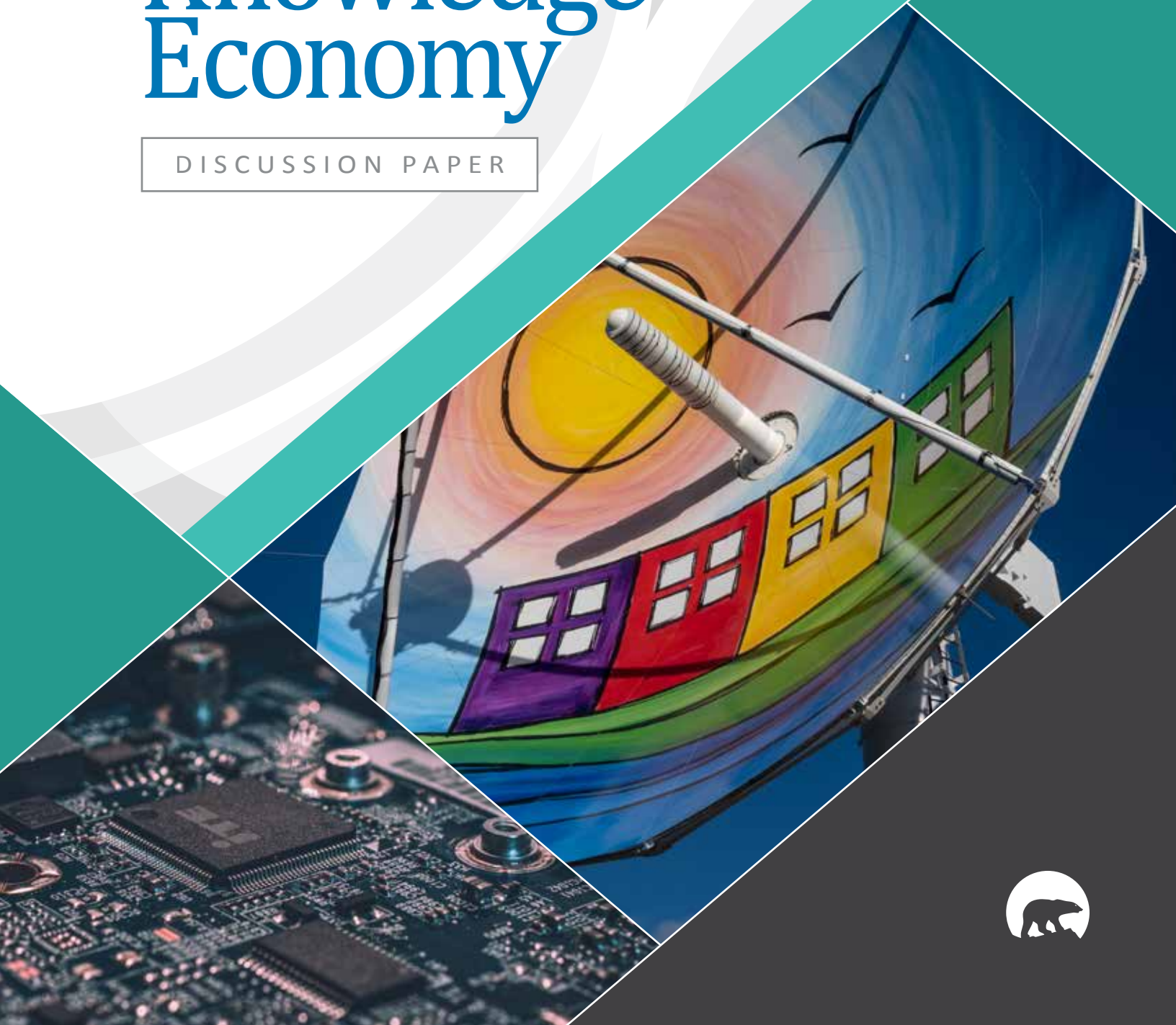


Government of Northwest Territories
Gouvernement des Territoires du Nord-Ouest

Advancing the Northwest Territories Knowledge Economy

DISCUSSION PAPER



Executive Summary

The Northwest Territories (NWT) has historically relied on natural resources as the primary economic driver for its economy. Given the cyclical nature of the industry and a desire to diversify and expand the economy, the 19th Legislative Assembly prioritized increasing economic diversification by supporting growth in non-extractive sectors and setting regional diversification targets. To reflect this priority, the Government of the Northwest Territories (GNWT) has made a mandate commitment to “Advance the Knowledge Economy.” The foundation of a Knowledge Economy is generally considered to be an environment that enables residents, businesses, governments and organizations to realize economic prosperity from the creation and sharing of their knowledge and ideas. It is about using technology

and information to create new efficiencies across society. In a Knowledge Economy, knowledge is viewed as a primary input with land and capital as secondary inputs.



economic diversification by supporting growth in non-extractive sectors and setting regional diversification targets.

This discussion paper outlines why the growth of a Knowledge Economy in the NWT should be supported and describes challenges faced in achieving that goal. Several opportunities to support the Knowledge Economy are also discussed. This discussion paper is intended as an engagement tool to seek the input and advice from NWT industries, residents and academia on how best to advance a Knowledge Economy.

In 2020, an environmental scan of various Knowledge Economy jurisdictions was completed to understand the elements required and the role industries, academia and various levels of government play in fostering a Knowledge Economy. Five key goals in establishing a Knowledge Economy in the NWT were subsequently determined and are being presented for public feedback.

Sommaire

Les ressources naturelles constituent depuis longtemps le moteur économique des Territoires du Nord-Ouest (TNO). Étant donné la nature cyclique de cette industrie et la volonté de diversifier et d'étendre l'économie, la 19e Assemblée législative a inclus dans ses priorités de favoriser la diversification de l'économie en appuyant la croissance des secteurs autres que celui des ressources extractibles et en établissant des cibles de diversification régionale. Afin d'honorer cette priorité, le gouvernement des Territoires du Nord-Ouest (GTNO) s'est engagé à soutenir l'essor de l'économie du savoir. L'établissement d'une économie du savoir permet en général aux résidents, aux entreprises, aux gouvernements et aux autres organisations d'atteindre la prospérité économique en créant et en partageant leurs connaissances et leurs idées. L'utilisation de la technologie et de l'information favorise l'efficacité

dans la société. Dans l'économie du savoir, le savoir est considéré comme la contribution principale à l'économie, tandis que les terres et les capitaux sont des contributions secondaires.

favoriser la diversification de l'économie en appuyant la croissance des secteurs autres que celui des ressources extractibles et en établissant des cibles de diversification régionale.

Le présent document de discussion explique les raisons justifiant de favoriser l'essor d'une économie du savoir aux TNO et décrit les obstacles qui se présenteront pour atteindre cet objectif. Il s'attarde également sur plusieurs occasions de développer l'économie du savoir. Ce document doit être interprété comme un outil d'échange pour obtenir les commentaires et les conseils des industries, des résidents et du milieu universitaire des TNO sur la meilleure façon de stimuler l'économie du savoir.

En 2020, une analyse de l'économie du savoir dans différentes régions a été menée pour comprendre les éléments requis et le rôle des industries, du milieu universitaire et des différents paliers du gouvernement dans une telle économie. On a ainsi dégagé cinq objectifs principaux pour l'établissement d'une économie du savoir aux TNO qui sont présentés au public pour recueillir ses commentaires.



OBJECTIF 1

Recherche et production du savoir : promouvoir la situation géographique et les cultures uniques des TNO qui en font le lieu idéal pour développer et appliquer le savoir et en tirer des avantages économiques.

OBJECTIF 2

Développement économique et entrepreneuriat : diversifier et faire prospérer l'économie ténosé en favorisant la culture de l'innovation, de l'entrepreneuriat et de la croissance économique communautaire durable.

OBJECTIF 3

Infrastructure : améliorer l'accès au savoir dans les collectivités ténosées par une meilleure connectivité et créer des espaces communautaires qui facilitent et encouragent le partage des connaissances.



OBJECTIF 4

Partenariat et collaboration : augmenter le partage, la participation et la collaboration entre les parties intéressées pour des projets et des initiatives de l'économie du savoir.

OBJECTIF 5

Renforcement des capacités : veiller à ce que le système éducatif des TNO et le milieu des affaires profitent des occasions de développer l'économie du savoir.

Le GTNO se réjouit de recevoir d'autres commentaires et points de vue lors de ces échanges avec le public pour déterminer la meilleure façon de mettre en œuvre cette initiative.

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Introduction

The Northwest Territories long-standing economic drivers have been in the natural resources sector, such as gold, tungsten, oil and gas, base metals and diamond mining. Prior to the COVID-19 pandemic, the NWT economy was suffering a downturn in mining production. The pandemic has amplified the reliance of the NWT economy on its non-renewable sector.

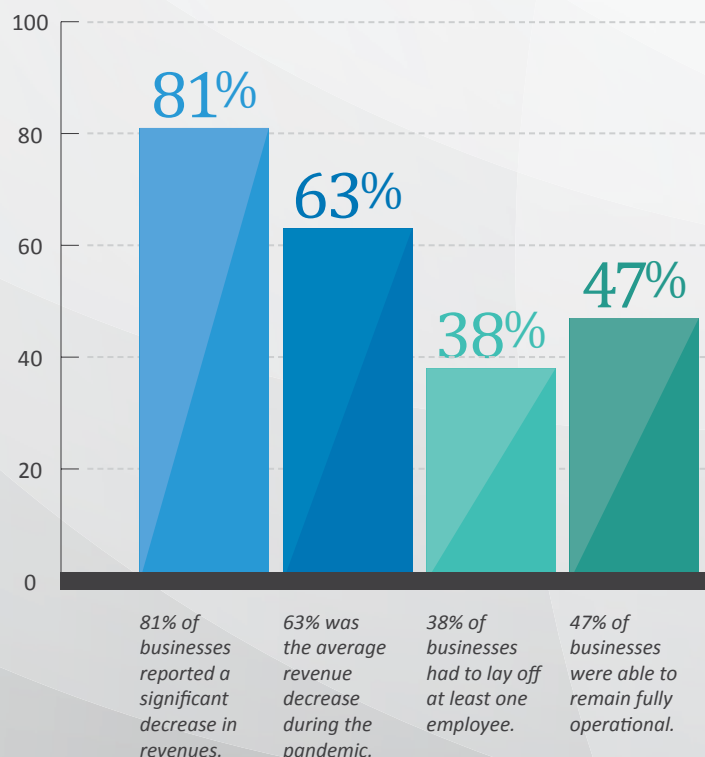
Businesses across the NWT have had to pivot in response to the pandemic. According to Statistics Canada’s Canadian Survey on Business Conditions (CSBC) from August, 2020, 38 percent of businesses in the NWT had to lay off at least one employee due to the pandemic, and only 47 percent of businesses were able to remain fully operational. In a GNWT survey from March to May, 2020, 81 percent of businesses reported a “significant” decrease in revenues, with an average revenue decrease of 63 percent¹. A strong recovery should include a plan that fosters a more diversified and advanced economy. This can be accomplished through the development of a Knowledge Economy. The pandemic also highlighted the social inequities within the Territory, underlining that initiatives that close the social gaps should be made a priority. The GNWT mandate for the 19th Legislative Assembly reflects this sentiment, quoted on right.

The mandate also commits to advancing the Knowledge Economy by working “with a broad range of partners to create a Knowledge Economy Action Plan.” The Department of Industry, Tourism and Investment (ITI) is leading this work but various GNWT departments have an important role to play within the Knowledge Economy and

are actively engaged in support for businesses and entrepreneurs, telecommunications projects, refining the student curriculum and other important Knowledge Economy initiatives.

There are already many examples of successful Knowledge Economy initiatives and enterprises in NWT communities. The Arts, Crafts and Technology Micro-manufacturing Centre (ACTMC) in Inuvik provides a collaborative and innovative work environment for entrepreneurs looking to further their skills and ideas. The Knowledge Economy Action Plan will aim to build on these successful initiatives while removing roadblocks hindering development of the Knowledge Economy.

This paper outlines several goals for developing a Knowledge Economy which have been identified by multiple GNWT departments after significant research and reflection. Each goal includes proposed actionable items the GNWT can take to forward the Knowledge Economy initiative.



¹ Department of Industry, Tourism, and Investment: Economic Impact of COVID-19 on Tourism and Business in the Northwest Territories – https://www.iti.gov.nt.ca/sites/iti/files/survey_results_-_economic_impact_of_covid-19_on_tourism_and_business.pdf



Questions to Keep in Mind

- How could you contribute to and/or benefit from a knowledge economy?
- How can an emerging knowledge economy benefit your organization, your business and/or your community?
- What can be done in the NWT that is a competitive advantage and can be leveraged for economic growth?

19TH LEGISLATIVE ASSEMBLY

The NWT has untapped economic potential in areas including tourism, agriculture, and the knowledge economy. Supporting opportunities for economic diversification will create jobs and improve community resiliency.





What is a Knowledge Economy?

A knowledge economy exists where technology and information create new efficiencies across society. The foundation of a Knowledge Economy is generally considered to be an environment that enables residents, businesses, governments and organizations to realize economic prosperity from the creation and sharing of their knowledge and ideas. A Knowledge Economy is considered the last stage of the Three Sector Model of long-term economic stages of development.

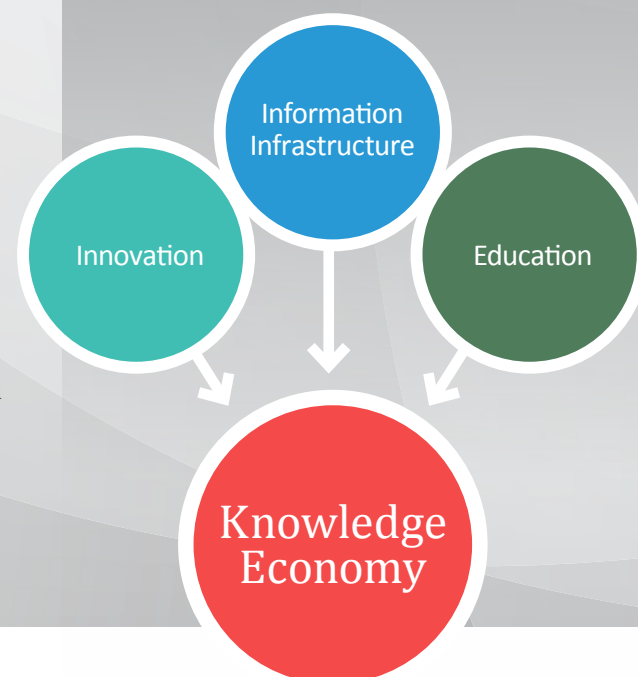
The World Bank identifies three key elements in creating a Knowledge Economy: education, an innovation system and an information infrastructure². The Knowledge Economy can be thought of as an extension of the final stage in the Three Sector Model, in which education, innovation and information infrastructures allow knowledge products and services to be the product of the economy. Knowledge Economy-based products and services are both consumed and produced in the primary, secondary and tertiary sectors, with the largest concentration in the tertiary sector. As such, a Knowledge Economy is larger than the technology or digital sector of the economy.

While various jurisdictions and global organizations hold an abundance of perspectives on the Knowledge Economy, the NWT Knowledge Economy will be unique to the history, culture, environment, potential and resources of the Territory. The future polytechnic university, the research that takes place in communities across the Northwest Territories and the world-class satellite facilities in Inuvik are examples of Knowledge Economy initiatives that support a unique culture of education, innovation and information infrastructure that the public and private sector can continue to build upon towards a greater knowledge-based economy. Still, significant gaps remain as roadblocks towards the Knowledge Economy. These gaps will be addressed below.



Three Sector Model

1. A primary economy is resource-dependent, where natural resources are a main source of economic prosperity.
2. A secondary economy is manufacturing-dependent, where industries have grown around competitive advantages and the work force has become skilled in areas related to manufacturing.
3. A tertiary economy is considered a service economy, where a relatively educated work force is employed delivering a variety of services such as banking, trades, education, culture and health.
4. Every type of economy will have varying degrees of economic sectors. For example, a tertiary economy may retain a strong resource or manufacturing sector if it maintains a competitive advantage.



² The World Bank – Building Knowledge Economies: Advanced Strategies for Development
<https://openknowledge.worldbank.org/bitstream/handle/10986/6853/411720PAPER0Kn101OFFICIAL0USE0ONLY1.pdf?sequence=1&isAllowed=y>

Why is the Knowledge Economy important to the Northwest Territories?

The main driver in the economy of the Northwest Territories has historically been resource extraction. This has caused a series of economic boom and bust cycles over the last several decades. Recent forecasts by the Conference Board of Canada predict a slowdown in the economic activity of the Northwest Territories with the closure of economically critical diamond mines. This has led to an emerging interest in diversifying the economy in the Northwest Territories in an environmentally sustainable way.

A significant economic challenge in the NWT remains the vast distances that resources for businesses and residents require, and that exports and imports must travel to meet markets. This is especially true for the remote communities of the NWT, where access is restricted to air only for some or all of the year and the cost of living and doing business limits development. A Knowledge Economy offers the opportunity to export knowledge, including research, innovations, designs, software and any other non-physical content freely, bypassing the costly hurdles of the NWT's great geographical distances and spurring growth in new areas of employment across the Territory.

Other jurisdictions across the world have embarked on Knowledge Economy plans. These include Newfoundland and Labrador, Kitchener-Waterloo-Cambridge, and locations in Iceland, Sweden and New Zealand. Kiruna, Sweden, is Yellowknife's Nordic counterpart. The town of 17 thousand residents has a growing remote sensing industry which has created over 400 jobs and generates over \$150 million a year for the community. The town also houses the Swedish Institute of Space Physics. These accomplishments are further evidence that investment in education and targeted investments supporting business opportunities in the NWT can lead to economic growth in the Knowledge Economy.

It is important to learn from these regions' Knowledge Economies. An environmental scan of Knowledge Economy jurisdictions demonstrated key findings, on right.

With sound investments and incentives, businesses and entrepreneurs can build a new Knowledge Economy that contributes to economic prosperity into the future.

\$150 million dollars
a year for the community from the remote sensing industry.

400 jobs created
for the 17,000 residents of Kiruna.

KIRUNA, SWEDEN



Environmental Scan Findings

- Successful Knowledge Economies maintain strong partnerships between government and industry as well as a shared vision and leadership from both parties.
- A central hub where people converge to work and innovate. This is done through strategic investments, by the public and private sectors.
- An innovation ecosystem created through a partnership between government, industry and academia. This is usually facilitated through a university.
- Investments in higher education, research and development.



Where is the Northwest Territories in developing a Knowledge Economy?

In May, 2020, the Conference Board of Canada (CBOC) estimated NWT economic growth of only 1.7% GDP growth over the next five years. It also estimated a reduction in GDP over the longer term due to further mine closures and downsizing of the related sectors that support resource extraction.

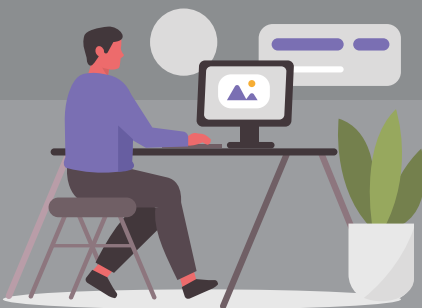
While tourists in the NWT had been increasing steadily prior to COVID-19, the pandemic has significantly negatively affected the tourism industry. With no concrete end of the pandemic in sight, this along with the upcoming closure of the NWT diamond mines emphasizes the need for economic diversification. Related GNWT priorities are shown on right.

Businesses and governments in the NWT already have several ideas for opportunities and initiatives, outlined in the Goals section below, which have the potential to reshape the future of the NWT. Further ideas exist, such as:

- Development and testing of cold climate products and technologies;
- Green technology for restoration and remediation of resource extraction sites;
- Implementing emerging technologies for remote service delivery;
- Northern housing development;
- Permafrost and Cold Regions research;
- Receiving and managing data from satellites (occurring in Inuvik, NT).

It will be critical for all stakeholders to collaborate on the development of these opportunities to ensure their long-term success.

Knowledge Economy Initiatives



- The completed Mackenzie Valley Fibre Line;
- Resources and Energy Development Information (REDI) sessions;
- The Arts and Crafts & Technology Micro-manufacturing Centre (ACTMC);
- Refreshing the NWT Geological Survey Strategic Plan;
- Exploring the feasibility of a Northern Center of Excellence;
- The transformation of Aurora College into a Polytechnic University;
- The completed Inuvik Satellite Station Facility (ISSF); and
- Implementing the Knowledge Agenda.



What gaps must be addressed to build the Knowledge Economy?

Without a significant history of using knowledge and research to support diversified commercial activity, we identify the following gaps the Knowledge Economy Action Plan will strengthen. Through five key goals, this paper outlines what research has shown will address the NWT's gaps currently limiting its growth.



Lack of support for research and knowledge generation

Like the other pillars of a Knowledge Economy, the ability for a community to innovate is co-dependent on the education of its members and the information infrastructure it can rely on. The NWT's ability to innovate for product and service research and development is hindered due to unreliable or absent telecommunications and the disconnection between post-secondary education and employment opportunities in the Knowledge Economy.

An under-developed entrepreneurial culture

The hallmark of an entrepreneurial culture is a group of individuals taking risks together in an environment of trust and strong relationships. In our early discussions with business communities of the Northwest Territories, entrepreneurs noted that this culture is lacking in the territory, largely because of the few services available to businesses. Owners and employees expend a large amount of time doing tasks that would be outsourced in other jurisdictions.

Lack of telecommunications infrastructure and collaboration space

Many small NWT communities lack robust broadband connections. This makes geographical distances a limiting factor for small businesses that wish to reach national and international markets. The lack of reliable internet connections also affects students' learning, online business and information sharing. Secondly, few communities in the Northwest Territories provide easy access to both virtual or physical common workspaces equipped with tools or equipment that people can use. This limits the collaboration that underpins a Knowledge Economy.

Stronger partnerships and collaboration needed

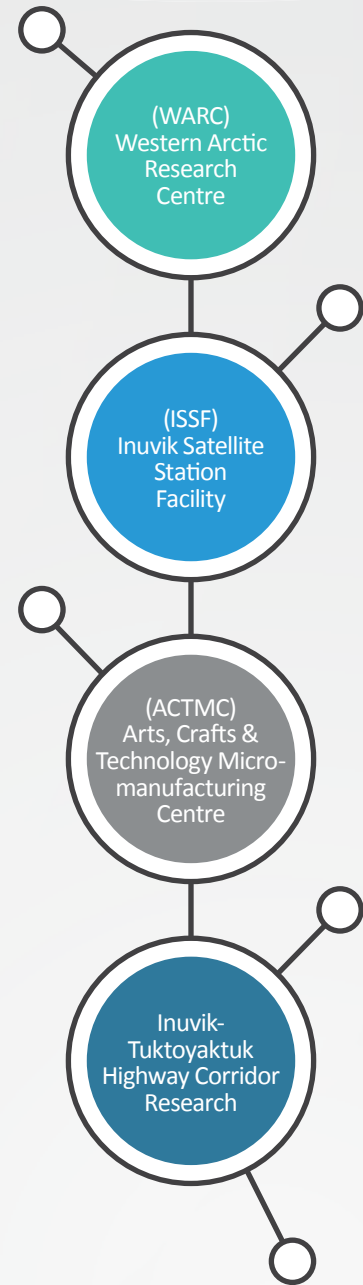
Without concerted attempts to tie together governments, Non-Government Organizations (NGOs), industry and academia, these institutions can often remain in silos and without meaningful opportunities to collaborate. This can result in duplication of research across departments businesses and researchers, as well as missed opportunities for input and idea generation. The NWT lacks the level of collaboration a Knowledge Economy requires for advanced innovation and efficient knowledge sharing.

Capacity shortage in post-secondary education and business supports

As described by the World Bank, the education of the workforce is critical to the Knowledge Economy and a strong middle class of professionals educated in a wide variety of subject matters is required to support the sectors both directly and indirectly related to the Knowledge Economy. Although an entrepreneur can be anyone, his or her business may require educated professionals such as accountants, lawyers, bankers, suppliers, partners and traditional and local knowledge holders to help support the business so it can grow. These educated services sectors are currently underdeveloped or lacking in NWT regions.

Based on a cross-jurisdictional scan of Knowledge Economy initiatives, successful Knowledge Economies in other jurisdictions demonstrated partnerships between government and industry, as well as a shared vision and leadership from both parties. They also maintain a central hub, or “cluster”, where people converge to work and innovate. This is done through strategic investments from the public and private sectors. The current innovation cluster in Inuvik, which consists of Aurora College’s Western Arctic Research Centre (WARC), the Inuvik Satellite Station Facility (ISSF), the Arts, Crafts & Technology Micro-manufacturing Centre (ACTMC) and the research being conducted on the Inuvik-Tuktoyaktuk highway corridor are an example of a Knowledge Economy cluster within the NWT. The environmental scan also demonstrated that investments in higher education, research and development, and an innovation ecosystem created through a partnership between government, industry and academia all helped move forward local Knowledge Economies. Through this research, the following five goals and key actions were identified as critical to the development of the Knowledge Economy in the NWT.

Inuvik Innovation Cluster



Goal 1

Research and Knowledge Generation

Promote the NWT's unique location and cultures as a place to develop and apply knowledge and derive the full economic benefit from knowledge generation activities in the territory.

Knowledge generation through research has long been a source of economic activity in the NWT. However, most research conducted in the NWT has been initiated, designed, funded and led by southern researchers and universities. There is room to grow the NWT economy by promoting the full spectrum of research activities in the NWT, including question project design, implementation and analysis. To that end, the GNWT promotes its research priorities through the Knowledge Agenda (2017). A key theme of the Knowledge Agenda is the development of expertise for NWT residents. Recently, the GNWT has shifted the focus of research funding programs such as the NWT Cumulative Impact Monitoring Program to NWT research priorities while promoting inclusion and capacity building for NWT residents. Indigenous governments, including the Tłı̨chǫ Government and the Inuvialuit Regional Corporation, have established their own research entities within their organizations. Independent

research organizations, such as the Institute for Circumpolar Health Research, have been established to advance and support research focusing on health and related social determinants. These are early steps to ensure that the NWT derives full economic benefit from research and knowledge generation activities in the Territory.

As noted in the recent Hotı̨ts'eeda Discussion Paper on the Knowledge Economy, although local research activity may result in some employment for Indigenous knowledge holders and local businesses, Indigenous governments and other local organizations also provide significant in-kind contributions to researchers:

...through not only un-compensated staff time and facilities, but also through providing de facto cultural competency training to researchers: educating them on the community, its protocols and cultural norms ...³

Further actions can be taken to maximize and localize NWT-based research, with the goal of fostering a strong, well-reputed research development environment. With the increased interest across Canada and internationally in Arctic and circumpolar issues, Indigenous culture and knowledge, and the increased rate of climate-related changes in the territory, the NWT is ideally positioned to promote its unique attributes. The Knowledge Economy Action Plan will build on the strong foundation of values inherent in northern Indigenous cultures and knowledge. As the Knowledge Economy Action Plan is developed, engagement and feedback will be critical to its success. While reading the following actions related to research and knowledge generation, consider the questions below.

Questions to Keep in Mind

- What challenges do you know of that hinder research or knowledge generation in the NWT?
- How can the GNWT further support research?

³ Hotı̨ts'eeda: Discussion Paper on the Knowledge Economy – https://www.jstor.org/stable/community.27990209?seq=1#metadata_info_tab_contents

Action 1: Promote and attract research in the NWT

GNWT departments and agencies are increasingly engaged in research based on the priorities set in the Knowledge Agenda, but there is opportunity to further promote research engagement and ensure that GNWT resources (both direct funding and in-kind support) are consistently focused on attracting research. The Knowledge Agenda maintains the goal of “positioning the Northwest Territories as an active leader, practitioner, partner and promoter of all forms of research”. Within the Knowledge Economy Action Plan, this endeavor can be advanced in various ways.

Southern researchers and institutions may encounter barriers in pursuing research interests in the NWT. Although they may have access to academic and Tri-Council funding, they may not know where to turn for advice and support about how to conduct research in the NWT. Stumbling blocks may include not knowing how to arrange transportation, accommodation or supplies in

remote locations, not understanding Indigenous government research policies and protocols, or not knowing how to engage in a respectful and effective manner with communities. The GNWT can actively attract increased research investment by developing or encouraging the development of research support services. These services would allow researchers access to the information and resources they need to succeed in the NWT.

Research investments in the communities would have stronger outcomes, including increased employment, the development of expertise for NWT residents and economic gains for the travel and accommodation industries.

2030 NWT Climate Change Strategic Framework

Released in May 2018 by the GNWT, the Climate Change Strategic Framework outlines three goals: transition towards a lower carbon economy, improve knowledge of climate change impacts and adapt to a changing climate. The first of two action plans to implement the Strategic Framework is underway.



1

Transition towards a lower carbon economy

2

Improve knowledge of climate change impacts

3

Adapt to a changing climate

The Knowledge Agenda recognizes that Northern interests include the commercialization of ideas originating from the north. There are many opportunities to attract the private sector located outside the north.

The GNWT's role as a pathfinder for these private, public, academic and NGO organizations can link their research interests to available programs, funding and research opportunities in the NWT. Further, through a pathfinding process the NWT's strengths can be advanced. Potential cold-weather testing facilities, further mining remediation and pipeline construction in sensitive environments are possible areas of specialization that could attract substantial investment, such as the Boots on the Ground program, detailed on right.

Given the NWT's unique geography, the NWT can promote itself as a location for Northern climate and wildlife research. Pathfinding on the part of

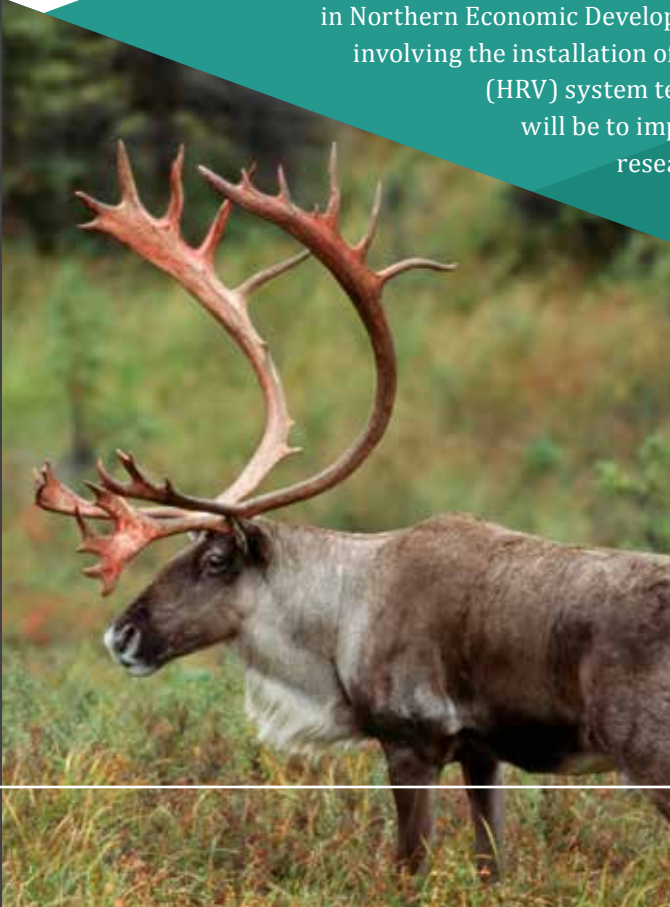
the GNWT can attract and support companies' and institutions' research interests in this field, such as studying the changing climate and the complex interactions between people, land and animals. Communities and Indigenous populations are an integral part of this work. Indigenous knowledge provides for a richer understanding of the impacts of climate change. Connecting businesses to existing tax credits for research and development could spur further research in the NWT. The Scientific Research and Experimental Development Tax Incentive uses tax credits to incentivize businesses to conduct research and development, with \$3 billion in tax incentives across Canada.

Advancements in Northern Housing

This coming year, the NWT HC plans to work with Natural Resources Canada and Canada Mortgage and Housing Corporation to submit a 2022-23 funding proposal under CANNOR's Strategic Investments in Northern Economic Development (SINED) program to pilot a "deep retrofit" project involving the installation of new energy efficient dual core heat recovery ventilator (HRV) system technology. The targeted outcomes from this investment will be to improve energy efficiency, support good building practices research and to assist the NWT HC in addressing operational challenges with existing HRV technology, particularly in the high Arctic communities.

Boots on the Ground

The Tłıchǫ Government's Research and Training Institute has attracted academic partners and research funding for its Ekwǫ̀ Nàxoède K'è: Boots on the Ground caribou monitoring program, which is collecting critical information on changes to caribou habitat.



Action 2: Strengthen a research support function in the Northwest Territories

GNWT departments, non-government organizations and Indigenous governments have all benefitted from accessing major federal and academic funding programs. There is great potential for NWT entities to access increased research support through the federal research granting agencies, listed on right. However, it requires a substantial investment of time, combined with subject matter expertise, to prepare a grant application to these agencies. Furthermore, once funding is received, there are numerous administrative and reporting requirements.

Southern universities manage these pressures through research support functions which have dedicated expertise knowledgeable about research funding programs. These support functions are resourced in part by the Tri-Council Research Support Fund (RSF), which allocates a percentage of each



research grant awarded to an institution directly to this central function. As Aurora College transforms into a polytechnic university, taking on this central research support function will be a logical step. Expanding the support function to make it available to other NWT entities with an interest in research, like the GNWT, who are not eligible to access the RSF, will be important to attract research funds to the NWT and build research capacity.

**Federal
 Granting
 Agencies**



Canadian Institutes of
 Health Research



The Natural Sciences
 and Engineering
 Research Council



The Social Sciences
 and Humanities
 Research Council



The Canada Foundation
 for Innovation



Goal 2

Economic Development and Entrepreneurship

Grow and diversify the NWT economy by creating the conditions for cultures of innovation, entrepreneurship and sustainable community economic growth.



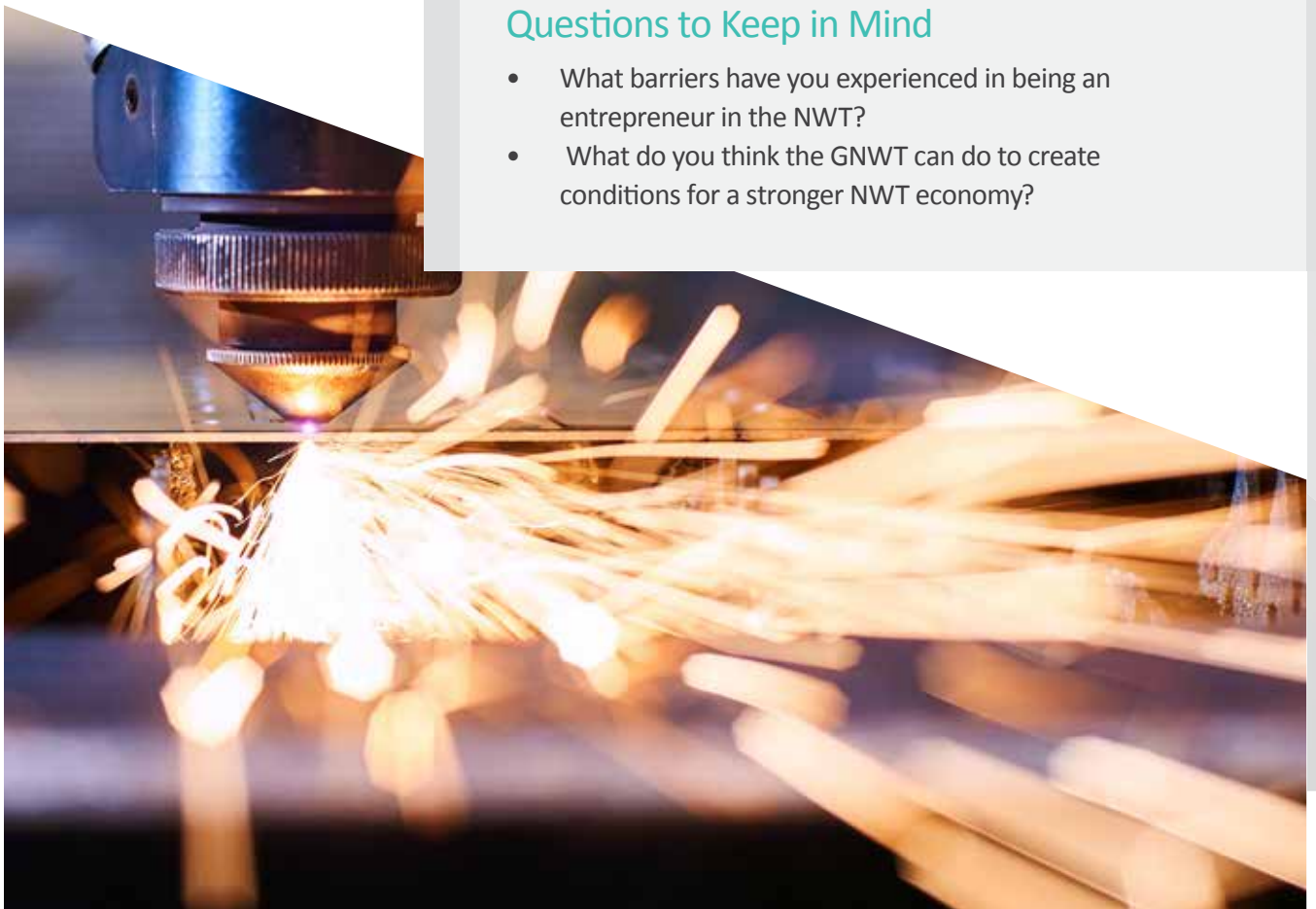
An environment and culture that values innovation and entrepreneurship are necessary to support the NWT Knowledge Economy. While government spending is an important part of the NWT economy, it is NWT entrepreneurs and business investments that will be responsible for any significant

growth in the economy. Below are actions that can assist in encouraging a culture of innovation and entrepreneurship in the NWT, with the goal of increasing entrepreneur and community-led growth and innovation.

While reading the following actions designed to grow and diversify the economy through innovation, entrepreneurship and new, sustainable economic growth, consider the questions outlined on right.

Questions to Keep in Mind

- What barriers have you experienced in being an entrepreneur in the NWT?
- What do you think the GNWT can do to create conditions for a stronger NWT economy?



Action 1: Enhance current business support services and identify, develop and implement new NWT business support services

There are a variety of programs at all levels of government designed to support businesses, including those from indigenous governments. GNWT-funded organizations at the territorial level providing business support services in the NWT include (but are not limited to):

- ITI regional offices;
- Métis Development Corporation;
- The Business Development and Investment Corporation (BDIC); and
- Community Futures organizations.

Despite these support services, there otherwise is relatively little in the way of technical expertise and support for businesses. This is especially evident

in smaller NWT communities where there is often limited access to commercial services such as bookkeepers, accountants and marketing companies. Business support services should be developed collaboratively by ITI, BDIC and Community Futures organizations, focusing on the regional and community level where commercial services are not available. Some business support needs could be met by innovation spaces, or ‘makerspaces’, discussed in the next Action.

Business Support Services

Business support services can encompass a wide range, including helping businesses access territorial and federal funding programs (pathfinding), business plan advice, submitting loan applications, basic book keeping and tax administration; and in smaller communities, even access to a computer hardware, software and document printing services can be a challenge.



Action 2: Encourage entrepreneurship through mentorship opportunities and makerspaces

Business programming is provided through Aurora College. The GNWT's Department of Education, Culture and Employment (ECE) offers the Self-Employment Program to train and mentor entrepreneurs. However, some NGOs also provide these services. Futurpreneur provides financing, mentoring and support tools to aspiring business owners. Entrepreneurth offers programming for Indigenous and community-based entrepreneurs to build sustainable businesses. The GNWT could consider directly investing into targeted entrepreneur mentorship programs. This could involve building upon existing programs currently provided by others or developing new programming for future entrepreneurs.

A consistent theme found in successful innovation ecosystems around the world is co-location: spaces that allow people from different backgrounds and at different stages in the innovation process to meet, collaborate, and experiment. Unlike urban centres, where clusters form more naturally, the vast distances of the north make co-location challenging without community and government support. These spaces range from simple office co-location to equipped makerspaces and elaborate innovation hubs. They host community activities, local training, and often social events that highlight community successes.

An example of a makerspace is Makerspace YK, a new initiative in Yellowknife which brings entrepreneurs and other "makers" together. They are focused on building the community around hands-on learning, shared space, and skills-building, and will offer a variety of equipment and support.

Going forward, the GNWT could work in collaboration with communities, Indigenous governments, and the federal government to support further innovation spaces that meet the needs of communities, researchers, students, and the private sector.

The Arts, Crafts & Technology Micro-manufacturing Centre (ACTMC)

Located in Inuvik, this facility has been developed and administered as part of Aurora College and is anticipated to continue under the polytechnic university. ACTMC members have access to tools for 3D-printing, laser cutting, screen printing and computer-aided design, among others. They can use the equipment and software to make jewelry, printed T-shirts, and etched glassware, metal, and other products.



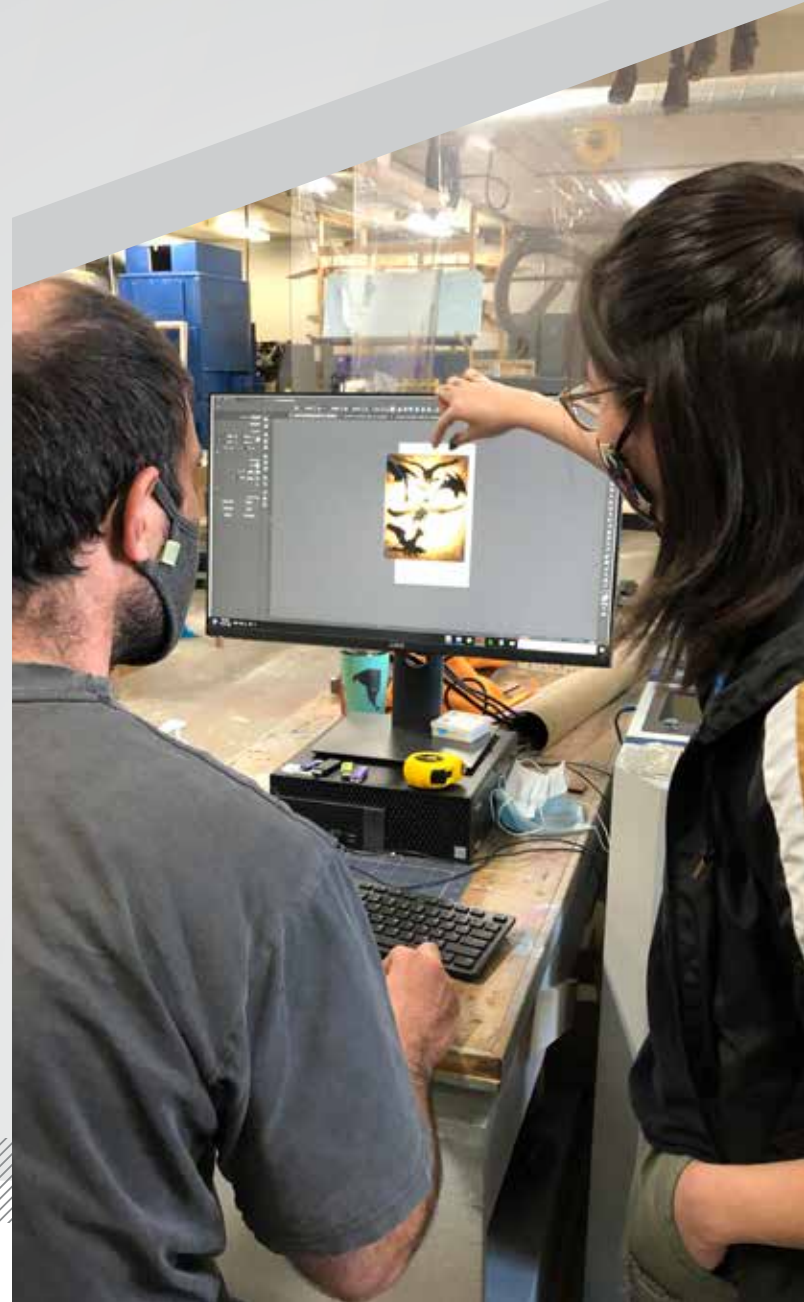
Action 3: Work with NWT residents, businesses, governments and organizations to develop Regional Economic Development Plans and identify strategic opportunities for economic growth

While the GNWT has been making some investments in the knowledge economy, there is a need for a coordinated approach and a coherent framework to guide GNWT actions and investments in the future which is what a Knowledge Economy Action Plan will do. Although the Knowledge Economy is wide-ranging, the specific investments made and opportunities taken will determine the success of NWT residents and businesses. These investments and opportunities must be obtained through outreach by the GNWT and by receiving ample feedback and suggestions on initiatives and the best ways forward.

The Regional Economic Development Plans will work to find and lay out how these opportunities can be supported by the GNWT and capitalized upon for the fulfilment of NWT residents and businesses. The GNWT Mandate outlines the importance of developing these plans and there is an opportunity to leverage the work being done within the Knowledge Economy to ensure residents, businesses and organizations have the necessary skills to play a meaningful role in the implementation of economic development plans.

As a capital city, Yellowknife is home to half of the territorial population, most government services and is the territorial hub for transportation. Employment opportunities are greater in Yellowknife compared to opportunities in smaller communities. The 19th Legislative Assembly has recognized this inequality and has made the promotion of economies in regions a priority. The intent is that the Knowledge Economy can supportively contribute to the economic development of all NWT communities and regions.

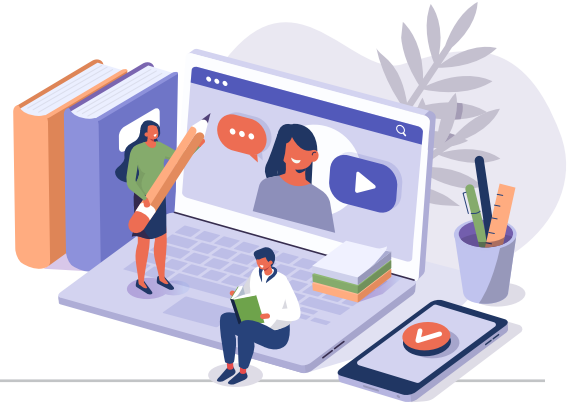
It is imperative that as each Economic Development Plan is developed, opportunities for all Canadians in these regions are considered. It will be important that policies and initiatives do not support systemic barriers, such as racism, and actively work to overcome these barriers through the engagement and policy-writing process.



Goal 3

Infrastructure

Improve access to knowledge in NWT communities through improved connectivity and the creation of community spaces that facilitate and promote knowledge sharing.



Connectivity can be thought of as fast, reliable internet service for residents, businesses, NGOs and governments. The importance of connectivity cannot be understated in providing critical information, business opportunities, learning opportunities and e-healthcare to the residents of the NWT. Many communities are still operating without consistent access to these services. With a population of 44,000 residents in thirty-three, often remote communities spread over an area of over one million square kilometres, broadband connectivity is crucial to link Knowledge Economy clusters and develop the “digital economy” of the future. The OECD defines the “Digital Economy” as:

... [incorporating] all economic activity reliant on, or significantly enhanced by the use of digital inputs, including digital technologies, digital infrastructure, digital services and data. It refers to all producers and consumers, including government, that are utilising these digital inputs in their economic activities.⁴



The following actions will support increasing access to knowledge through a digitized economy, with the goal of increasing usage of technology by entrepreneurs, small businesses and residents to access services and conduct business such as e-commerce platforms, graphic design, healthcare appointments and e-learning. The integration of reliable connectivity can also help spur big data storage and analysis, the application of AI and algorithmic solutions, as well as app development. These systems can aid staffing and boost healthcare system efficiencies as well as other applications. Indigenous governments are moving towards data sovereignty for ownership, control, access and possession of data, indicating the need for these information infrastructures to be in place. Such promising technologies can play a contributing role in the development of the NWT’s information infrastructure required for the Knowledge Economy.

Questions to Keep in Mind

- What challenges have you experienced due to a lack of fast, reliable internet?
- How can your community benefit and grow with enhanced internet services?

⁴ OECD - Roadmap toward a common framework for measuring the Digital Economy:
<https://www.oecd.org/going-digital/topics/measurement/>

Action 1: Foster improved connectivity in all NWT communities



Various telecommunications infrastructure projects have been initiated for connectivity in the NWT. The Mackenzie Valley Fibre Optic Line (MVFL) has been completed and there are many connectivity projects planned by both public and private sectors over the next three years which will complete the telecommunications infrastructure required to provide world-class internet to many NWT communities. Entrepreneurs will have greater access to on-line services, information and markets. E-learning and enhanced telehealth services could provide greater services in communities at a lower cost to the health and education systems (which collectively represents 46 percent of the GNWT budget).

The federal government has signaled strong support for investments in enhanced community connectivity, especially in rural and remote communities through various funding mechanisms.

The Canadian Radio-television and Telecommunications Commission (CRTC) universal service objective (USO) for fixed internet access service is that all Canadians have access to at least 50Mbps download and 10Mbps upload speed. The Federal Government is also working on a Universal Broadband Fund, which is indicated to also be focused on supporting this minimum level of service (50/10). In August, 2020, the CRTC announced approval of \$20.9 million alongside approximately \$10 million in direct investment by Northwestel Inc. (NWTel) to upgrade 18 NWT Terrestrial and 8 NWT Satellite served communities. The approval directs NWTel to complete “last mile” upgrades in 26 of the NWT’s 33 communities offering 50/10 USO, by 2023. The 8 satellite communities are proposed to increase their capacity by taking advantage of the proposed Low Earth Orbit (LEO) satellite networks. LEO networks don’t yet exist and the current estimate for their

deployment is late 2022/2023. NWTel plans to complete this work by the end of 2023.

The only community within the NWT that was not included in the CRTC/NWTel announcement is the community of Whatì. The GNWT has committed to working with the Tłı̨chǫ Government to assess a fibre build from the junction of HWY 3, following the new Tłı̨chǫ All Season Road right-of-way to Whatì. The Tłı̨chǫ Government is planning to complete this fibre installation by end of November 2021.

The GNWT is also committed to extending the Mackenzie Valley Fibre Link (MVFL) to the community of Tuktoyaktuk. The GNWT looks to begin engagement with stakeholders in the summer of 2021 and is currently working with the Federal Government for capital support for the project through the Investing in Canada Plan funding stream. The GNWT is targeting completion of this project by the end of 2023.

Once these funded initiatives are implemented into completed projects, the NWT communities will be nearing the level of telecommunications infrastructure required for an integrated Knowledge Economy. Every community in the NWT would have access to the USO of 50/10, unlimited when complete. It is critical the GNWT’s Knowledge Economy Action Plan ensures reliable internet access and is established fairly within each of the communities.

Mackenzie Valley Fibre Link

The MVFL provides state-of-the-art fibre-optic telecommunications for communities in the Mackenzie Valley and Beaufort Delta regions – a critical link in advancing the Knowledge Economy.

Action 2: Enhance resiliency and affordability of internet services

The Yukon Government is currently in the procurement phase to construct a fibre line between Dawson City, Yukon and Inuvik, NWT. Both Fort McPherson and Tsiigehtchic, NWT will be connected as a result of the Dempster Fibre Line (DFL) and this project will provide a redundant link for both governments. The Yukon Government is targeting construction for this project by the end of 2023. This project is the final connection required to complete the Canadian Northern Fibre Loop (CNFL). The CNFL will consist of the NWT's MVFL, Yukon's Dempster fibre line and NWTel infrastructure providing a fully-operational fibre network for the Yukon and the NWT Mackenzie Valley communities.

Another important project is the proposed connection from Yellowknife to south of Great Slave Lake. Yellowknife has nearly 50% of the territory's population and also houses 100% of the GNWT Dynamic Circuit Network (DCN) before being sent south, which currently provides for a single point of failure. This project would provide a diverse connection from Yellowknife similar to what the DFL is providing Whitehorse and the rest of the Yukon.

While broad availability of broadband internet service in the NWT is within sight given the initiatives already planned and underway, the affordability of internet service for residents and businesses remains a key barrier to adoption. This is particularly true in more marginalized populations and small businesses. Emerging technology will play a factor in addressing affordability; however, as service becomes more

widely available, government and industry will have to work together to address affordability and ensure broadband services for all.⁵



⁵ Northwestel Map - <https://www.nwtel.ca/community/canada-north-fibre-loop-0>

Action 3: Establish physical spaces that foster collaboration in the Knowledge Economy

As noted by the World Bank, if having educated people and a place for them to work together is the first goal of implementing a knowledge economy, the second relates to how they interact. What sets innovation apart from the other steps toward commercialization is the sharing of information and the tolerance of failure. These two aspects of innovation happen only when people come together in trust, for shared benefit, and with a sense that they are facing a common challenge.

This is the reason why innovation ecosystems and the knowledge economy are often associated with geographic clusters: cities and regions that attract multiple companies in a given sector and are often linked to a college or university. While it is sometimes thought that companies flock to strong geographic clusters, the inverse is true: the trust-based form of early and small networks between friends and colleagues builds towards more robust clusters. But being close together doesn't guarantee trust; shared spaces where people cross paths and work together are the foundation. This is why, as outlined in Goal 2, Action 2, there are initiatives to create these spaces in the NWT. These include makerspaces, research and collaboration at Aurora College, office co-locations, and local training.

Goal 4

Partnerships & Collaboration

Increase the sharing, participation and collaboration of stakeholders on projects and initiatives within the Knowledge Economy.



Increased partnerships and collaborations are key hallmarks of a Knowledge Economy. NWT entities such as the GNWT's departments and agencies, various research firms, academia, industry and the federal government can work together more collaboratively by regularly sharing and collaborating on ideas, perspectives and initiatives. The following actions support increasing these connections, with the goal of positioning stakeholders to further facilitate partnerships and other forms of collaboration.

While reading the following actions designed to enhance partnerships and collaborations throughout the NWT, consider the questions on right.

Questions to Keep in Mind

- Are there examples where stronger partnerships between organizations like businesses, governments and NGOs would benefit your community?
- What do you think the GNWT can do to help build partnerships or collaboration between these organizations?



Action 1: Enhance partnerships between funders of business supports and services

Partnerships between funders in the NWT are important not only to limit duplication and have a holistic strategy, but for entrepreneurs and business owners looking to secure funding and have access to a variety of business support needs. Being able to compare the available resources from different institutions helps entrepreneurs and businesses find the best path forward for their specific ideas and circumstances. Some business support services are detailed on right.

Of note, the ITI regional offices and CFDCs have a regional presence throughout the NWT. CanNor, the MDDF, and the BDIC have client bases throughout the NWT but do not have a regional/local presence outside of Yellowknife. While some services and advice are provided on an 'own client' basis, providing general business support services to the NWT as a whole is not a focus of

any one organization. The GNWT can prioritize the partnerships between these institutions so that entrepreneurs and business owners can have more straightforward access to the variety of support services they need in the following ways:

- Improve pathfinding and ensure that businesses are aware of the wide variety of programs and agencies available to support northern businesses;
- Improve communication and collaboration between agencies with a focus on finding more ways to partner and leverage resources; and
- Clarify roles and responsibilities of each agency.

With these strategies, the GNWT can elevate the resources available to businesses and streamline agencies towards more efficient allocation of capital and industry coverage.

Business Support Services



ITI headquarters and the regional offices

Canada

Canadian Northern Economic Development Agency (CanNor)



Métis-Dene Development Fund (MDDF)



The Community Futures Development Corporations (CFDCs)



NWT Business Development and Investment Corporation (BDIC)



Action 2: Increase collaboration amongst Northwest Territories industry and within the GNWT

Through its Service Innovation Strategy, the GNWT is implementing a comprehensive vision of online services and information for NWT residents, supported by updated enterprise architecture, streamlined project services and a robust information management program. The Strategy can support the Knowledge Economy by encouraging the exchange of information within the Territory, increasing the potential for both industry and various levels of government to employ that information in innovative ways.

Once implemented, the Service Innovation Strategy will become the basis for advances in government services across the GNWT. It will help departments use technology to reduce internal barriers that can impede service delivery to residents and require businesses to navigate unnecessary red tape and hurdles. Through the governance structure in place within GNWT for the Knowledge Economy, departments will work together to evaluate potential initiatives that improve services to residents and businesses. Initiatives such as tele-medicine, community government training programs, geospatial data delivery, and improved access to information to accelerate research are a small number of the innovations that are possible as a result of the Service Innovation Strategy.

Another effort between the federal government, the GNWT, the Tłı̄chǫ First Nation and various private businesses is already underway to connect Whatı̄ to Highway 3, which connects to Yellowknife. The road will provide businesses, the community and residents with price and time reductions on

goods, services and doing business as accessibility dramatically improves. The road will also bypass the nearby Fortune Minerals NICO project, which could provide Whatı̄ with excellent employment opportunities and secondary economic benefits into the future. Other highly collaborative efforts found in the North include:

- A three-turbine windfarm to replace diesel as the main fuel source in neighboring Kivalliq, Nunavut;
- Linking the above region to Manitoba’s hydro grid through a 900-kilometre transmission line; and
- Upgrading and reinstating a four-megawatt windfarm in Whitehorse, Yukon, which will power 700 homes.

These initiatives made possible through intra-government and intra-industry collaboration can be learned from, replicated and improved upon for a NWT context.



Goal 5

Capacity Building

Ensure the NWT education system and business supports align with opportunities in the Knowledge Economy.



Simply put, capacity can be thought of as the total benefit a community can produce for themselves or others. Commonly, education, population, political stability and social cohesion play a large role in the capacity of a community to create, develop and expand. As noted by the World Bank, education is a key element for enhanced capacity in a successful Knowledge Economy. Although building

a well-rounded student is a valuable investment for society, the educations that secondary and post-secondary students receive in the NWT must be relevant to the future workforce requirements. As Knowledge Economy initiatives phase in over the next decade, education systems must adapt to prepare those students to be able to meet the skills demands of those opportunities.

Similarly, the business supports offered by the NWT, the federal government and NGOs should align with the needs of the future Knowledge Economy. This may require program changes, requests for new types of funding, and adapting business support spaces with new technology. The following actions outline this, with the goal of positioning NWT residents and students to contribute to and participate meaningfully in the Knowledge Economy.

Questions to Keep in Mind

- How can the GNWT support future entrepreneurs and their businesses?
- How can the GNWT prepare people for jobs in the knowledge economy?
- What is something achievable that can be done to help build capacity in your community?

While reading the following actions designed to align the NWT education system and business supports with knowledge economy opportunities, consider the questions on right.



...the educations that secondary and post-secondary students receive in the NWT must be relevant to the future workforce requirements.



Action 1: Further incorporate STEM skills through JK-12 education

The inclusion of STEM skills is integral in developing a workforce educated in Knowledge Economy related fields. For example, science-based work requires employees educated with science backgrounds. Since a Knowledge Economy is in large part comprised of a significant digital economy, digital literacy and often math, programming, coding skills and general technological understanding are critical. Digital literacy emerges from and is supported by a workforce with strong backgrounds in STEM fields.

While preparing students who have exited the secondary education system for the current labour market is an immediate need, preparing students for the digital economy of the future must be initiated as well. JK-12 students with a curriculum and extra-curricular options that further promote science, technology, engineering, and math concepts now will be prepared for northern careers in a technology-based and digitally-oriented knowledge economy

as new businesses and institutions are established or expand. Further, enhanced training for internet users, whether for businesses or students, could be offered to facilitate internet education and bringing products and services to international markets online.



Action 2: Align the post-secondary education system with opportunities in the Knowledge Economy

The Department of Education, Culture and Employment (ECE) is leading work to strengthen and expand the NWT post-secondary education system. Recent work in this has seen the establishment of pathways to the establishment of new post-secondary institutions and programs, as well as the NWT Post-Secondary Education Strategic Framework 2019-2029 that is driving work to increase access to quality post-secondary education opportunities in the NWT. Following a comprehensive decision-making process, the GNWT has committed to transform Aurora College into an effective, efficient and sustainable polytechnic university by May 2025.

Generally, a polytechnic university combines the practical approach of a college education and the depth of study usually associated with a university

program. Polytechnic programs are skills intensive and technology-based. Hands-on learning opportunities provide students with practical training for in-demand jobs. Program and curriculum decisions at polytechnic universities are also made in close collaboration with industry, ensuring graduates attain skills that are relevant to the current job market. It will also continue to offer adult basic education and access programs that help to ensure accessibility. The polytechnic university will have a place for every resident who seeks an opportunity to further their skills, knowledge and abilities through post-secondary education.

Prospective students, current students or graduates from other post-secondary institutions will take advantage of unique learning opportunities in the NWT by continuing their education at the polytechnic university, where Indigenous, traditional and local knowledge will

be respected and incorporated into teaching and research. It will also engage in Northern research programs and seek innovative solutions to Northern issues. Furthermore, a future polytechnic university must work in partnership with Indigenous governments and communities on a wide range of teaching and research initiatives. As the only public post-secondary education institution based in the NWT, the polytechnic university will become a central part of the NWT's knowledge economy. Areas of specialization will provide a basis for broader partnerships, increasing the opportunities for growth of the knowledge economy and complementing other GNWT investments.

In order to support economic growth and diversification, the polytechnic university will focus on the evolving labour needs of NWT employers. In 2015, the GNWT released the Labour Market Forecast and Needs Assessment. This document provides a socio-economic profile of the NWT along with an economic outlook and occupational demand forecast for workers up to the year 2030.

Areas of specialization will provide a basis for broader partnerships, increasing the opportunities for growth of the knowledge economy and complementing other GNWT investments.



Action 3: Enhance current training and support and develop new support services for entrepreneurs and small businesses

While building a post-secondary education institution is necessary for a Knowledge Economy making connections between education and business is also critical. Student cooperative education programs are good examples of the connections that form between post-secondary education and the business community, provided the rewards of innovation are shared by both the student and the employer. Innovation centered on research is a secondary example of education and business connections. In these cases, the government states a mission or challenging problem it needs to solve, and academics and private

companies collaborate in a physical space and with program funding to solve it. Their work and research leads to knowledge spillovers that generate activity in other sectors of the economy when this information is shared. This spillover is only available to be capitalized on if collaboration is encouraged among networks.



Summary

Various actions have been showcased as viable initiatives that support the NWT's transition towards a Knowledge Economy. The goals of enhancing research, economic development, telecommunications infrastructure and connectivity, partnerships and collaboration, and education and business support system alignment will further the vital building blocks of education, information infrastructure and an innovation system required to grow the Knowledge Economy.

...build upon the unique strengths of the Northwest Territories, to contribute ideas for economic diversification and growth...

However, as demonstrated, there are further ideas for developing the Knowledge Economy that could come from the business and academic communities, the different levels of governments and NWT residents. It is important that we consider these main questions as the Knowledge Economy Action Plan is developed:

- How could you contribute to and/or benefit from a knowledge economy?
- How can an emerging knowledge economy benefit your organization, your business and/or your community?
- What can be done in the NWT that is a competitive advantage and can be leveraged for economic growth?

What we are seeking from all Northerners is their thoughts on the opportunities to build upon the unique strengths of the Northwest Territories, to contribute ideas for economic diversification and growth through the Knowledge Economy Action Plan.



Government of Northwest Territories
Gouvernement des Territoires du Nord-Ouest

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