilot several treatment options and examine pros and cons so the community could decide for themselves which options to invest in. Hard work from the community's leadership in investigating pragmatic solutions was rewarded with a grant from the provincial government.

KEY CONSIDERATIONS:

Through organizing an open house, the entire community was made aware of how their needs are being handled, and what design principles are being followed. VAID's Board of Trustees were able to address questions like what works, why and how? There was constructive dialogue among the partners focusing on the community's needs and requirements, rather than arguments.



The Whole Is Greater Than the Sum of Its Parts



CHALLENGE: Lytton First Nation (Nickeyeah IR#25) had been on frequent BWA for over a decade. In the past, there were initiatives undertaken to address water treatment system issues, but sustainable solutions remained elusive and major proposals had not been considered cost effective by the funding agency.



SOLUTION:

The community leadership and operators worked together to leverage university resources, industry insight and community support. The participants developed an iterative pilot plan to investigate several pragmatic treatment options. An engineering firm was also engaged to identify ways to enhance the community's water intake. The long-lasting BWA was lifted in 2015.

KEY CONSIDERATIONS:

The partners brought together different components of the community, including leadership, operators, youth, residents, health authorities, funding agencies, consulting firms, manufacturing firms and contractors. Together, they worked to build consensus for success on the community's terms, and ultimately created an affordable treatment solution for the community.



Taking a Longer View



CHALLENGE: Prior to 2008, Kluskus village IR#1 (located west of Quesnel, BC) sourced its water from a single, large-diameter, shallow well next to Kluskus Creek, but it was susceptible to turbidity and bacterial contamination. That well was replaced by two deep-supply wells, but these have proven to have elevated levels of iron and manganese, and they are located in a historic burial area and approximately 80 metres from a failing septic field. The community is off-grid, and power is supplied by a diesel generator. The permanent residents – a population that fluctuates from 20 to 35 – rely on bottled water and have long desired an alternate water source and robust treatment system to address esthetic quality and chronically high levels of iron and manganese.



SOLUTION:

Seeking an alternative water source, the community engaged the partners to investigate viable options. The participants conducted a thorough study of neighbouring lakes and creeks, but none proved to be a viable option for the long term. The partners also identified different locations for new wells, and conducted pilot testing of several treatment options. The ultimate solution was favoured by the community, and also is considered appropriate for local settings by local health authorities and the funding agency.

KEY CONSIDERATIONS:

The partners searched for long-term sustainability in a new water source and system, rather than simply problem solving for the short term. Consideration of long-term sustainability brought out creative strategies acceptable to both health authorities and the funding agency that likely would not have been discovered during a search for a quick fix.



Forming an Unusual Partnership



CHALLENGE: Middle River, a small and remote community in the Tl'azt'en Nation, was faced with serious drinking water challenges that prolonged a 14-year boil water advisory. The village, with population variances of five to 40+ people, utilizes a traditional water source of a nearby river. Since 1998, efforts have been underway to identify and implement a water treatment system appropriate for the community and robust enough to treat high organics, turbidity and bacteriological matter. The challenge was heightened by the remote location of the community, a historical lack of communication and engagement with local residents, power and connectivity challenges and minimal operator resources. In the last two decades, there had been efforts to address the issues; at one point ground water was considered as a source, but the well was clogged to protest reports it contained a low amount of arsenic. Also, a sophisticated treatment plant was installed but it proved to be too complicated for local operators to run, so it was quickly decommissioned.



SOLUTION:

The community leadership, the operator and residents partnered with the water industry to investigate viable solutions. The participants conducted a thorough pilot study of various treatment options. In particular, an innovative biological ion exchange was tested, a new technology that had not been commercially available for treating drinking water. The project team developed a unique partnership with experts from universities, engineering firms, a manufacturer, health authorities and the funding agency to validate the viability of the solution. The long-lasting BWA was lifted in 2018. The project received several awards, including the most prestigious award in the consulting engineering industry.

KEY CONSIDERATIONS:

The project team brought together experts who worked to identify and develop a solution that was beyond the mandate of their respective organizations, and foreign to their own context.



Build on a Validated Learning Strategy



CHALLENGE : The ʔaqam community, also known as the St Mary’s Indian Band, is located about 10 minutes outside of Cranbrook, in the southeast corner of British Columbia. Many homes in the ʔaqam community have water with high iron, manganese, fluoride or a combination of other contaminants. Most homes in the community receive water in large 20L jugs, which is used for drinking and cooking. The community has a well water system and reservoir to serve the community office, school, healthcare centre and a nearby resort. There is no centralized water treatment/disinfection for homes, and the current wells are shallow and susceptible to contamination. Homeowners report that their clothes get stained an orange colour, that the plumbing in their house (especially dishwashers, coffee machines and shower heads) wear out fast and require replacement. They also describe their feet turning orange and occasional skin rashes, which they believe are caused by poor water quality.

SOLUTION:

The ʔaqam community has prioritized the wellbeing of their residents, and water infrastructure is listed as a core component of that mission. In 2011, the community released a community strategic plan. Within the ʔaknukak (infrastructure) section, they seek to provide “high-quality public buildings and other infrastructure essential for a healthy community and ecosystem.” The third objective states: “provide healthy, clean drinking water to all homes and community buildings.” As part of a pilot project, two homes were chosen to receive POE treatment systems.

KEY CONSIDERATIONS:

In many rural settings, decentralized treatment is a more viable option versus centralized systems used in larger towns and cities. Decentralized systems may collect and treat water for a single home. In partnership with the ʔaqam community, ongoing monitoring of the POE systems allows not only for ensuring the treated water remains safe, but also to monitor the effectiveness of the POE-style of decentralized treatment.



Prioritizing Outcomes, Not Features



CHALLENGE: Gilles Bay Improvement District (GBID) is a small community of 450 full-time residents (a population that doubles during summer) located on the northwest coast of Texada Island in British Columbia. It regularly faces recurring BWAs. Water is supplied from Cranby Lake, a shallow-surface water source with high colour and organic content. The main objectives of this Community Circle pilot project are to identify solutions that meet GBID's strategic requirements in terms of i) the ability to remove natural organic matter and colour from the source water, ii) effective disinfection, iii) budgetary considerations and iv) long-term sustainability.

SOLUTION:

These objectives will be achieved through a series of activities over 24 months, which began in early 2020. Pilot investigations started by deploying the RESEAU Mobile Water Treatment Pilot Plant Mobile Lab; (which effectively and affordably tests a variety of disinfection technologies) in April 2020. Technologies being evaluated as part of this long-term pilot study are granular activated carbon, biological activated carbon, ion exchange and biological ion exchange for organic and colour removal, as well as UV and chlorine disinfections for the inactivation of microorganisms.

KEY CONSIDERATIONS:

The RESEAU team is working closely with the community and other partners, regulatory agencies, and health and industry partners to continually refine the project and its activities so that the community will eventually be equipped with the data needed to make an informed decision about adopting a sustainable, affordable and acceptable drinking water treatment solution for the community. The main objectives are identifying solutions that meet GBID's strategic requirements in terms of i) the ability to remove natural organic matter, colour and turbidity; ii) effective disinfection; iii) budgetary considerations; and iv) long-term sustainability. These objectives will be achieved through a series of activities spanning over 24 months. The pilot investigations will be conducted by deploying the RESEAU Mobile Lab. The project plan will be further developed with input from stakeholders, regulatory, health and industry partners.



Rapid Implementation of Localized Drinking Water Solutions during Emergencies



CHALLENGE: The Zhiibaahaasing First Nation on Manitoulin Island in Ontario has been steadily growing, with 65 current permanent residents and 112 living off-reserve. More than 120 people are expected to live in the community within 20 years. Plans are underway for building a school and day care, medical clinic and other economic development opportunities, which are expected to double water demand. The effects of climate change and aging equipment amplified the community's urgent need for a reliable water treatment system that would work given the remote location, frequent power outages and unreliable Internet connectivity.

SOLUTION:

During summer 2020, the existing water plant was compromised due to safety concerns as rising lake water flooded the plant. Community members, Indigenous Services Canada and the First Nations and Inuit Health Branch partnered with RESEAU, BI Pure Water, First Nations Engineering Services Ltd. and Viqua. Through a rapid implementation of RESEAU's SAILS, the team conceived, designed, built, transported across-country and delivered a water treatment plant in only three months.

KEY CONSIDERATIONS:

Importantly, this was not an off-the-shelf packaged plant; the community leaders, water operator, RESEAU and other partners were engaged throughout the process, and the resulting solution meets not only the emergency requirements but is also aligned with the community's long-term infrastructure plan. This rapid response strategy was innovative and participatory, a model for how affordable localized solutions can be achieved in a timely manner.



RESEAU Operators' Walkthrough Lab (OWL): Digital Circle in Action



Two augmented reality (AR) applications that allow virtual walkthroughs of a treatment plant before it has been manufactured.

CHALLENGE: Designing customized solutions that truly work for I+NU communities requires the acceptance of water operators who will be tasked with maintaining and optimizing water systems, as well as community leadership and members at large. It can be difficult to envision system designs and builds to ensure they meet desired criteria, and to train operators on customized systems before they are built. The OWL also serves as a communication tool, facilitating experience-based discussions as people are able to walkthrough the plant, interact with the equipment and provide insight and feedback before the plant is fabricated.

SOLUTION:

RESEAU developed two augmented reality (AR) applications that allow virtual walkthroughs of a treatment plant before it has been manufactured. AR reduces the risk of building the wrong thing and engages the operators and the communities into an iterative design process that implements their insights so alternative fabrication options can be considered. The AR apps also provide remote operation and support capabilities, superimposing live data on the AR to allow operators and engineers to remotely monitor, troubleshoot and make necessary adjustments to plant operation. It also facilitates training and peer support among operators. The apps were piloted at Yukon University to provide students with immersive exposure to various water and wastewater environments in 2020, when fieldtrips were problematic.

KEY CONSIDERATIONS:

Designing innovative platforms to enhance the immersive experience and connectivity among representatives of value chain partners, talent and communities is a key component of our Community Circle platform. COVID-19 increased the need for enhancing and transforming contactless experiences. However, our focus is not on throwing technology at our partner communities; rather, we seek to track what their experience looks like, identifying gaps and continually improving our process. The platform can also be used as part of operator training programs, allowing participants to experience different types of treatment solutions during a time when travel to actual plants is not feasible.



Treading Water



CHALLENGE: Ending all advisories in Indigenous communities by 2021 is considered a precursor of deficiency reduction and development.

However, the innovation agenda has not kept up with this ambitious policy goal. Tragically, the more Indigenous communities develop resilience and adapt to water system failures, the stronger the illusion of sustainability grows among industry leaders, disrupted only occasionally by media coverage of major incidents.



SOLUTION:

Working with research-based theatre (RBT) experts at UBC, we co-developed Treading Water, an innovative 20-minute play that brings to life some of the rich stories discovered during our community collaborations. The play flows between the intersecting narratives of characters in a community dealing with unsafe drinking water, and explores the journey toward health and well-being related to water quality challenges. Water operators and their experiences are central in Treading Water, and the play illustrates their pivotal and complex role in the community. Presented by engineers, water operators and actors, the play aims to open conversations addressing water quality and health issues facing rural and Indigenous communities in the 21st century.

KEY CONSIDERATIONS:

Through RBT inquiry, the experiences and perspectives of different groups of people can become more accessible and translatable to others. With this broader understanding among all players in a Community Circle project (e.g., communities, regulatory agencies, suppliers, consultants, industry, academics), an innovation agenda can be built upon shared appreciation for the roles each has to play, and shared values with respect to innovation.



Mobilizing Symphony



CHALLENGE: World Water Day is an annual United Nations (UN) observance that raises awareness of the 2.2 billion people living without access to safe water and promotes action to tackle the global water crisis. In keeping with our arts-based enquiry approach, RESEAU sought a unique tactic to generating discussion on the need for innovation in our response to climate change and its impact on water.

SOLUTION:

We partnered with renowned conductor Aram Khacheh of the Brescia, Italy-based symphony Bazzini Consort to create a series of short video vignettes featuring musicians playing excerpts from Vivaldi's *The Four Seasons*. The excerpts are aligned with larger messages about climate, water and community health, as well as the importance of thinking outside the box for innovative approaches to ameliorating climate change and its impact on water.

KEY CONSIDERATIONS:

Vivaldi's masterpiece challenged musicians to create the sounds and sensibilities of nature using unconventional, innovative approaches. The piece also echoes the history of climate upheaval from the early 17th century into the early 18th century, which heavily influenced revolts and uprisings. Vivaldi gave meaning and a narrative to his music, while using mood and new playing techniques to convey things like the buzzing of insects and barking dogs, which was very radical for his time. The videos draw several parallels between this piece in terms of innovation and telling a human tale about climate, and the challenges we face today.





The Community Experience: Measuring Success

What's important to I+NU communities when it comes to collaborative innovation for community health?

Interaction Experience

- Was it easy to interact with the industry?
- Could we interact with industry the way we wanted?
- Did industry make us feel like they knew us?
- Were our experiences the same as we would get from another industry?
- Did our experiences teach us something we didn't already know?

Product/Service Experience

- Does the product work for us?
- Is the product easy to use?
- Do the products address our changing needs?
- Does using the product make our life better?

Price and Brand

- Is the brand aligned to our values?
- Does the product offer good value for what we pay?



Help us empower Indigenous and non-urban communities to define and build their own futures.

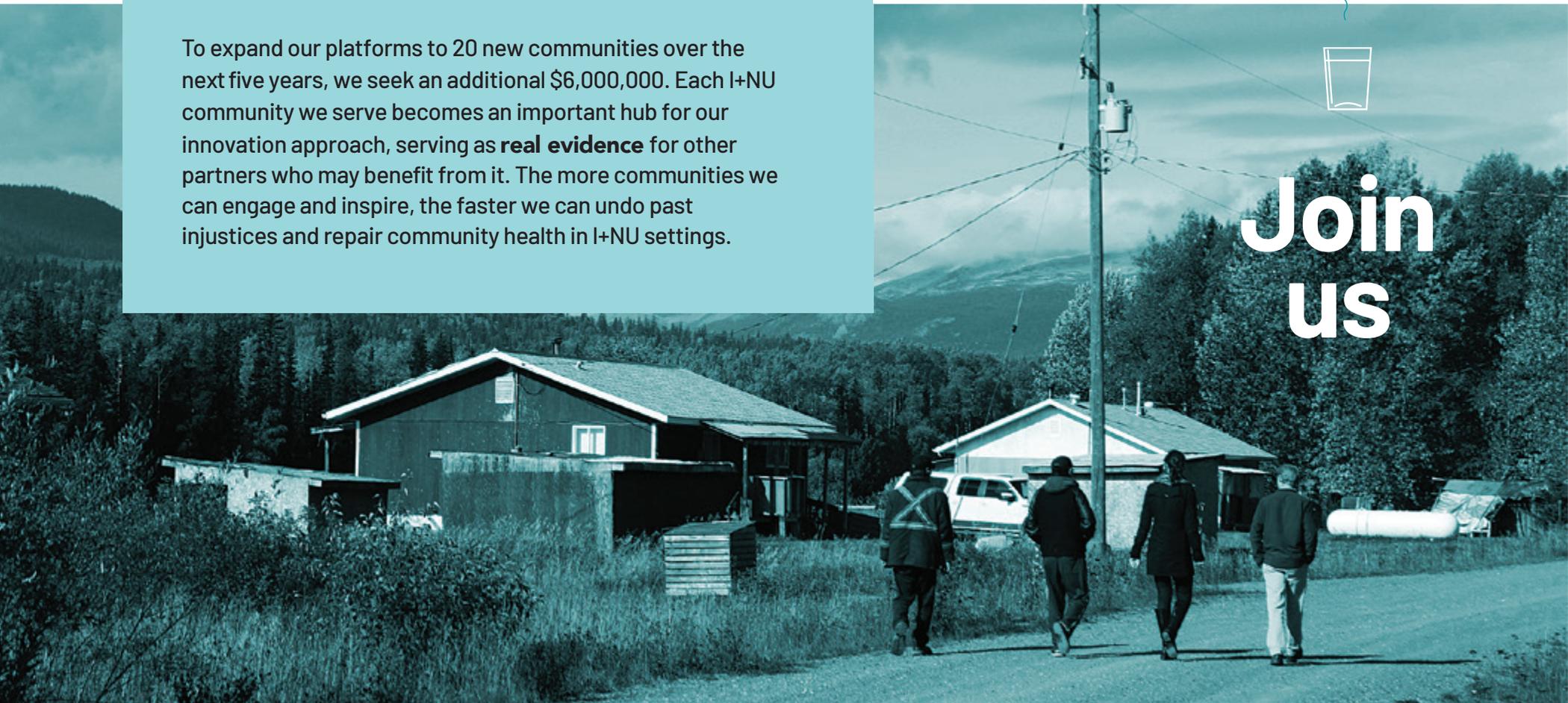
Over the next three years, **RESEAU will provide \$2,400,000** to match cash contributions from new funding partners.

To expand our platforms to 20 new communities over the next five years, we seek an additional \$6,000,000. Each I+NU community we serve becomes an important hub for our innovation approach, serving as **real evidence** for other partners who may benefit from it. The more communities we can engage and inspire, the faster we can undo past injustices and repair community health in I+NU settings.

Become a partner today



**Join
us**





RESEAU

centre for mobilizing innovation

Learn how your organization can join RESEAU:

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