AN ACTION AGENDA FOR ATLANTIC GROWTH

Background Document to Support Recommendations of

The Atlantic Growth Advisory Group

November, 2017

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Introduction

The Atlantic provinces have been making steady economic progress for decades. Per capita output has significantly closed the gap with the national average since the 1960s and now equals more than 80% of Canada's per capita GDP. The fundamental challenge facing Atlantic Canada is demographics. The region's extremely slow-growing population is the oldest in Canada. Statistics Canada's "high growth" population scenario for the region through 2038 projects a total of only 2.5 million, barely above the current level of 2.4 million.

Fortunately, population is not immutable. But it is linked with economic performance in a circle of mutually reinforcing cause and effect. So a growth strategy for Atlantic Canada must be both an *economic* growth strategy and a *population* growth strategy.

There is a palpable optimism in much of Atlantic Canada today even as the shock of lower oil prices and the ever-present demographic challenge make for an uneven picture. We are at a time when the balance of forces favours opportunity.

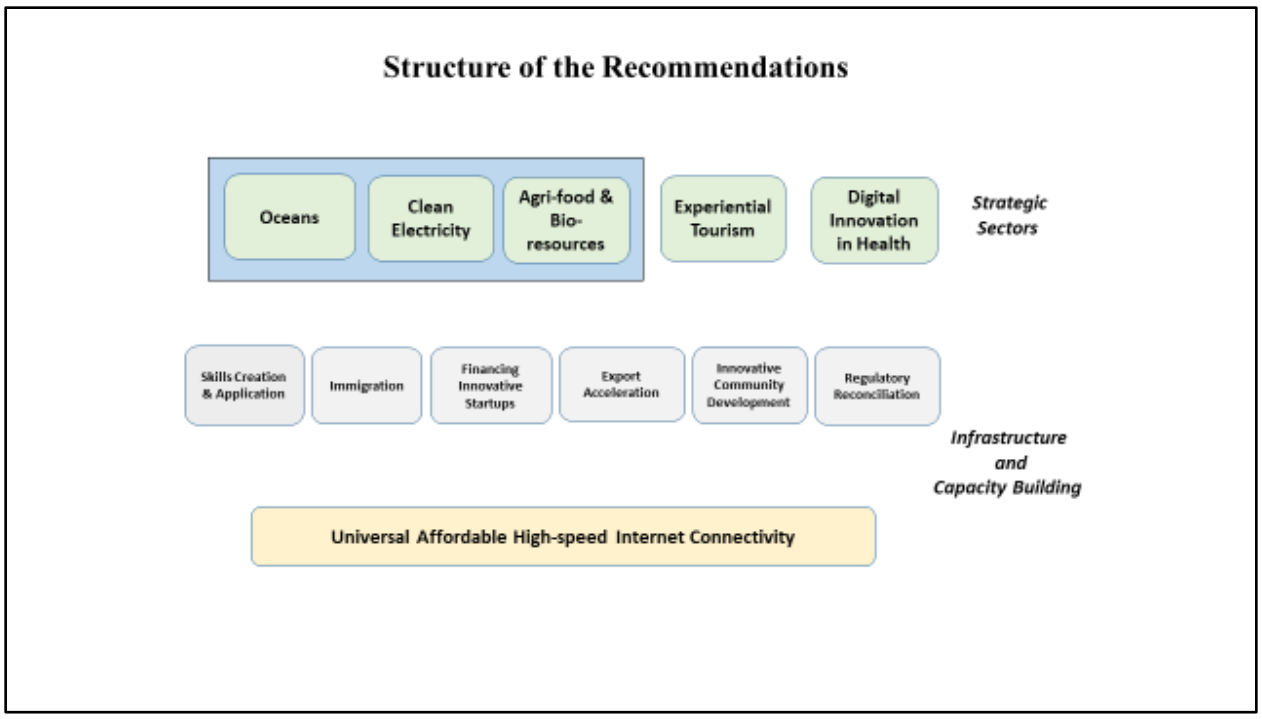
Atlantic Canadians themselves are the ones most responsible for seizing the opportunity. But the long history of the region leaves no doubt that government must continue to complement the capabilities of the private sector and be a key enabler of its success.

This is the context in which the governments of Canada and of the four Atlantic provinces launched the Atlantic Growth Strategy (AGS) in July, 2016. An Atlantic Growth Advisory Group was appointed in early 2017 to consult widely and prepare advice for the AGS Leadership Committee of federal ministers and Atlantic premiers.

The Advisory Group has focused its advice through a relatively limited number of recommendations that satisfy the following criteria.

- Each recommendation must have the prospect of *substantial impact*.
- Each should have *pan-Atlantic application*.
- Each should *break new ground*.
- Finally, each recommendation must be specific enough to be clearly *actionable*.

The structure of the recommendations is diagrammed in the following chart which is also a guide to the ten sections that follow.



A theme running strongly throughout the recommendations is the opportunity to apply innovative policy approaches first in Atlantic Canada. The region is tailor-made with multiple jurisdictions to learn what is needed to collaborate effectively; large enough to provide adequate scale and scope, yet small enough to avoid too much administrative inertia; and often in particular need of innovative approaches to achieve the objectives of the Atlantic Growth Strategy.

1. Providing Universal Broadband Access

Affordable access to high quality broadband service is foundational for the Atlantic Growth Strategy. Quite simply, broadband access is *transformative*. Virtually all of the recommendations that follow depend on it directly or indirectly. The CRTC has established, as a national objective for broadband Internet, a speed of at least 50 megabits per second (Mbs) for download and 10 Mbs for upload—the "50/10" objective.

***Recommendation 1*: Create and implement an Atlantic Broadband Action Plan with the objective of providing all Atlantic Canadians with access to Internet service of at least 50 megabits per second (Mbs) down-loading and 10 Mbs up-loading**.

An *Atlantic Broadband Action Plan*, to be developed collaboratively by the four Provinces, is required to collect and make available the detailed community-level data needed to scope out the requirements to meet the 50/10 objective and to set priorities. The plan must include a timeline of interim targets toward the objective and the publication at least annually on the state of progress.

The "universality" being recommended refers to availability of a service at a reasonable price. Achieving the 50/10 standard will take time and connecting every last house may not be possible at affordable cost, although steadily improving satellite and "fixed wireless" technologies promise eventually to close most gaps. Two national programs—through ISED and the CRTC—will make available $1.25 billion across Canada over the next five to six years to increase broadband access. This will need to be complemented by other regional sources, public and private.

2. Creating Future Skills

In view of Atlantic Canada's challenging demographic circumstances, the region cannot afford to be a laggard in facing tomorrow's labour market challenges and opportunities. It needs to embrace innovative approaches.

The 2017 federal Budget allocated $225 million over four years to establish "a new organization to support skills development and measurement in Canada." The Advisory Council on Economic Growth (ACEG) had earlier proposed an organizational model—dubbed the "FutureSkills Lab"—that would largely fulfill those functions. As a novel organization, the Lab's *modus operandi* and governance will require organizational innovation and some experimentation.

***Recommendation 2*: Establish the "FutureSkills Lab" in Atlantic Canada on a pilot basis, governed by a joint federal-provincial-stakeholder board having a majority of members not from government.**

As recommended by the ACEG, the governance structure might be analogous to that of the Canadian Institute for Health Information though with a smaller board. Federal funding support would be provided by an appropriate fraction of the $225 million committed in Budget 2017.

3. Attracting Talented Immigrants

Lagging economic growth and the absence of a critical mass of recent immigrants have made it difficult for Atlantic Canada to attract and retain anything close to its per capita proportion of immigration to Canada. But recently—due primarily to expanded use of the Provincial Nominee Program (PNP)—the situation has begun to turn around.

Recommendation 3.1: **Increase annually over the next five years Atlantic Canada's *percentage share* of the Provincial Nominee Program under the Canada Immigration Plan so long as the region is able to fulfill its allocation.**

The spirit of the recommendation can be met, while minimizing the impact on other provinces, by increasing: (i) the all-Canada PNP level as a proportion of national immigration, and (ii) the resources dedicated to applicant processing.

To fill growing PNP allocations, Atlantic Canada needs a stronger economy, boosted by an infusion of experienced entrepreneurial talent.

***Recommendation 3.2*: Establish a procedure to proactively identify and recruit to Atlantic Canada small numbers of exceptionally accomplished individuals with demonstrated entrepreneurial talent and the ability to scale-up businesses in areas that support the Atlantic Growth Strategy.**

This recommendation could be implemented as a new stream within the Atlantic Immigration Pilot Program and structured as a generalization of the existing *Start-up Visa* program.

Immigration policy has become more supportive of international student retention through measures like the Post-Graduation Work Permit Program, but in view of the exceptional value contributed by international graduates, more should be done. Echoing a conclusion of the Advisory Council on Economic Growth:

***Recommendation 3.3*: Enhance the Express Entry program for foreign graduates from Atlantic post-secondary institutions to assign greater weight to their personal suitability—age, skills, and prior work experience—than to possession of an immediate job offer; and increase efforts to inform international students of possible pathways to permanent residence after graduation**.

4. Financing Innovative Startups

Building the "ecosystem" of institutions, financing, and experience to nurture innovative companies from concept to maturity is a long-term endeavour. Atlantic Canada is still in the early phases despite having over-preformed in the creation of technology-based startups—e.g., there has been on the order of $2 billion received from the sale of venture-backed companies based in the region over the past six years.

Atlantic Canada suffers from a dearth of experienced "angel" capital—i.e. early-stage investment by private sector individuals who have worked extensively with startups in specific areas of technology. To encourage more angel investment the various provincial investment tax credits should be harmonized and re-focused.

***Recommendation 4.1*: Harmonize across Atlantic Canada the existing provincial investment tax credits, and make them refundable; available to an investor wherever located; and focused on small businesses that are innovation-based. Include as eligible investments: common and preferred shares, convertible debentures and units; and as**

eligible investors: individuals, corporations, trusts and limited partnerships.

Because the objective is to attract both risk capital and experienced investors, the credit should be made as widely available as possible; ideally across North America.

The next gap to be filled as the Atlantic startup ecosystem matures is to build more companies that can attract "Series A" financing (approximately $3-$10 million). This is not only a funding gap but also an expertise/experience gap.

***Recommendation 4.2*: Invest public funds in private-sector-managed regional funds making pre-seed as well as seed and early-stage venture capital investments. The provincial governments should invest, approximately on a pro-rata basis, together with federal government matching, BDC, and the private sector.**

The announced $25 million "Nova Scotia Technology Seed Fund" could be extended to a regional project supported by federal agencies, making the new fund both stronger and beneficial to the entire region. Atlantic Canada has a regional fund, Build Ventures, which is fully invested and in the process of raising another fund.

5. Accelerating Export Growth

Faced with a slow-growing domestic market, Atlantic Canada's prosperity will be driven by businesses that are able to compete and grow globally. Atlantic Canada's businesses, particularly SMEs, need to raise their export performance significantly. To help, the federal and Atlantic provincial governments have committed to an "Atlantic Trade and Investment Growth Strategy" with an investment of $20 million over the next five years.

***Recommendation 5*: Establish, under the Atlantic Trade and Investment Growth Strategy, a pan-Atlantic "SME Export Accelerator" program.**

The objective would be to increase the export ambition and capabilities of selected SMEs through an intensive program of export strategy development and coaching led by world-class experts. The distinguishing feature of the *Accelerator* will be the quality and reputation of the "faculty". The program would complement and collaborate closely with the federal "Accelerated Growth Services" initiative.

The effectiveness of the SME Export Accelerator could be amplified if SMEs were also encouraged to hire individuals with the skills and motivation to pursue export expansion vigorously—for example, highly-qualified recent graduates trained at the leading edge of a relevant field, equipped with a global outlook, young enough to see a bright future, and lacking the experience to know that "it can't be done". To this end, the Export Accelerator program should be complemented with an "Export Talent Attraction" incentive that would provide time-limited wage subsidies to selected SMEs that hire recent highly-qualified graduates (including international grads) of Atlantic Canada's post-secondary institutions**.**

6. Reconciling Regulation Across Atlantic Canada

There is a large body of existing regulation that differs among the four Atlantic Provinces in ways that impede commerce or efficient service to the public but are *not* essential to the regulatory objective(s). They are distinctions without a difference. They create inter-provincial barriers that fragment a market that is already small, worsen diseconomies of scale, and discourage business investment.

An on-going commitment to regulatory reconciliation across Atlantic Canada needs to be clearly communicated from the top and followed-up in each Province with the assignment of modest *full-time* resources and the sustained senior priority needed to complement the region's Joint Office of Regulatory Affairs and Service Effectiveness.

Inter-jurisdictional regulatory reconciliation, even when the differences are very small, has proven to be painfully slow—like chipping away at an iceberg with a teaspoon. The key roadblock is that when "sovereign" jurisdictions (the four Atlantic Provinces) attempt to reconcile, there is no supervening authority to break stalemates and force timely conclusions.

***Recommendation 6*: Implement a process to reconcile, in a much more timely way, existing regulations that unreasonably impede trade, investment and worker mobility within Atlantic Canada.**

How might this be done? Beginning with a group of four similar regulations to be harmonized (one from each Province) select at random one to be designated as the "default" version and set a time limit to negotiate a harmonized version. If agreement is not reached within the stipulated time the default automatically becomes the "harmonized" regulation. (As the process continues with further groups of regulations, a new Province would be selected to have the default version ensuring that no one is favoured.) This procedure *forces closure* and creates a powerful incentive to co-operate. Because it would be applied in cases where distinct versions of a regulation constitute "distinctions without a difference", no Province should feel aggrieved.

There may be concern that this recommendation could conflict with the national process of regulatory reconciliation just established as part of the Canadian Free Trade Agreement (CFTA). To mitigate this risk, the Atlantic pilot procedure could first address regulations that were unlikely to be taken up in the early phases of the CFTA's reconciliation process. And if the recommended process produces agreements among the four Atlantic Provinces it could show the way nationally.

7. Supporting Innovative Community Development

Asset-based community development ("ABCD") is a novel and effective approach that focuses on the capacities and assets of communities rather than on their needs and deficiencies. Might there be a way to plant the ABCD seed systematically? A government-funded "Community Challenge" could stimulate collaborative innovation that, once experienced, would make

communities much more aware of what can be accomplished by identifying and mobilizing their own assets and talents.

***Recommendation 7*: Create a "Community Challenge Fund" that would invite Atlantic Canadians to develop proposals to build on local assets to be employed in innovative community development projects.**

a) Individuals and groups would be invited to collaborate to bring forward proposals for leveraging local assets for community development.
b) Proposals to the Challenge Fund would be adjudicated by panel(s) of individuals of broadly recognized integrity and experience regarding social innovation in a community development context.
c) Selected proposals would receive support from the Challenge Fund, drawing on ACOA's Innovative Communities Fund augmented by an amount from the Province(s) in which the project is to be located.

The philosophy is that success breeds success, and as examples of "Challenge Funded" projects accumulate, others will realize that they can do it too.

8. Growing Experiential Tourism

Tourism is a major growth opportunity for Atlantic Canada but the region needs to build more ambitiously on its cultural richness—particularly of Indigenous peoples; those of Acadian ancestry; and other groups that have retained distinct cultural identities and a strong sense of place.

***Recommendation 8.1*: Increase support for experiential tourism in Atlantic Canada, including a new multi-year initiative to develop Indigenous experiential tourism based on authentic cultural practices and skills.**

Although the recommendation is described in the Indigenous case it would have counterparts for other cultural groups in Atlantic Canada. Experiential tourism, in addition to its economic opportunity, offers a way to preserve and re-vivify Indigenous and other traditional Atlantic Canadian cultures in a modern context.

An Indigenous experiential tourism strategy would feature cultural, skill-building, and investment components. There will need to be intensive re-skilling since many of the traditional activities are no longer widely practised. Government funding will be required on a long-term, predictable basis to support development of Indigenous experiential tourism products that meet high global standards as well as the marketing resources to make them known to the world.

Regarding tourism expansion generally in Atlantic Canada—direct air connections with China and other high-potential markets are needed and should be complemented by a denser intra-regional network to afford more convenient access to Atlantic Canada's attractions. Because the operating economics of short-range aircraft are improving steadily and the willingness of affluent

tourists to pay for high-quality experiences is increasing, the time may be at hand when certain intra-Atlantic routes could be facilitated at reasonable cost relative to the developmental potential.

***Recommendation 8.2*: Identify an initial set of high-potential but under-served air routes to and within Atlantic Canada, and provide subsidies or other incentives sufficient to attract operators for at least a five-year trial period.**

9. Building On Strong Sectoral Clusters

Clusters of related economic activity—infotech in Silicon Valley, aerospace in Montreal, among countless examples—constitute the structural foundation of the world's most dynamic regional economies. The Atlantic Growth Strategy needs to further develop the cluster dynamics of this region's leading sectors. Based on submissions to the federal "supercluster" competition it might be inferred that three of the most important would be: oceans-related industries; agfood and bio-resources; and clean technologies. While at most the "Oceans" proposal will be selected in the supercluster competition, the collaborative experience of developing proposals for that competition has already demonstrated the value of an on-going version of cluster support at more limited scale.

***Recommendation 9*: Create "Innovation Marketplaces" in Atlantic Canada to support collaboration among large and small businesses, research performers, and governments in sector clusters, including Oceans, Agfood and Bio-resources, Clean Technologies, and potentially others.**

The *innovation marketplace* concept, which has been advocated by the Advisory Council on Economic Growth, gives organizational form to initiatives to promote existing clusters through collaborative innovation activities such as: joint precompetitive R&D; prototype development and testing; specialized skills attraction and training; and sector strategy formulation.

While the term "innovation marketplace" may be unfamiliar, the basic concept has several analogous antecedents in Canada including, for example, CRIAQ in the aerospace sector; FPInnovations in forest products; and SGIN in the smart grid space in Atlantic Canada.

In 2014, Norway launched a "Norwegian Innovation Clusters" program that is already supporting 36 clusters in three stages of development—*Arena* (for the most immature stage); *Norwegian Centres of Expertise* (for the next stage of evolution); and *Global Centres of Expertise* (for the most mature). Governments and business should consider an analogous tiered approach based on the innovation marketplace concept. How would it work?

Private sector initiators would assemble groups of like-minded companies and research and educational institutions, all interested in investing in a technology platform, or collaborating to solve a shared problem, or in strengthening sector capacity overall. Larger corporations in the innovation marketplace would support development of the sector/cluster ecosystem by serving as

a test bed and first customer, and by challenging younger companies to meet global standards of price and quality in order to become regular suppliers. Government could provide convening, informational, and operational support—e.g., by co-funding with business sponsors the marketplace's administrative overhead as well as projects that benefit multiple industry players.

The productivity and global competitiveness of Atlantic Canada's key sectors will depend on investment in the technologies and processes of what is being called *Industry 4.0*—the networked application of information technology, robotics, big data, the Internet of Things and other innovations in advanced manufacturing, materials handling, and all manner of industrial processes. Innovation marketplaces serving specific sectors will be important vectors for the more rapid diffusion of *Industry 4.0* into the Atlantic economy.

10. Leading In Digital Health Innovation

The digital revolution has so far had relatively limited impact on innovative products and practices in the health field. Now that is changing rapidly as the Electronic Health Record becomes ubiquitous and the range of services that can be delivered remotely grows both in functionality and cost-effectiveness. A "digital health" revolution is inevitable.

Atlantic Canada can benefit disproportionately by being among the leaders. With a population of 2.4 million, the region is close to ideal as a "living laboratory" for digital health innovation. But because each province is sub-scale, a collaborative approach is needed.

Although the health sector is usually thought of as a source of *consumption* of publicly funded services, digital health can also be a *growth* generator for three principal reasons: (i) the development and sale of digital health products and services will be a leading global industry of the future; (ii) digital health services will be essential enablers of rural population retention and thus of rural/small community economic development; and (iii) the cost-efficiencies eventually derived from digital healthcare will ease the growing pressure on public finances and thus increase the resources available for growth-promoting public and private investment. Healthcare is the biggest sector in the advanced economies. It cannot be ignored in an Atlantic Growth Strategy for the long term.

For Atlantic Canada to be among the leaders in digital health will require commitment to *transformation*, not simply to "modernization." Modernization happens gradually in the normal course as digital methods diffuse intermittently into health practice, but this will not bring the exceptional economic and health system benefits enjoyed by jurisdictions that embrace digital health in transformational terms.

Jurisdictional silos and the daily press of operational priorities will stymie a pan-Atlantic digital health strategy unless there is some institutional machinery with a strong mandate and the resources to drive it.

***Recommendation 10*: Create an "Atlantic Digital Health Innovation Foundation" to drive a collaborative strategy and to manage a "Digital Health Innovation Fund" that will support digital health pilot projects and finance small-scale procurements from Atlantic-based technology and service innovators in digital health.**

Dedicated funding for early-stage digital health trial initiatives is essential. An investment equivalent to roughly 0.5 to 1 percent of the collective health budget of the Atlantic Provinces (or about $50-100 million annually) would support the "R&D" requirements of a digital health strategy and demonstrate commitment. The Atlantic Digital Health Innovation Fund would need federal and Provincial contributions and would be substantially augmented by private investment in, and by, digital health solutions providers.

Authority to manage and allocate the Digital Health Innovation Fund would ensure that the proposed Foundation would have a real job to do and would therefore be able to attract a first-rate, action-oriented board and staff. The Foundation should be structured as a mixed public-private organization, with a non-government majority of board members including a strong private sector perspective in view of the twin objectives of Atlantic Canada to be among the leaders both in the quality of digital health care and in the digital health industry.

Conclusion: Advice on Implementation

The Advisory Group's recommendations form a coherent whole that is mutually reinforcing. They address opportunities where pan-Atlantic collaboration can achieve far more than individual governments acting separately. The recommendations build on good work already underway but they break a lot of new ground. Above all, they are specific and actionable.

Implementation is the stage at which many advisory projects fall far short of what was intended. To avoid the proverbial dusty shelf, the recommendations that the Leadership Committee decides to accept will need a focal point of accountability to drive implementation. The primary federal operational accountability would naturally reside with ACOA and that of the Provinces with the Council of Atlantic Premiers and its secretariat. Each of ACOA and CAP should appoint a senior policy official with clear accountability for timely implementation.

Because many of the Advisory Group's recommendations will unfold over several years, there is a need for periodic reporting on progress, ideally bi-annually. The public reporting function might be through a small group of well-qualified private citizens appointed by the Leadership Committee.

INTRODUCTION

In 1934 the Province of Nova Scotia appointed a distinguished commission to conduct a broad enquiry into the province's economic condition.[1]The assessment at the time included the following words:

> "…the population of Nova Scotia is slowly dwindling, its industries are languishing and its wealth…is considerably lower than the central provinces…and the opportunities for enterprise and investment are correspondingly small. The result of this condition is that the younger men and women are more or less compelled to leave the province and to search for careers in other parts of Canada or other countries."

Fast forward 80 years to the report of the Nova Scotia Commission on Building Our New Economy—entitled *Now or Never*:

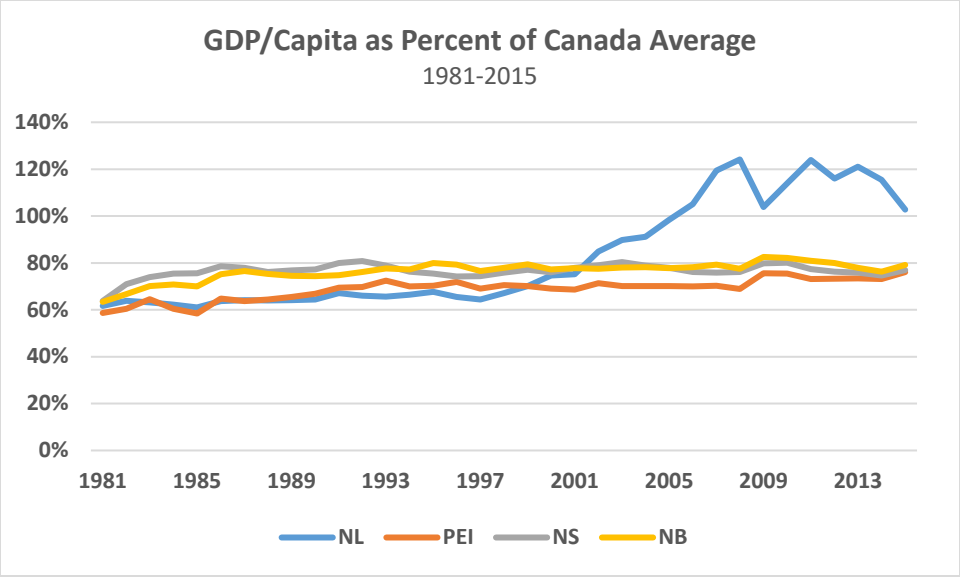
> "The Commission's core message is this: Nova Scotia is today in the early stages of what may be a prolonged period of accelerating population loss and economic decline. These negative prospects are not, however, inevitable or irreversible."

Reading these authoritative conclusions—which could equally be said of any of the Atlantic provinces—the optimist might believe that the dire situation described in 1934 and again in 2014 could likely be put off for another 80 years, so why worry; while the pessimist might conclude that, try as we might, nothing will change, so why bother.

The facts point to a different conclusion. The encouraging truth is that the Atlantic provinces[2] have been making steady economic progress for decades.

[1] *Nova Scotia Royal Commission, Provincial Economic Enquiry*; J.H. Jones and Harold Innis; 1934

[2] Throughout this document, reference to a Province, when capitalized, refers to the government of the province, whereas un-capitalized references are to the province as a geographical/social/economic entity.

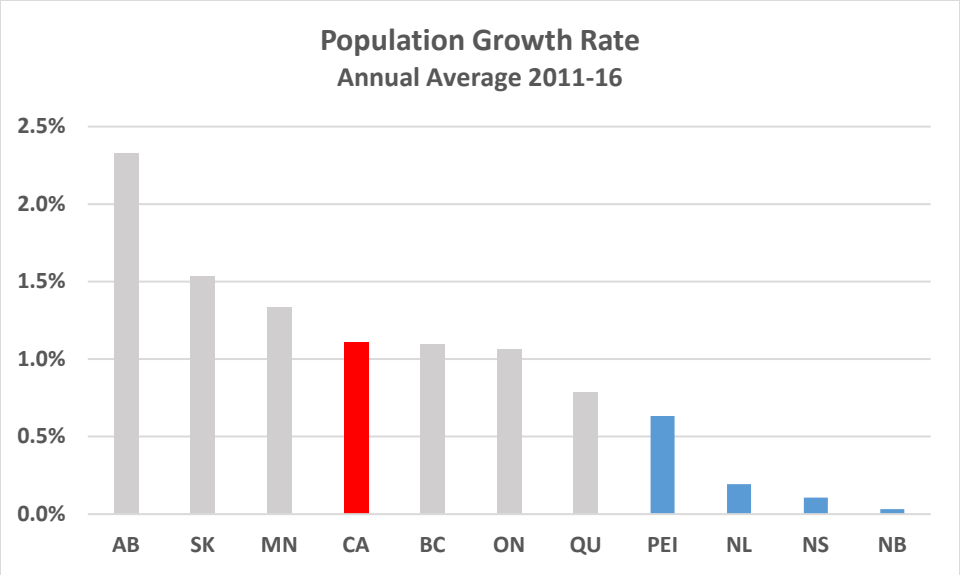


Although the region's per capita output has not caught up to the national average,[3] it has closed the gap significantly since the 1960s and now equals more than 80% of the Canadian average (Chart A). In the case of PEI, for example, GDP per capita was less than half the national average in 1961, but by 2015 had climbed relatively to about 77%. The surprising implication of these figures is that the Atlantic region's per capita output, and that of the provinces individually, has grown faster on average than Canadian per capita GDP over the past 50 years or more. That is why the Atlantic average has narrowed the gap with the national average.

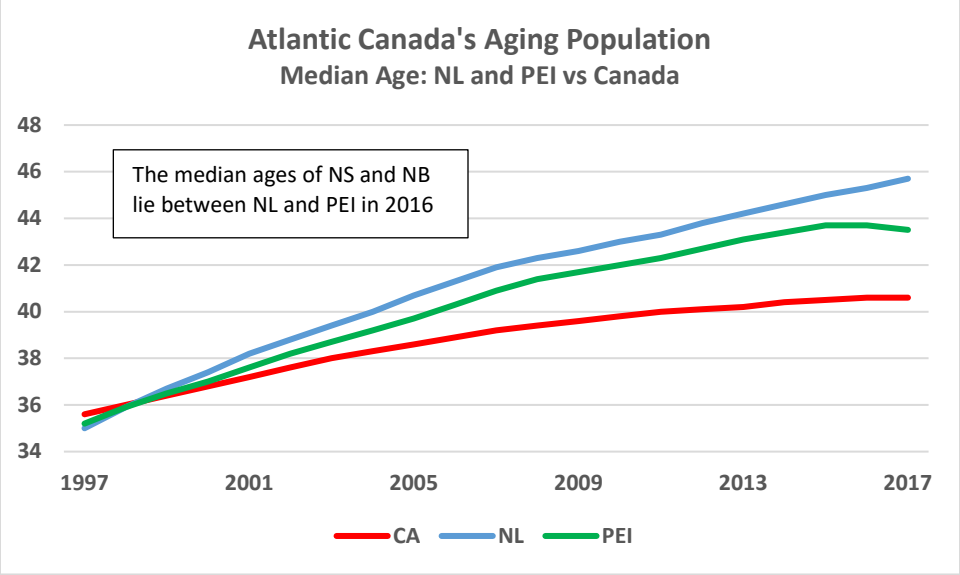
So are the optimists in fact right and there is not much to be concerned about? No; they are not right either, and for two fundamental reasons. The first is that economic welfare is always a moving target and the competition globally is getting tougher. Fortunately, the opportunities are also getting greater. But if the Atlantic economy were to begin to lose ground, the outflow of investment and people would accelerate, resulting in further lost ground and triggering a downward spiral. The second reason not to become too comfortable is that Atlantic Canada has a very serious population problem:

- The region's average annual population growth over the last five years, at a little over a tenth of one percent, has been far below the national average of 1.1% (Chart B)

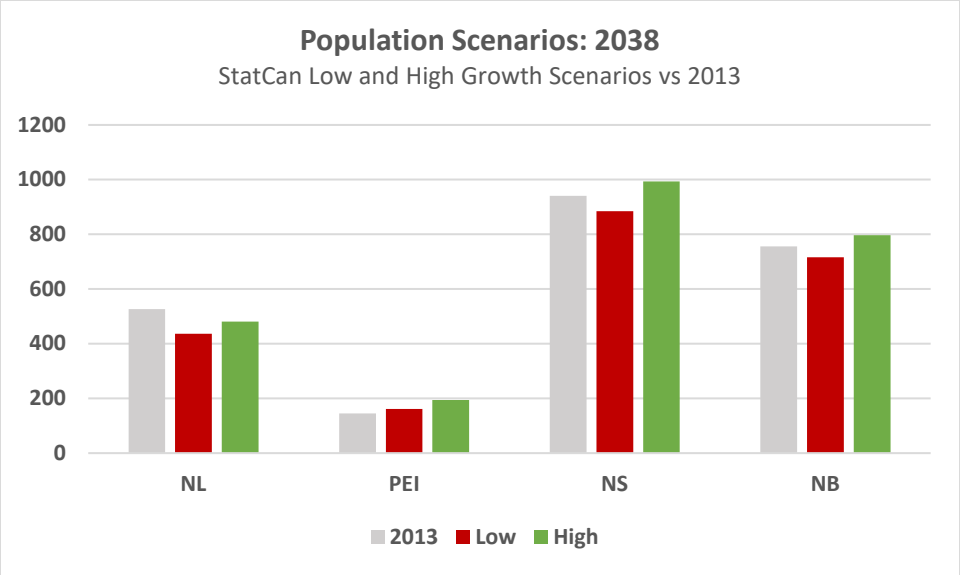
[3] The exception has been the energy-fuelled boom in Newfoundland and Labrador which pushed that province's GDP per capita above the all-Canada average in 2005, although by 2015 it had fallen back close to the average.



- The Atlantic population is the oldest in Canada in terms of median age (Chart C) and has the highest proportion over the age of 65 and the lowest proportion under 15. This puts an out-sized strain on public resources and tends to shorten the "investment horizon" of the population as a whole which works against the longer-term perspective that is needed to achieve durable growth.



- Looking forward, Statistics Canada has prepared scenarios for population growth through 2038 (Chart D).



In the "low growth" case, Atlantic Canada's population would be about 2.2 million in 2038 (as compared with 2.4 million currently), while in the "high growth" scenario it would be 2.5 million, barely above the current level. There is nothing inevitable in these projections. If immigration is strong; if more immigrants are retained; and if the out-migration of young people is turned around, then the high growth scenario could be well exceeded. But the challenge is clear.

Population—not its quality, but its growth—is the Achilles heel of Atlantic Canada. Fortunately, population growth is not immutable. But it is linked with economic performance in a circle of mutually reinforcing cause and effect. Population growth is a key driver of economic growth; while economic growth and prospects are the most important factors in attracting and retaining population. So a growth strategy for Atlantic Canada must be both an *economic* growth strategy and a *population* growth strategy.

Lately there have been plenty of encouraging signs—for example:

- Immigration has been up strongly, although still well below the region's per capita share of the national total.
- There are vibrant technology-based startup communities in several places in Atlantic Canada, helping to attract and retain young talent and investment.
- The traditional fishery in many parts of the region has been experiencing strong growth and impressive exports.
- Aquaculture, vineyards and other elements of the "agfood" industry in Atlantic Canada are innovating, adding greater value and increasing exports in what is forecast to be one of the most significant growth opportunities for Canada as world population expands both in numbers and affluence.
- The clean, renewable energy sector and related infrastructure in the region is positioned for long-term growth as the world transitions to a low-carbon future.

- Oceans-related industries, a comparative advantage of Atlantic Canada, are poised to build on a cluster of established skills and world-class research capacity to play a much bigger role in this expanding global sector.
- Many of the small communities of Atlantic Canada finally have a realistic prospect of turning around decades of declining prospects as the modernization of traditional sectors, the up-grading of tourism and cultural assets, and improving broadband access make rural/small town living an increasingly attractive and affordable option for a young tech-savvy generation.

These factors account for the palpable momentum and optimism in much of Atlantic Canada today even as the shock of lower oil prices, weakness in certain sectors of the traditional resource economy, and the ever-present demographic challenge make for an uneven picture. We are at a time when the balance of forces favours opportunity.

Atlantic Canadians themselves are the ones most responsible for seizing the opportunity and sustaining the momentum. But the long history of the region, and indeed of all economically advanced societies, leaves no doubt that government must continue to be an essential complement to the capabilities of the private sector and a key enabler of its success.

The Atlantic Growth Strategy

This is the context in which the governments of Canada and of the four Atlantic provinces launched the Atlantic Growth Strategy in July, 2016 (see Box 1). The objective is to drive long-term economic growth in Atlantic Canada by implementing evidence-based actions under five priority areas: Skilled Workforce/Immigration; Innovation; Clean Growth and Climate Change; Trade and Investment; and Infrastructure.

The Atlantic Growth Advisory Group was appointed to conduct a series of roundtable consultations on the foregoing priority areas and, more generally, to advise the Leadership Committee of federal ministers and Atlantic premiers regarding specific actions to achieve the objective of the Atlantic Growth Strategy (AGS). The purpose of this document is to convey the requested advice in the form of specific, actionable recommendations that will be described in ten chapters to follow. (Biographies of the Advisory Group can be found in Appendix 1 at the end of this document.)

Four roundtable consultations, attended by a broad spectrum of informed stakeholders, were held throughout the region:

- Halifax; April 29 on the themes of Immigration; Tourism; and Trade and Investment
- St John’s; May 25 on the themes of Innovation and the Oceans economy
- Moncton; June 20 on the themes of ICT, startups and innovation; Infrastructure; and Clean Growth and Climate Change
- Charlottetown; June 30 on the themes of Skilled Workforce; and Food and bio-resources.

These structured consultations were complemented by informal one-on-one meetings with premiers and senior officials; various *ad hoc* fact-finding discussions; and reading of an extensive volume of studies/reports on the Atlantic economy.

Box 1 THE ATLANTIC GROWTH STRATEGY

The Government of Canada and the four Atlantic Provinces launched the Atlantic Growth Strategy in July, 2016. The governments have committed to collaborate on actions to stimulate the region's economy, support both innovative and traditional industries, increase job opportunities, and focus on persistent and emerging regional challenges. The Strategy's objective is to drive long-term economic growth in Atlantic Canada by implementing targeted, evidence-based actions under the following five priority areas:

- **Skilled Workforce/Immigration** – To enhance the region's capacity to develop, deploy and retain a skilled workforce by addressing labour market needs and making Atlantic Canada a destination of choice for immigrants while also supporting labour market participation for unemployed and underemployed Canadians, including Indigenous peoples, older workers, and persons with disabilities.
- **Innovation** – To foster greater business innovation by supporting the scaling-up of small firms, technology transfer, the commercialization of research, and the generation of breakthrough ideas in areas such as bioscience, aquaculture, ocean technology and renewable energy, while spurring value-added opportunities in established industries.
- **Clean Growth and Climate Change** – To stimulate economic growth, create clean jobs and drive innovation in the transition to a low-carbon economy.
- **Trade and Investment** – To expand business activities between Atlantic Canada and international markets, and strategically market the region as a whole by displaying the best Atlantic Canada has to offer the world to attract new investment and grow tourism.
- **Infrastructure** – To invest in regionally significant infrastructure projects that support long-term growth in Atlantic Canada and position the region to capitalize on global trade opportunities by attracting investment and enhancing productivity.

Federal Ministers Bains, Brison, LeBlanc, MacAulay, Petitpas Taylor and O'Regan, and Atlantic premiers Ball, Gallant, MacLauchlan and McNeil form a Leadership Committee on the Atlantic Growth Strategy to review the broad range of factors that affect the Atlantic Canadian economy; provide policy direction; oversee the implementation of targeted actions; and drive results.

In April, 2017 the Leadership Committee announced appointment of an Atlantic Growth Advisory Group to support the Leadership Committee by providing strategic advice on pan-Atlantic collaborative approaches and actions to advance the Atlantic Growth Strategy. The Advisory Group, chaired by Henry Demone, includes eight other members, two from each province.

The Advisory Group's Approach

There have been countless reports over the decades recommending measures that might be taken by governments to promote growth in Atlantic Canada. While there certainly are no "silver bullets," the Advisory Group has taken that good work as given and focused its advice on a relatively limited number of topics, guided by the five priority areas of the AGS but narrowed down within those broad areas on several quite specific recommendations. The criteria applied in coming to the recommendations were as follows:

- Each recommendation must have the prospect of *substantial impact* and at least some should be potentially transformative.
- Each should have *pan-Atlantic application*, often addressing an issue that could benefit greatly from a more collaborative approach than now prevails, while at the same time respecting and complementing the strategies of the individual Provinces.[4]
- Each recommendation should *break new ground* and not simply repeat or slightly embellish what has been well said already. A consequence is that several of the recommendations, while perhaps not radical, stray from the tried and true and will test the capacity of the "system" to innovate. One exception to the "breaking new ground" criterion is the recommendation on provision of high-speed Internet access. This is already being addressed to varying degrees but in view of its essential nature, the Advisory Group wanted to add emphasis and convey urgency.
- Finally, each recommendation must be specific enough to be clearly *actionable*. Many of the recommendations are quite detailed, not because the details are necessarily the right ones, but rather to engage a serious discussion of pros and cons and of the implementation issues. In short, specificity is needed to put the Advisory Group's advice in play.

The recommendations resulting from application of the foregoing criteria have a strategic coherence. Collectively they cover a large part of the growth policy landscape and they do so in a mutually reinforcing way. The structure is diagrammed in Chart E.

At the base of the structure is an essential element of infrastructure—access to affordable high-speed Internet connectivity, ultimately for all Atlantic Canadians. No subject was more widely and passionately raised during the roundtable consultations, regardless of the designated topic of the roundtable. Chapter 1, following this introduction, explains how this requirement should be interpreted and recommends further steps to that end.

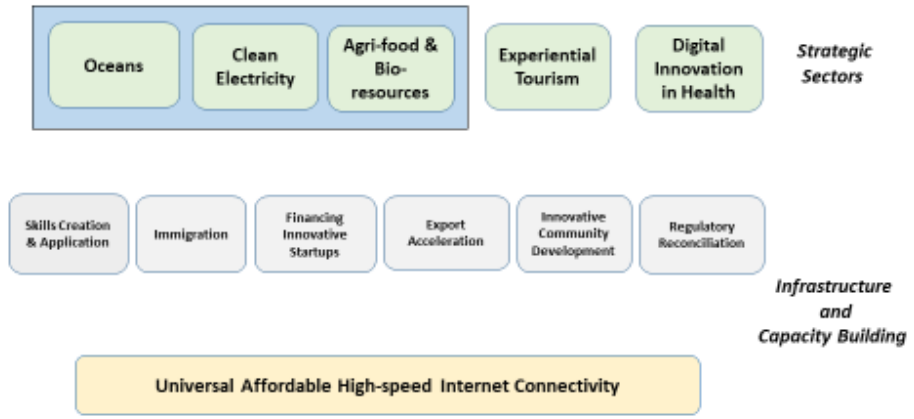
The "second storey" of the structure consists of six blocks that constitute essential capacity building complemented with organizational and social infrastructure—Skills creation and application; Immigration; Financing high-growth startups; Accelerating exports; Regulatory

[4] Each of the Atlantic Provinces has recently put forward quite comprehensive growth strategies—*The Way Forward: A vision for sustainability and growth in Newfoundland and Labrador*; *The Mighty Island: A Framework for Economic Growth in Prince Edward Island; New Brunswick's Economic Growth Plan;* and in the case of Nova Scotia, a number of initiatives outlined in the last two Throne Speeches drawing on advice from the One NS Coalition in its report, *We Choose Now,* and subsequent informal documents. Together with complementary initiatives arising from the Atlantic Growth Strategy, the measures and commitments outlined in the foregoing documents constitute an impressive agenda. The table has been well set for implementation.

reconciliation across the region; and Innovative community development. A great deal is already being done in each of these domains. The actions recommended here complement, and in some cases go considerably beyond, the on-going activity.

The "third storey" consists of five strategic sectors—oceans-related industries; cleantech with a focus on clean electricity; agri-food; tourism with a specific emphasis on creating compelling experiences for the visitor; and "digital" innovation in health including both delivery of care and new business opportunities in what is likely to become one of the world's largest and most innovative industries. In the recommendations, the three sectors related to oceans, clean electricity and agri-food/bio-resources are treated together, each as a prominent cluster in Atlantic Canada and in a position to benefit from the novel type of organizational structure—an "innovation marketplace"—that is being recommended. Most of the infrastructure and capacity-building blocks at the second storey will be needed to supply/support the strategic sectors on the third storey.

Chart E Structure of the Recommendations



The Advisory Group has drawn extensively on the excellent work of the federal Advisory Council on Economic Growth and recommends implementing, in an Atlantic context, a number of the innovative ideas developed by the Council including, in particular, the "FutureSkills Lab" and the concept of an "Innovation Marketplace." In fact, a theme running strongly throughout the recommendations is the opportunity to apply a number of highly innovative approaches first in Atlantic Canada. The region is tailor-made for such trials—multiple jurisdictions to learn what is needed to collaborate effectively; large enough to provide adequate scale and scope, yet small enough to avoid too much administrative inertia; and often in particular need of innovative approaches to achieve the objectives of the Atlantic Growth Strategy.

The concluding chapter deals with implementation; the stage at which too many advisory projects fall far short of what was intended. To avoid the proverbial dusty shelf, the recommendations contained here, and that the Leadership Committee decides to accept, need a locus of accountability to drive implementation.

1. PROVIDING UNIVERSAL BROADBAND ACCESS

High-speed Internet access ("broadband") is fundamental enabling infrastructure for the 21st century. It is the equivalent in our era of what railways, electricity and highways were in the 20th century. Its impact economically, socially and culturally is *transformative*. Looking forward, broadband access will be essential to belong to the world. In the words of CRTC Chair, Jean-Pierre Blais:

> "Access to broadband Internet service is vital and a basic telecommunication service all Canadians are entitled to receive…. High quality and reliable digital connectivity is essential for the quality of life of Canadians and Canada's economic prosperity."

In December, 2016 the Canadian Radio and Telecommunications Commission established as a national objective for broadband Internet service a speed of at least 50 megabits per second (Mbs) for download and 10 Mbs for upload, hereafter referred to as the "50/10" objective.[5] The 50/10 speed exceeds the great majority of household requirements today but experience shows that, over time, bandwidth consumption is insatiable. Fortunately, the technologies that can deliver 50/10 performance can be cost-effectively upgraded as demand for even higher speed materializes.

The CRTC has estimated that in 2015 about 82% of Canadians had *access* to Internet service that met the 50/10 objective.[6] This included the great majority of urban residents but fewer than 30% of rural Canadians. The Atlantic region is the most rural in the nation, with almost 45% of the population—more than a million residents—classified as "rural" by Statistics Canada. This equates to over 16% of Canada's total rural population. Atlantic Canada is therefore particularly reliant on measures that need to be taken to achieve the CRTC's objective of affordable broadband access for all.[7] This will have to be a multi-year goal, urgently pursued and based on collaboration among the Provinces, the federal government and the private sector. Access to high-speed Internet service can no longer be considered a luxury. Why?

- High-quality Internet service is necessary for a growing number of businesses and is a *sine qua non* for today's "remote worker." It is therefore key to attracting and retaining a younger and entrepreneurial population in Atlantic Canada, especially in rural and small communities. The same can be said for attracting today's tourist who takes high-speed connectivity essentially for granted, even in quite remote locations.
- An increasing range of public services rely on Internet delivery and many will require very high bandwidth—particularly those related to education and health (see Chapter 10). Internet service provision will increasingly be the only way to enable cost-effective access to many

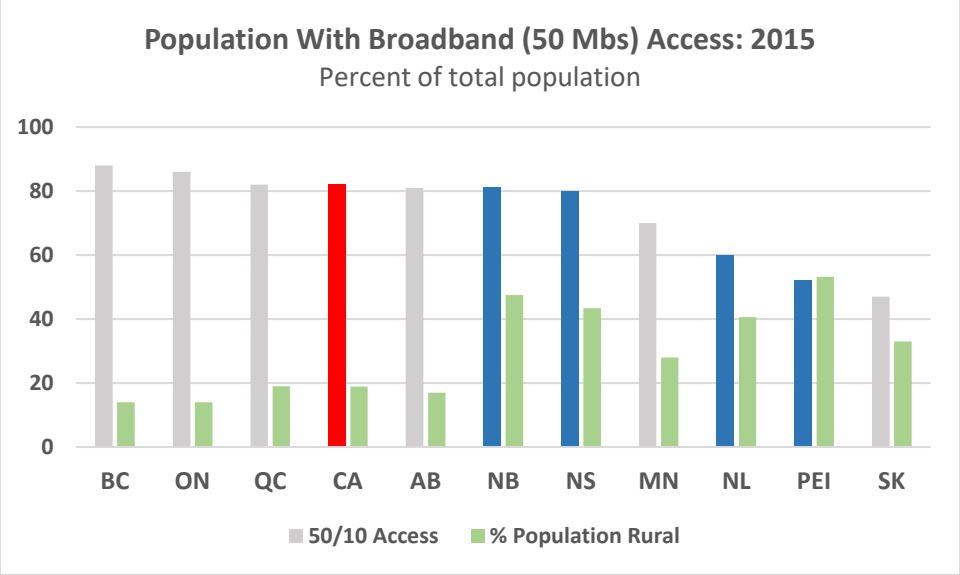
[5] The CRTC acknowledges that this is a challenging objective, but feasible. For comparison, the US telecom regulator has an objective of at least 25 Mbs (down); Australia 25; most of Europe 30; and Germany 50.
[6] Not all those who have *access* to a particular service speed will actually purchase that service from a provider.
[7] Regarding affordability, CRTC Chair, J-P. Blais has said: "Affordability concerns are best addressed by the emergence of a dynamic market place where service providers compete on price in conjunction with social responsibility programs of carriers and different levels of government." There is work to do since Canada ranks near the back of the pack among OECD countries in the price of mobile and Internet services.

government services in areas of low population density. This requirement will, at the same time, strengthen the case for public assistance to make broadband universally available.

- High bandwidth connectivity is needed to afford access to cloud-based services, quality video conferencing, and emerging real-time monitoring functions that will find increasing application as virtually all industries and services come to rely on vast amounts of data and analysis.
- As rural resource-based industries embrace digital technologies in all their operations, reliable broadband will be a prerequisite for creation of well-paying, sustainable jobs and even for competitive survival.
- Apart from the foregoing economic requirements for broadband connectivity, it has simply become an essential ingredient in the quality of life—delivering social contact, entertainment, and video access to distant family members. The social and cultural necessity can only increase as generations of those born in the Internet era come to dominate the population.

As emphasized repeatedly during the Advisory Group's roundtable consultations, affordable access to high quality broadband service must be at the foundation of the Atlantic Growth Strategy. Virtually all of the recommendations in the chapters that follow depend on it, directly or indirectly. Put simply, broadband connectivity is transformative.

Market forces have so far delivered access to the CRTC's 50/10 standard for about 75% of the population of Atlantic Canada, compared with 82% nationally, although to significantly smaller percentages in PEI and Newfoundland and Labrador (Chart 1.1).



But there remains a big gap in rural and small community areas which, for reasons of future access to public services and retention of population, are the *most* dependent on a high-speed connection. Market forces alone cannot be relied on to close this rural gap because the cost of providing service is unlikely to be covered by the subscriber revenue that can be expected given

the limits of affordability for customers. That is why the federal, provincial and local governments and non-profits are coming forward to finish the job. Two new national programs are most significant.

- *Connect to Innovate,* under the authority of the Minister of Industry, Science and Economic Development, will disburse $500 million by the end of 2021, primarily to assist provision of ultra-highspeed "backbone" connectivity[8] to underserved and unserved areas. Funds will typically cover up to 75% of the cost of projects and will be awarded competitively. There are no specified regional allocations. Before applications closed, about 900 were received requesting $4.5 billion.
- The CRTC will make available $750 million over five years to assist achievement of the 50/10 access objective.[9] Funded by a levy on existing service providers (and replacing the longstanding subsidy for voice services in rural areas), the new fund will be disbursed competitively; will be managed at arm's length from the CRTC; and will require that applicants also have government and investor funds to complement those of the CRTC. The Commission estimates that 90% of Canadians will have at least 50/10 access by 2021 and 100% within 10-15 years after that.

These two national programs will make available $1.25 billion over the next five to six years to facilitate increased broadband access. These funds will be complemented by other sources, public and private—e.g., the national infrastructure plan announced in Budget 2017 includes a $2 billion "Rural and Northern Communities" component that could be tapped for broadband provision; the Nova Scotia government has committed since late 2016 more than $20 million to assist with rural broadband; and many municipalities and local groups throughout Atlantic Canada have implemented or are proposing plans to enhance access to high bandwidth. There are nevertheless a great many claimants on the available resources—witness the massive over-subscription of the *Connect to Innovate* program, which is also testament to the extremely high priority Canadian communities attach to high-speed Internet access. That is why there must be a focused, collaborative Atlantic Canadian approach to meet the disproportionate need of our heavily rural region.

***Recommendation 1*: Create and implement an Atlantic Broadband Action Plan with the objective of providing all Atlantic Canadians with access to Internet service of at least 50 megabits per second (Mbs) down-loading and 10 Mbs up-loading**.

Atlantic Canada needs to establish a reputation as a place a place where youth and entrepreneurial ambition will be served. This will not happen without a comprehensive "Atlantic Broadband Action Plan" that brings together governments, business, and communities around a common objective of "50/10 access for all".

[8] Backbone connection (usually provided by fibre optic cable capable of carrying thousands of megabits per second) constitutes the principal "arteries" of the Internet and joins the major distributors of traffic to nodes in outlying communities. From there it is necessary to provide so-called "last mile" connection—analogous to capillaries—to homes and businesses.

[9] The CRTC is consulting on implementation details with a view to issuing a decision in 2018. The fund may then be operational starting in 2019.

The Atlantic Provinces should develop collaboratively the Broadband Action Plan so as to maximize, on a regional basis, the opportunity afforded by the federal "Connect to Innovate" program as well as other funds and initiatives of the federal, provincial and municipal governments, the CRTC, and the private sector. Achieving 50/10 access for all will take time, but progress is already being made and one benchmark along the way forward should be for Atlantic Canada to exceed the CRTC's estimate of 90% access to the 50/10 standard by 2021. The Atlantic Broadband Action Plan would include both region-wide and individual Provincial initiatives—for example:

- Collect and make available the detailed data, community by community, needed to scope out the requirements to meet the 50/10 objective and to set priorities. A detailed inventory of what we already have, and what we need, is essential and has to be a top priority. The asset mapping must be undertaken with the assistance of competent professionals and with the co-operation of Internet service providers.
- Develop information resources to assist local groups to contribute to the broadband roll-out. Such information toolkits should be shared regionally.
- Promote the benefits of state-of-the-art broadband in order to build public support and to increase customer demand so as to improve the economics for providers.
- Feature the 50/10 commitment in regional and provincial investment and immigration promotion.
- Co-ordinate application to the various federal and provincial assistance programs so as to generate the best proposals in this intensely competitive environment. In this regard, it would greatly facilitate planning and collaboration among governments if the various federal sources available to support broadband access were combined into an "Atlantic Broadband Fund".

Achieving the 50/10 objective for all

The objective can be substantially met over time through an integrated combination of technologies in those areas where the 50/10 speed is not currently available—specifically by:

(a) extension of fibre optic backbone;

(b) "last mile" connection from backbone termination to customer premises by (i) fibre optic cable, or (ii) coaxial cable, or (iii) "DSL" over existing telephone wires, or (iv) "fixed wireless" from local transmitting equipment to a customer's receiver; and

(c) via satellite where the cost of last mile connection (b) is prohibitive.

The "last mile" is problematic both in terms of cost to install and certain technical factors that constrain delivery of a satisfactory service. A fundamental consideration is that the capacity of an Internet network is always shared among the users active at any given time. So if there are many users relative to the overall bandwidth in the backbone connection, or in a cable or wireless system, speed may be degraded well below the advertised level. Moreover, some providers put monthly caps on data usage in rural areas—e.g., tens of gigabytes (GB) per month as compared with average usage in Canada in 2015 of more than 100 GB per month and growing rapidly.

Co-ax (from cable providers) or fibre can fully achieve the CRTC's 50/10 objective and beyond. DSL generally cannot deliver the target speed in rural areas but can be part of an evolutionary path to 50/10.[10] Fixed wireless can deliver 25 Mbps and 50 Mbps in certain implementations and the technology is improving steadily. There is, however, a challenge to ensure sufficient capacity to allow data usage comparable to urban areas and to avoid undue congestion during peak periods. Satellite service has great potential to evolve—e.g., the Woodstock NB provider, Xplornet, plans to offer, beginning in early 2018, service of up to 25 Mbs (down) in Atlantic Canada. On the near horizon are plans to launch large numbers of small, relatively cheap satellites in "low earth orbit" (LEOs) that could provide high-speed connectivity anywhere on earth.[11] Satellite does have capacity constraints that can limit the number of simultaneous users implying that terrestrial technologies will likely continue to be the primary approach. But broadband satellites are undoubtedly important tools for closing uneconomic access gaps and the technology is improving.

There are no insurmountable technical barriers to eventually achieving the 50/10 objective in Atlantic Canada—e.g., "fibre to the home" can meet the challenge today in an essentially future-proof way, and is already available, at a price, to many urban residents in the region. The issue is *cost* to provide the physical infrastructure, and *affordability* of the resulting service. Capacity and quality of service would also be important considerations in deploying infrastructure so that subscribers are not unduly limited in their data usage; speeds are reliable; and the network is scalable to upgrade speed as future needs emerge. By viewing high-speed Internet connectivity as a top priority, public policy and resources must play a key role in eventually meeting those requirements.

It is emphasized that the "universality" being recommended refers to *availability* of a service at reasonable price, and that coverage of the most remote households may not be feasible using terrestrial technology; in which case improving satellite service will usually, but perhaps not always, fill the remaining gaps. Although universal access is clearly the goal, there can be no guarantee that it will be available to every last household, particularly at the 50/10 standard. But as technology improves and the backbone buildout continues, 50/10 access will become feasible for a steadily increasing fraction of the Atlantic Canada's rural and small community residents. Government will not need to bear all the cost. Private sector service providers are stepping up and subscribers themselves should be expected to cover a reasonable part of the cost of final hook-up of broadband service to the premises, just as is typically the case with electrical and telephone service. The decision as to what are "reasonable" costs in these circumstances will rest

[10] Although DSL can deliver 50 Mbps over very short distances, speed drops off rapidly with distance from the backbone termination and in practice would not be expected to deliver more than about 10 Mbs (down) in rural areas; usually less. Most current fixed wireless offerings are even slower, but there is more scope for improvement of those technologies. They nevertheless require unimpeded line of sight and service can be affected by heavy rain or snow. Broadband service is also provided quite comprehensively by cellular networks but is very costly for regular data-intensive use.

[11] For example, SpaceX intends to deploy—with its re-useable rockets—a system of 4,425 satellites beginning in 2019 and in full service by 2024. A second company, OneWeb, is on track to provide a LEO service employing about 700 satellites even earlier. Telesat is planning its own constellation and is launching two prototype satellites in 2017. The technical and economic feasibility of these systems remain to be proven but eventually they could eliminate one's location as a barrier to broadband connectivity.

with policy makers in the context of an overarching commitment to make broadband access available to all Atlantic Canadians.

Provincial and municipal opportunities to facilitate installation of broadband infrastructure

The cost of broadband provision is due primarily to factors related to construction—digging trenches for cable; installing towers for wireless; obtaining rights-of-way. While the cost of electronic components (per unit of performance) has been falling for decades, the cost of operating a back-hoe has not. Provincial and local governments need to look for every opportunity to facilitate installation of the "passive infrastructure" of the broadband network. For example: when roads are being improved, or water/sewer lines installed, use the opportunity to add fibre; use regulatory authority proactively to allow right-of-way or facilitate access to electrical utility poles; provide loan guarantees or other financial incentives to not-for-profit entities, such as local co-operatives, dedicated to providing or enabling broadband infrastructure. Acting collaboratively, the Atlantic Provinces should use their combined procurement muscle to get the best deals on network equipment for broadband installations by not-for-profits. The federal government can help—beyond its large direct financial contributions—by making available unused spectrum to provide or upgrade wireless Internet service in rural areas.

Staying focussed

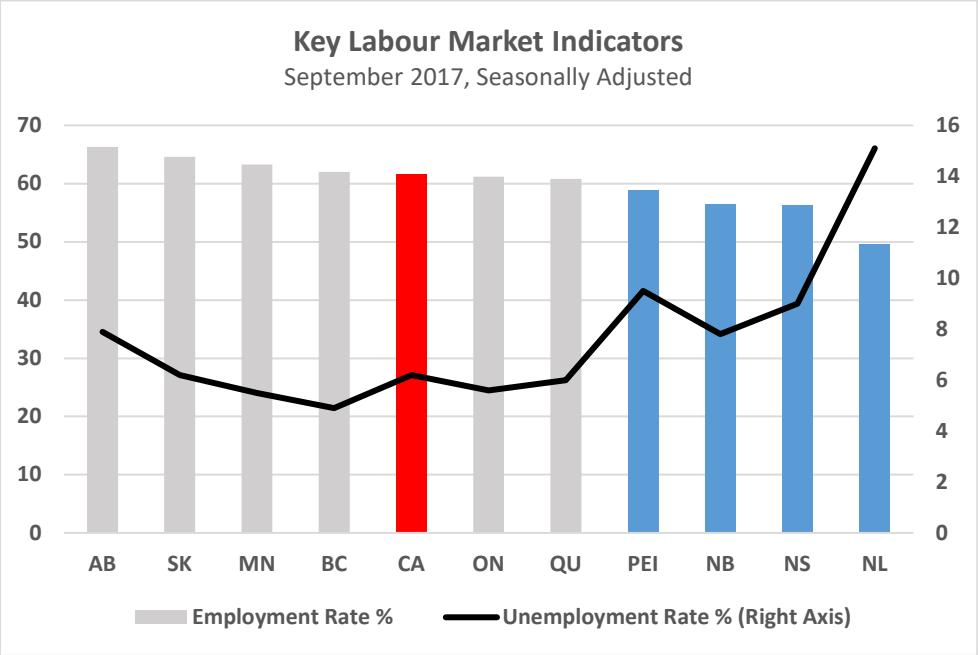
The Atlantic Broadband Action Plan will need day-to-day guidance from dedicated centres of responsibility in each Province and at the regional level; the latter likely under the joint auspices of ACOA and the Council of Atlantic Premiers. The Action Plan will need to establish annual interim targets, both qualitative and quantitative, and associated progress reports to the public. These are needed to stay focussed, to sustain priority, and to enable businesses, investors and individual Atlantic Canadians to plan their own broadband future.

2. CREATING FUTURE SKILLS

The twin mega-forces of globalization and automation, which have been shaping labour markets for decades, have become even more transformative as emerging economies catch up with the "West" and as the exponential power of information technology threatens massive disruption of jobs across virtually all sectors of the economy. The typist and the assembly line worker have already felt the impact. Sometime within the next 20 years the same may be said of fish cutters, check-out clerks, truck-drivers, and knowledge workers like tax-preparers and legal assistants, among countless others. In the words of the Advisory Council on Economic Growth[12]:

> "Advances in automation and digitization, combined with continued forces of globalization, are leading to fluid and mobile labour markets where employers' skills requirements evolve quickly and workers transition between jobs and industries more often than they did in the past. To prepare Canadian students and workers for the future of jobs, there is an urgent need for Canada to develop new approaches to training and skill development."

What is true for Canada is doubly so for Atlantic Canada. As measured by both the unemployment rate and the *employment* rate (the number employed as a proportion of the population of working age), the performance of the labour market in each of the Atlantic provinces almost always trails behind the rest of the country (Chart 2.1).



While this is the result of long-standing economic and social factors, the region's dire demographic circumstances mean that Atlantic Canada cannot afford to be a laggard in facing the labour market challenges and opportunities today and in the future.

[12] *Building a Highly Skilled and Resilient Canadian Workforce Through a FutureSkills Lab*; February 6, 2017

Two principal and related issues are confronting the job environment at both the national and regional levels: (i) connecting available jobs with available qualified workers, and (ii) enhancing the capacity of workers to thrive amid accelerating change in the job market.

Connecting jobs and workers—This is an enduring challenge and, by international standards, Canada does a pretty good job. In Atlantic Canada, however, there is the paradox of high unemployment co-existing with many unfilled openings, particularly in rural areas and resource-based sectors. In fact, employers throughout Atlantic Canada now realize that they can no longer rely on an abundant supply of workers. Several factors contribute. Rural demographics are part of the reason. The design of the EI program also plays a role and a pilot project is now underway through August, 2018 to test the balance of incentives by permitting some work while collecting benefits. But the "paradox" goes deeper. Unfortunately, many resource-based jobs are widely perceived by young people as yesterday's jobs, the very opposite of the knowledge-based work that is promoted as the best, or only, route to a prosperous future. The truth is that resource industries—in large part owing to the dearth of willing workers—are being rapidly and profoundly restructured by technology and offer many knowledge-based opportunities for those with proper training. But youth awareness lags the reality. Another example—skilled trades like electricians, plumbers, and carpenters are much needed in rural areas and small communities; are relatively immune to competition from Asia and from microchips; and can support an excellent middle-class career. But there is too little awareness of these advantages among school-age students. So there is a big challenge of myth-busting and getting specific information about the labour market to those who need it.

Capacity to adapt—The percentage of Canada's population with post-secondary education ranks among the highest in the world. As one consequence, employers generally report that workers have sufficient basic competence, although there are exceptions in specialized fields and concern that information technology skills will not be able to keep up with burgeoning demand. But as expressed almost universally by employers both in Canada and the US, the main shortfall is in the "soft skills"—effective communications, critical thinking and problem solving, collaboration/teamwork, tolerance of change. These capabilities are needed in the here and now. And looking forward to the growing pace and scope of economic change, the key challenge is to find effective ways to increase worker *resilience*—the capacity for flexibility and almost continuous adaptation to a rapidly evolving work environment. This will require a reorientation of the education/training system to place relatively less emphasis on instilling fact-based knowledge, which increasingly can be conveyed on-line, and much more on developing people skills, resilience, and the creative potential of each individual. This re-orientation is already underway but, despite many successes at limited scale, there is still much to learn about how to instill these capabilities broadly. One obvious approach is to focus on imparting a generic set of skills—basic competence to be sure, but allied with the soft skills that are required in virtually any role. The critical requirement is also to impart the capacity to "learn how to learn" so that specific job skills can be acquired as they are needed—just-in-time learning as it were. This is easy to say, but hard to do.

Governments in Canada devote enormous resources to labour market programs—currently estimated to be approximately $17 billion annually, not including EI.[13] The many programs/funds/policies provided by all governments can be confusing for the uninitiated and is much in need of collaboration and co-ordination: (i) because prepared workers are a joint provincial-national responsibility,[14](ii) to minimize overlap and possibly conflicting characteristics among programs of the various governments, and (iii) to join forces on projects of mutual interest such as labour market data collection and sharing; credentials harmonization; and sharing experience from program implementation.

To address the need for collaboration, the federal and provincial-territorial governments established in 1983 the Forum of Labour Market Ministers (FLMM). The Forum has just created a Labour Market Information Council (LMIC) through which governments and stakeholders will work together to ensure that Canadians have access to the unbiased information about the job market they need in order to make informed decisions. The FLMM has also established as a current priority to share research findings and information on best practices, and to collaborate on research to inform decision-making. Meanwhile, the federal government in Budget 2017 allocated $225 million over four years from 2018-19 to establish "a new organization to support skills development and measurement in Canada." (Box 2.1).

Box 2.1 Investing in Skills Innovation

Text from Budget 2017: "As recommended by the Advisory Council on Economic Growth and the Forum of Labour Market Ministers, new approaches are needed to address skills gaps and support lifelong learning throughout Canadians' working lives. To that end, Budget 2017 proposes to provide $225 million over four years, starting in 2018–19, and $75 million per year thereafter, to establish a new organization to support skills development and measurement in Canada. Working in partnership with willing provinces and territories, the private sector, educational institutions and not-for-profit organizations, this organization will:

- Identify the skills sought and required by Canadian employers.
- Explore new and innovative approaches to skills development.
- Share information and analysis to help inform future skills investments and programming.

Further details on this new organization will be shared in the coming months."

---

[13] The $17 billion estimate is from the Advisory Council on Economic Growth. It is difficult to pin down a precise number due to varying definitions of what to include. Currently the federal government transfers $2.9 billion to Provinces and Territories (about $400 million to the Atlantic Provinces) for various labour market programs, the great majority of which are delivered at the provincial/local level. A separate estimate by researchers at the University of Ottawa found that the federal government spent about $14.5 billion in 2014-15 on training and skills development, an amount that would include support for post-secondary institutions and their research.

[14] Workers trained in one jurisdiction may move to another carrying their human capital with them. This risk creates an incentive to underinvest in labour market programming or to place administrative/regulatory constraints on worker mobility, to the detriment of the *national* economy. The same incentive structure has been blamed for weak investment by business in workforce training.

The Advisory Council on Economic Growth proposed an organization—dubbed the *FutureSkills Lab*—that would largely fulfill the functions of the "new organization" referenced in Budget 2017. A summary description of the "Lab" is provided in Box 2.2. In brief, it would be a non-governmental organization (though with government financial support) that would serve as a laboratory for skills development and measurement. It would have three core functions:

- Support innovative approaches to skills development, including co-financing pilot projects.
- Identify and suggest new sources of skills information.
- Define skills objectives and inform governments on skills programming, including identification and dissemination of best practices.

In essence, the FutureSkills Lab would perform an "R&D" function for Canada's labour market stakeholders. This is much needed to: (i) better inform the large annual labour market expenditures by all levels of government; (ii) serve the full range of stakeholders—workers, employers, students, skills development institutions, governments—by cutting across organizational silos; and (iii) identify and support innovative approaches to the fundamental challenges of connecting jobs with workers, and developing in workers greater resiliency to adapt.

Box 2.2 The FutureSkills Lab

(Excerpt from the Report of the Advisory Council on Economic Growth, lightly edited)

"The Council proposes the formation of a national non-governmental organization to operate as a laboratory for skills development and measurement. The FutureSkills Lab would invite all levels of government, private sector organizations, labour unions, not-for-profits, and other interested parties to partner on an opt-in basis. Through project partnerships and co-financing opportunities, innovative approaches to skills development and outcome measurement will be explored. Drawing from these experiences, the FutureSkills Lab would amass learnings and best practices. By sharing these, the Lab could help inform skills and training program funding decisions of multiple players. To accomplish such an ambitious mission, the FutureSkills Lab will have three core functions.

1. *Support innovative approaches to skills development:* Solicit, select, and co-finance innovative pilot programs in skills and competency development that address gaps among workers, post-secondary students, and youth.

2. *Identify and suggest new sources of skills information*: Gather labour market signals of skill needs by amassing a portfolio of pilot proposals; support innovative labour market information initiatives focused on employer expectations; use web-based sources to synthesize emerging labour market trends; and draw links between credentials and skills.

3. *Define skills objectives and inform governments on skills programming:* Rigorously measure outcomes of forward-looking and targeted training programs and skills information initiatives; identify and disseminate best practices broadly to education and training stakeholders; and

determine a set of skills objectives for the future.

While the FutureSkills Lab would be an arm's length entity, its collaboration with existing organizations will be crucial to ensuring that efforts are well-coordinated and non-duplicative. Early engagement with ministries of education and labour can build the connectivity required to identify priorities and translate successful pilot outcomes into mainstream policy.

The FutureSkills Lab would need to work closely with Statistics Canada and the Forum of Labour Market Ministers' Labour Market Information Council (LMIC) to exchange information and prioritize areas for collection and analysis of labour market information. Open communication with the Council of Ministers of Education Canada will be critical to ensure that training pilots supported by the FutureSkills Lab are aligned with objectives in education policy. Regular sharing of information, results, and best practices with Employment and Social Development Canada and the Forum of Labour Market Ministers would help build the FutureSkills Lab into a trusted advisor. Collaboration and information sharing with other pan-Canadian organizations in this space – the Business / Higher Education Roundtable (BHER), Universities Canada, Polytechnics Canada to name just a few – will ensure complementarity in efforts."

The FutureSkills Lab would be a novel organization serving as a resource across several jurisdictions and labour market stakeholder groups. The *modus operandi*—governance, relationship with stakeholders, and program emphasis—will therefore require organizational innovation and some experimentation. This suggests that it be created first on a pilot basis.

***Recommendation 2*: Establish the "FutureSkills Lab" in Atlantic Canada on a pilot basis, governed by a joint federal-provincial-stakeholder board having a majority of members not from government.**

The benefits of this approach include at least the following:

- The Atlantic region represents in miniature the kind of environment in which the Lab would operate at a national scale—i.e. multi-jurisdictional with all types of stakeholders present.
- The region experiences some of the toughest labour market challenges in the country and is arguably in greatest need of the innovative solutions to be explored by the Lab.
- Given that each of the Atlantic provinces is facing similar labour market challenges, it should be easier in the region than nationally to secure the inter-jurisdictional collaboration to get the FutureSkills Lab up and running *quickly*.

There are two main reasons to establish the FutureSkills Lab regionally—first, as noted above, to get the concept up and running and tested quickly; second, and more important, to make the Lab responsive to the significant variation in labour market circumstances across Canada. While there is a role for a national structure it will need regional manifestations, so the Atlantic pilot could eventually become one of those on-going manifestations. Similarly, the early

creation of a FutureSkills Lab (Atlantic) would not prejudice potential proposals for startup initiatives in other regions.

Some activities of the FutureSkills Lab

The Atlantic FutureSkills Lab would solicit and support innovative, forward-looking skills development projects in areas particularly relevant to the Atlantic Growth Strategy—for example:

- re-skilling older workers and retaining younger workers;
- increasing the workforce participation of disadvantaged and under-represented groups;
- improving retention of skilled immigrants;
- up-skilling for more professionalized tourism;
- effectively delivering on-line training through community colleges and universities (e.g., as demonstrated by Dal Med @ UNB Saint John)

A particularly significant labour market need is to equip Atlantic Canadians for the "digitization" of virtually the entire economy. This is increasingly evident in the resource sectors and manufacturing as various forms of sophisticated automation fill the gap created by growing worker shortages. The need for digital competence as the foundation for the jobs of the future implies that preparation must begin in the earliest grades, continuing through the post-secondary years and into frequent up-dating to keep pace with the rapid evolution of technology. Precisely what kinds of digital skills will be needed for what jobs in Atlantic Canada? How can the skills be most effectively imparted at various life stages and taking into account factors such as culture, gender, and life experience? These are fundamental and very pragmatic questions that might be addressed by the FutureSkills Lab through projects undertaken in practical contexts and by identifying and disseminating relevant experience and best practices from around the world.

The foregoing are among themes of the Atlantic Workforce Partnership (AWP), initiated in 2012 under auspices of the Council of Atlantic Premiers. A FutureSkills Lab could increase the impact of the AWP by providing a standing capacity for research, data analysis, pilot projects, and sharing of information on best practices. A particularly important initiative, for example, would be to equip identified grade school staff with detailed, up-to-date information regarding labour market opportunities and prospects so as to greatly increase the quality of career counselling in schools.

The length of the pilot phase and the funding level of the Atlantic FutureSkills Lab would be negotiated so as to be sufficient to demonstrate the value of the Lab and to identify the governance and other issues that would need to be addressed when expanding to national scale. One issue, for example, will be to ensure that the Lab complements and does not overlap the initiatives of the Forum of Labour Market Ministers, and particularly the new Labour Market Information Council. As described so far, the LMIC and the FutureSkills Lab share a similar

goal regarding labour market information but obviously they should implement complementary initiatives to that end. For example, the Lab could undertake certain projects identified and co-funded by the FLMM and LMIC.

Governance of the Atlantic FutureSkills Lab

Governance of the FutureSkills Lab is potentially contentious in view of the individual interests of provincial and federal governments as well as of non-government stakeholders, including employee groups, business, post-secondary and other training and research institutions. The multiplicity of stakeholders creates the need for a substantially independent organization—the FutureSkills Lab—that can be responsive to all stakeholders while not being seen as under the *de facto* control of any one, or any sub-group. But independence needs to be tempered by accountability through an appropriate governance structure.

The Advisory Council on Economic Growth suggested that governance might be modelled on that of the Canadian Institute for Health Information (CIHI), an initiative of federal and provincial-territorial health ministers in 1993 to create an arm's length institution to improve the quality of health information in Canada. CIHI has 16 directors of which five are nominated by provincial governments (one representing each of five regions in Canada), one by a territorial government and two by the federal government. There are five nominated, on a regional basis, by stakeholder groups, and three at-large directors, including the Chair. Because of significant similarities of the FutureSkills Lab and CIHI—in terms of the federal-provincial jurisdictional split and the knowledge-generation mandate of each—analogous governance structures make sense. Moreover, CIHI has proven the durability of its structure during more than 20 years. In the case of the Atlantic FutureSkills Lab pilot, a similar model could be implemented—for example:

- A smaller board of 11 with one director nominated by the federal and each provincial government; four by stakeholder groups—one from each province—and two at-large directors, including the Chair. (The at-large directors should not necessarily have to be resident in the Atlantic region.)
- The 6-5 non-government majority would strengthen the arm's length nature of the Lab and provide more scope for stakeholder representation.[15]
- The process for *initial* board selection might logically be developed under auspices of the Atlantic Workforce Partnership and the Minister of Employment and Social Development Canada, with advice solicited from the Forum of Labour Market Ministers since the Atlantic pilot would be intended eventually to be made national.[16]

[15] CIHI has equal government/non-government representation whereas the Canada Foundation for Innovation (CFI), an arm's length organization established and wholly funded by the federal government, has a majority of non-government directors.

[16] The initial board of CFI was chosen by a "bootstrap" process which began with a small number of board "electors" chosen by the federal government, who then chose others (to form a "Members" group) and the Members

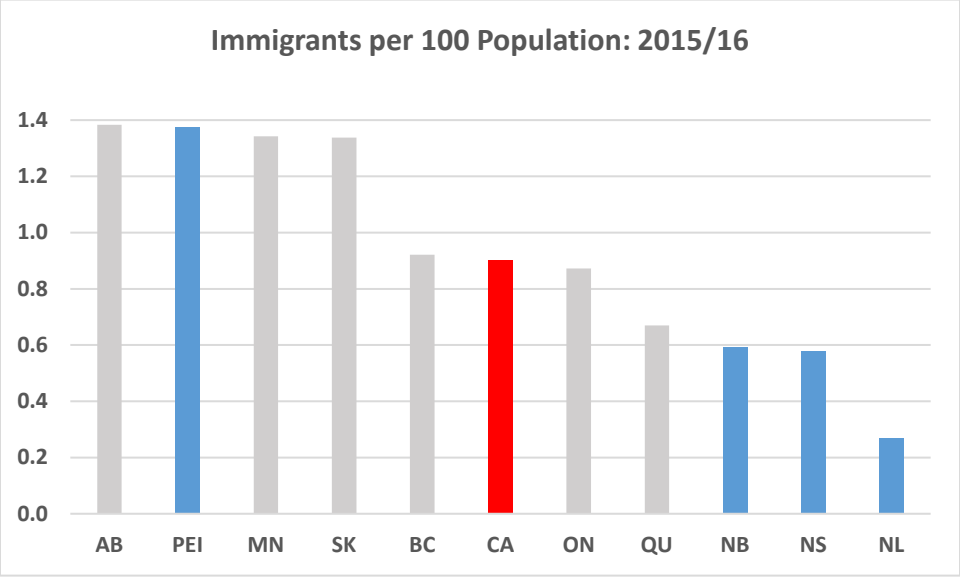
The core staff of the Lab would be physically located under one roof, but the scope of its work would be Atlantic-wide and equally accessible to the governments and residents of the four provinces.

Funding for the Atlantic FutureSkills Lab would be provided by an appropriate fraction of the $225 million already committed in Budget 2017. Eventually, as has been the case with CIHI, there might be agreements funded by one or more Provinces to have the FutureSkills Lab undertake projects of particular interest to the sponsoring Province(s), or more generally as might be agreed under the Atlantic Workforce Partnership.

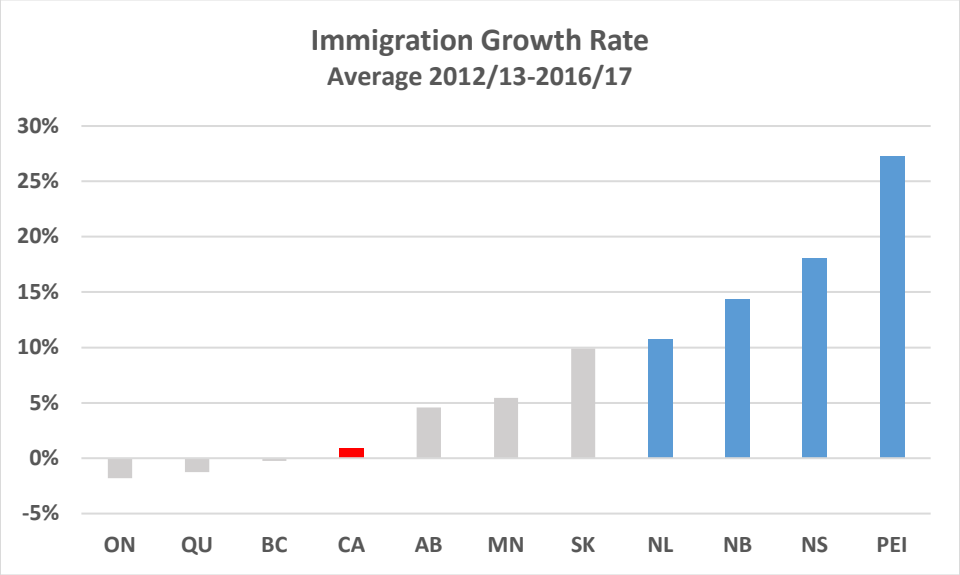
chose the first board, respecting certain compositional constraints. Thereafter, the CFI board has essentially been self-appointed, as is the board of CIHI, always respecting defined compositional constraints.

3. ATTRACTING TALENTED IMMIGRANTS

Atlantic Canada's population is the most slow-growing and rapidly ageing in Canada. No region is in greater need of immigration to get the growth process moving. Unfortunately, a poor growth track record, and the absence of a critical mass of recent immigrants, have made it difficult for the region to attract and retain anything close to its per capita proportion of immigration to Canada (Chart 3.1 a).



It is nevertheless encouraging that immigration to the region has grown significantly over the past several years both in absolute numbers and as a share of Canada's total (Chart 3.1 b).



This reflects the success of efforts by the federal and Atlantic provincial governments to foster increased Economic Class immigration. But given the long-standing barriers to be overcome, even more ambitious measures are needed and are timely in view of less immigrant-friendly attitudes prevailing in several advanced economies.

A welcome measure has been the Atlantic Immigration Pilot, the first announcement under the Atlantic Growth Strategy. This three-year trial program, established to help address worker shortages faced by specific sectors, provides greater flexibility to Atlantic provincial governments to test innovative approaches to help retain immigrant workers. It is providing 2,000 extra immigration spaces to Atlantic Canada for principal applicants in 2017, a number that may be increased in the second and third years of the program provided there is sufficient demand. These new places are in addition to the 4,300 currently available under the Provincial Nominee Program.

The federal government's Global Skills Strategy includes a suite of measures to improve the immigration system and make it easier for companies to recruit highly-trained people with in-demand skills. Budget 2017 provides $7.8 million over two years to implement a Global Talent Stream (under the Temporary Foreign Worker Program) which sets a two-week standard for processing visas and work permits for global talent. In addition to the Atlantic Immigration Pilot project and the Global Skills Strategy, specific additional measures are warranted to help the region's economy acquire the further highly-qualified people and entrepreneurial skills that will be needed to meet the objectives of the Atlantic Growth Strategy.

The Future Direction of Atlantic Immigration

Research by the Atlantic Provinces Economic Council (APEC) attributes the recent strong growth in Atlantic Canadian immigration to expanded use of the Provincial Nominee Program (PNP).[17] The PNP affords a Province flexibility in identifying immigrants that can best fulfill local labour market needs and are most likely to integrate successfully in the province. Being "closer to the ground" the Provinces are in the best position to make these calls. The total PNP allocation within Canada's annual Immigration Plan should therefore be increased as a *proportion* of the Economic Class.[18] In view of Atlantic Canada's extraordinary reliance on robust immigration to offset demographic decline, the Advisory Group recommends further as follows:

Recommendation 3.1: **Increase annually over the next five years Atlantic Canada's *percentage share* of the Provincial Nominee Program under the Canada Immigration Plan so long as the region is able to fulfill its allocation.**

[17] *Immigration on the Rise*; APEC, January 12, 2017.
[18] Admissions under the PNP nationally in 2015 were 44,533 or 26.1% of the Economic Class.

The purpose of Recommendation 3.1 is to provide the Atlantic Provinces more PNP room to accommodate the very high priority they have placed on immigration as a central pillar of their economic strategies. This would, for example, enable the Provinces to create nominee programs specifically focused on international students attending post-secondary education in the region. More generally, by raising the PNP caps and increasing resources to be able to manage inventory and processing times, immigration to Atlantic Canada can make a significant impact on the demographic challenge. Recent experience has shown that top priority attention from provincial governments can result in remarkable growth of immigration to the region—for example; between 2012 and 2016 immigration to Atlantic Canada increased 113% (from a low base) whereas the increase in the rest of the country was only 12.4%.

Increases in the PNP share would of course be contingent on the individual Atlantic Provinces continuing to fill their existing and future allocations. To this end, the four Provinces will need to work closely with the federal government to help ensure the full utilization of allocations.

It is instructive to draw a comparison between the immigration experience of the Atlantic region and that of Manitoba and Saskatchewan combined ("MNSK" for short). Both groups have similar shares of the national population—6.6% for Atlantic Canada and 6.8% for MNSK. Currently, Atlantic Canada's PNP "cap" is 4,300 immigrants or 12.9% of the national cap of 33,400, whereas MNSK's cap is 11,100 or 33.2% of the all-Canada total.[19] This reflects a history in which MNSK placed very high priority on immigrant attraction (assisted in SK's case by a strong resource-based economy) while the Atlantic governments were somewhat less focused on the issue. In the event, MNSK built up much higher annual levels of immigration—to 31,682 in 2016 versus 13,622 for the Atlantic region. But lately the rate of immigration growth in MNSK has slowed while Atlantic Canada's has accelerated in response to a focused effort by governments.[20]

The annual allocation among Provinces of PNP caps is decided by the federal government in consultation with the Provinces in the context of many factors including the immigration objectives of the Provinces; the existing inventory of PNP applicants; and the processing times needed to clear the inventory and accommodate new applicants in a timely way. The framing of Recommendation 3.1 recognizes the complexity of the allocation decision and is therefore stated in directional terms rather than as precise numerical targets for a growing Atlantic regional share of PNP allocations. Nevertheless, the overall objective is to boost Atlantic Canada's share of Economic Class immigration to at least the region's share of the national population. The spirit of the recommendation can be met by increasing (i) the all-Canada PNP level as a proportion of national immigration; (ii) the Atlantic share of the PNP allocation (Note that if the PNP *share* of

[19] The percentages are large because Quebec is not included in the PNP and, while Ontario is included, its PNP cap of 6,000 is very small relative to its population.
[20] Between 2012 and 2016 immigration to MNSK increased by 7,189 (29%) while the increase of 7,230 in Atlantic Canada was slightly greater in absolute terms and vastly greater in percentage terms (113%).

the national Economic Class total were increased then Atlantic Canada's share of the national PNP total could be increased without decreasing the allocated *number* of PNP immigrants to other provinces.); and (iii) the resources dedicated to applicant processing. These steps would accommodate significant growth of immigration to the Atlantic Provinces on the further assumptions that the Provinces themselves continue to place the highest priority on immigrant attraction and retention, and that improved economic performance of the region—which will depend crucially on stronger population growth—will make Atlantic Canada more attractive to immigrants.

It is one thing to attract immigrants to Atlantic Canada; quite another to retain them. Various studies based on tax-filer residence information have established that Atlantic Canada lags well behind the rest of Canada in immigrant retention. One rigorous analysis of interprovincial immigrant mobility over the 2006-11 period[21] found that:

- Of the 24,710 immigrants landed in Atlantic Canada over the 6-year period, just under 60% were still resident in the region at year-end 2011. (The retention rates for the individual provinces were 62.4% for NL; 32.3% for PEI; 72.1% for NS; and 65.8% for NB.)
- The retention rate for all other provinces was much greater, ranging from 85.1% for Manitoba to 93% for Ontario.
- Retention of original immigrants is only part of the story since the *net* position of a province will depend on the extent to which in-migrants (i.e. immigrants who move to the province in question) offset the out-migrants for a given cohort of immigrants to Canada. But in this regard too, all the Atlantic provinces ended 2011 with fewer immigrants from the 2006-11 cohort than the number that first settled in the province. Of the 24,710 first settlers in Atlantic Canada 9,950 out-migrated, whereas only 3,080 moved into the region from other provinces. This resulted in a net loss of 6,870 by year-end 2011 or 27.8% of the number of first settlers in Atlantic Canada during the 2006-11 period. Among other provinces, only Manitoba and Quebec ended in a net negative position.

It has been well-established that the principal drivers of immigrant attraction and retention in a given region or community are the likelihood of good employment; the presence of a significant number of people having cultural characteristics similar to the potential immigrant; and the quality of life, including a "welcoming attitude" on the part of the host community. Atlantic Canada has been consistently disadvantaged by a slow-growth economy exacerbated by the fact that the region has not been able to establish a critical concentration of certain immigrant cultures. These two factors are self-reinforcing—weak immigration tends to slow the economy and to reduce cultural attractiveness relative to areas that already experience strong immigration.

[21] *Interprovincial Mobility of Immigrants in Canada 2006-2011;* M. van Huystee and B. St Jean; IMDB Research Series, July 2014. There are anecdotal reports that Atlantic retention has improved recently. Analyses such as that undertaken by van Huystee and St. Jean should be updated frequently.

But experience has shown elsewhere in Canada, and recently in the Atlantic region, that this vicious circle can be turned around. Most important is to strengthen the economy to create more opportunity, complemented by a determined effort at the community and individual levels to make immigrants feel valued and welcome. That is why the Atlantic Growth Strategy, taken as a whole, is also the most effective immigration strategy. That said, how might a specific immigration initiative have a *direct and out-sized impact* on economic growth in Atlantic Canada?

Identification and Recruitment of Exceptionally Accomplished Immigrants

Although Atlantic Canada has taken many steps over the decades to escape its "have-not" economic status, the region has still not caught up to the Canadian average and now finds itself at the wrong end of the demographic stagnation that is affecting virtually all affluent countries. This situation calls for exceptional measures of the sort being recommended by the Advisory Group in other chapters. In the case of immigration, the forward-looking policies already being implemented need amplification to boost the slow-growth trajectory of the regional economy. The current path of immigration programming is good, but not sufficiently ambitious. The region needs an infusion of experienced entrepreneurial talent—not because there are no great entrepreneurs in Atlantic Canada, but because there are not enough of them.

***Recommendation 3.2*: Establish a procedure to proactively identify and recruit to Atlantic Canada small numbers of exceptionally accomplished individuals with demonstrated entrepreneurial talent and the ability to scale-up businesses in areas that support the Atlantic Growth Strategy.**

The target group, which would perhaps number 25-50 recruits per year, would include:

- Serial entrepreneurs with a track record of success;
- Experienced executives with exceptional business development expertise in dynamic sectors who have built or grown globally successful companies; and
- Globally-recognized technical or research talent with STEM (science, technology, engineering or mathematics) skills necessary to scale-up a technology-based or innovative export business.

This recommendation is about identifying and aggressively recruiting talent *proactively*, not reactively. The recommendation could be most readily implemented as a carve-out under the Atlantic Immigration Pilot Program but with a different objective and focus than the "high-skilled" stream of the AIPP. Applicants for the high-skilled stream are identified by a designated employer to fill a specific job opening whereas the targets of Recommendation 3.2 are individuals with exceptionally high potential to be job *creators*. An existing model would be the "Start-up Visa" pilot program (Box 3.1). Start-Up Visa is a proactive, highly-targeted, small volume program with the objective of attracting world-class entrepreneurs and innovators who have the skills to build *start-up* companies that can compete globally. The program works under

the premise that the private sector is in the best position to judge who will be an innovative entrepreneur, and therefore relies on designated private sector business incubators, angel investor groups and venture capital funds to identify applicants.

Box 3.1 Start-Up Visa

Start-Up Visa is a five-year pilot program launched in 2013 to attract innovative foreign entrepreneurs with the skills to create *new* globally competitive companies. Before applying to immigrate through Start-Up Visa, entrepreneurs must secure a commitment from a *designated* Canadian business incubator, angel investor group or venture capital fund to support the entrepreneur's business concept. In the case of a venture capital fund, a $200,000 minimum investment is required. For angel investor groups, the minimum is $75,000. There is no investment required for business incubators, but the entrepreneur must be accepted into the incubator's program. There are currently 28 business incubators, 22 venture capital funds and eight angel investor groups that have been designated as eligible to participate in the program. Applicants must show that they have a sufficient funds to sustain themselves while in Canada and have a significant ownership share of their business. More than 130 entrepreneurs have now received permanent residence under the program, and have launched almost 80 new businesses across Canada. There are six designated entities located in Atlantic Canada, and they have been exceptionally successful in their efforts. A 2016 evaluation of the program showed that 23% of entrepreneurs under Start-Up Visa had settled in Atlantic Canada.

Recommendation 3.2 would build on the success of the Start-Up Visa, but would not be focused on early-stage entrepreneurs and start-ups seeking incubation or angel investment and venture capital. Instead, the objective of the present recommendation is to identify seasoned entrepreneurs and executives in areas of particular importance to the Atlantic region's economy who have scaled companies in global markets or have the clear potential to do so – more akin to a "Scale-up Visa".[22] To implement Recommendation 3.2 as an Atlantic Canada program, complementary to Start-up Visa, would require steps such as the following:

a) Create "SWAT" team(s) reporting jointly to the federal and Atlantic provincial governments and comprised of private sector individuals familiar with the target fields and with global talent recruitment. This feature is precisely analogous to the entities in the Start-up Visa pilot (designated angel investor groups, VCs and incubators) but generalized beyond start-ups.
b) Task the team to identify and proactively recruit these potential immigrants—essentially like a head-hunter's function.

[22] In 2014 the federal government considered creating a *Business Skills Immigration Pilot Program* focused on "attracting experienced business people with the talent and skills (rather than investment capital) to deliver meaningful benefits to our economy as immigrants…The question is whether the Start-up Visa program effectively fills the entrepreneur/innovator space?" The government at the time conducted national consultations on the concept but did not implement the pilot. The time has come to reconsider in an Atlantic Canada context.

c) Develop criteria that must be met by potential candidates to ensure their commitment—e.g., analogous to the financial commitments in the Start-up Visa program.
d) Create a customized fast-track immigration processing program for the recruits; and
e) Provide a customized incentive to "sweeten the pot".

The individuals targeted in this "AGS talent quest" would be genuinely world-class entrepreneurs, innovators and researchers with expertise in strategic sectors in Atlantic Canada—e.g., oceans, agri-food, clean energy, information technology, digital health, tourism and culture. The principal selection criterion would be the likelihood of making a transformative contribution to Atlantic Canada's society and economy. Those chosen would be counted on to be among the key enablers of many of the other recommendations of the Advisory Group—in short, they would be essential drivers of the Atlantic Growth Strategy.

Facilitating the immigration of international graduates of Atlantic post-secondary institutions

In 2014-15 there were more than 14,200 international students enrolled in universities and colleges (post-secondary educational institutions or PSEs) in Atlantic Canada. This represented 6.6% of the national total and an increase of 27% since 2011-12, while total PSE enrolment in Atlantic Canada declined by almost 5%. International students now account for more than 12% of PSE enrolment in the region and are an increasingly important offset to declining domestic enrolment. International students are especially attractive for a growth strategy because they can bring unique economic and cultural benefits to the institutions where they study, to the organizations for which they work, and to the communities in which they live. Their Canadian education and work experience make them particularly sought after as potential immigrants.

To be eligible for Express Entry (under the Canadian Experience Class), most former international students need at least one year of work experience in Canada, which can be acquired after graduation. The Post-Graduation Work Permit Program (Box 3.2) is therefore an important incentive for international students because it allows them to gain Canadian work experience and may assist in meeting eligibility requirements for permanent residency.[23]

Box 3.3 Post-Graduation Work Permit Program (PGWPP)

The PGWPP provides a path to immigration and is focused on enhancing the experience of international student graduates of post-secondary institutions in Canada. The program facilitates participation in the labour market, helps to fulfill work experience requirements enroute to permanent resident status, and increases the temporary labour supply for key industries and occupations in Canada. The holder must

[23] The downside is that PGWPP holders generally report low employment earnings and are largely working in sectors with low median wages—e.g., accommodation, food services, and retail—that also have a higher incidence of unstable work.

have been in full-time studies and can work anywhere in Canada and may change employers at any time. The permit is also exempt from the Labour Market Impact Assessment (LMIA) procedure which assesses the likely impact of hiring a temporary foreign worker on the Canadian labour market. A permit may be issued for a period up to a maximum of three years but not longer than the student's completed study program. Each student may receive only one permit, regardless of how many programs of study undertaken. As of December 31, 2016 there were almost 102,000 PGWPP permit holders in all of Canada of which 4,300 (only 4.2%) were in the Atlantic provinces.

A recent survey of graduates of Atlantic Canadian universities by Corporate Research Associates found that 77% of respondents wanted ultimately to live and work in the region and 65% hoped to stay immediately.[24] With their Canadian PSE credentials, language proficiency, and social networking and work experience in Atlantic Canada, these students can integrate quickly into the labour market and society. Immigration policy has become more supportive of graduate retention through measures like the PGWPP, but in view of the exceptional value contributed by international graduates of Atlantic PSEs, more can be done. The Advisory Council on Economic Growth recommended that:

> "the government should reconsider how points are awarded under Express Entry…placing more emphasis on human capital characteristics (such as age, education, language, or Canadian work experience)…Reform of the Express Entry points system to award more favourably those human capital characteristics that correlate with successful economic integration…can help to attract skilled graduates from schools outside of Canada as well." [25]

Echoing this conclusion, the Advisory Group recommends that Immigration, Refugees and Citizenship Canada:

***Recommendation 3.3*: Enhance the Express Entry program for foreign graduates from Atlantic post-secondary institutions to assign greater weight to their personal suitability—age, skills, and prior work experience—than to possession of an immediate job offer; and increase efforts to inform international students of possible pathways to permanent residence after graduation.**

This recommendation is complementary to, but distinct from the International Graduate stream of the Atlantic Immigration Pilot Program. The latter is employer-driven and requires a job offer, whereas Recommendation 3.3 calls for an Atlantic "tweak" to the Express Entry points system for international graduates of the region's PSEs.

There is considerable anecdotal evidence that international students are not sufficiently aware of the immigration programs potentially available to them, and that information they do receive

[24] *Survey results say grads want to stay, but can't;* Halifax Chronicle-Herald; July 11, 2017. The CRA survey was carried out on behalf of the Association of Atlantic Universities.
[25] *Attracting the Talent Canada Needs Through Immigration*; ACEG; October, 2016, p 8

may be inaccurate and/or out of date. This is understandable in view of the detailed features and frequent revisions of the various federal and provincial programs. It appears to be the case that employers are also not always aware of the benefits and steps to be taken in hiring international graduates. A *proactive* campaign is needed to disseminate information in Atlantic universities and colleges, among international student associations, student co-op coordinators, and student employers. The Employer Liaison Network officers of IRCC in Atlantic Canada should increase promotion to employers of the Express Entry opportunities for international students and inform employers how to hire international student candidates to meet their permanent workforce needs.

4. FINANCING INNOVATIVE STARTUPS

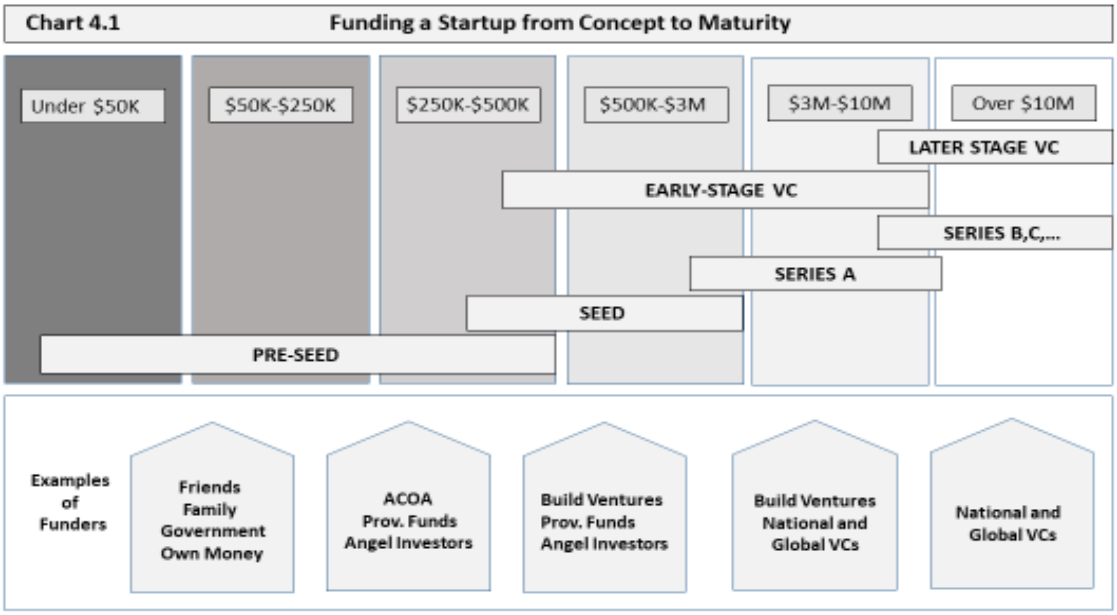
High-growth startups are the so-called "gazelles" of the economy—companies with at least $100,000 in sales, that grow 20% or more annually for four years and double revenue in the process. In the US, gazelles account for fewer than 5% of all firms but for 60% of net new jobs. Of the remaining 40 percent, about half came from other startups, and half from large companies.[26] Similar results have been approximately replicated worldwide. The message of these statistics is that supporting highly innovative companies in their early stages benefits far more than just a small group of winners. In fact, the job creation record of high-growth firms suggests that they are ultimately the best route to widespread prosperity and opportunity. That is why Atlantic Canada's thriving startup community of high-growth, early-stage companies needs to be nurtured so that they can become tomorrow's dynamic job creators. Their contribution to jobs and income today is relatively tiny. But like the acorns that eventually grow into oaks, these startups, operating at the cutting edge of innovation, are the green shoots of the future economy.

The good news is that Atlantic Canada has over-preformed in the creation of technology-based startups. There has been on the order of $2 billion received from the sale of Atlantic Canadian venture-backed companies over the past six years—for example: $540 million for Ocean Nutrition; $500 million for Q1 Labs; $340 million for Radian6; more than $200 million for STI; $70 million for GoInstant; and undisclosed amounts for companies such as CARIS and Compilr. While take-overs by out-of-the-region companies (usually US-based) may be lamented, the consequences for the young startup ecosystem in Atlantic Canada are unquestionably positive for several reasons. The "exits" finance a new generation of serial entrepreneurs who go on to be savvy angel investors and experienced mentors. Much of the technical talent remains in the region ready to re-deploy into the next venture. Every large buy-out is noted in the global venture financing community, thus building the reputation of Atlantic Canada as a place to invest. High-profile buy-outs create confidence in budding entrepreneurs that "it can be done here." On top of all that, the new buyers usually maintain a presence in the region.

Venture finance: some background

The venture financing business has developed an insider's terminology that can lead to confusion when describing the evolution of a startup's funding stages. Although there is no absolutely standard set of definitions, Chart 4.1 provides a rough working map of the process and its jargon. Further background, highly summarized, is provided in Annex 4.1 (at the end of the chapter) which describes the general trends, success factors, and challenges in today's startup environment both globally and in Atlantic Canada.

[26] *The Importance of Startups in Job Creation and Job Destruction;* The Kauffman Foundation; 9 Sept., 2010



Building an ecosystem—institutions, experience, skills and financing—to nurture innovative companies from concept to maturity is a long-term endeavour. It may take 20 years to evolve generations of serial entrepreneurs and it takes at least two investment cycles (approximately eight years) for a venture capital fund to establish a credible track record that will attract widespread private sector investors. While Canada has finally evolved a few relatively mature startup ecosystems—e.g., in the Waterloo-Toronto corridor—Atlantic Canada, despite some spectacular successes, is still in the early phase. A strong preponderance of funding in the region is at the pre-seed and seed stages where, relative to international benchmarks, there is no shortage of capital on average. Nevertheless; sectors like life sciences and cleantech—where regulatory scrutiny, capital requirements, and long sales cycles can be barriers to early-stage investment—may have difficulty raising capital regardless of where they are located. The particular challenge in Atlantic Canada is the immaturity of the regional ecosystem. This is confirmed by the dearth of later-stage deals and the small deal size—currently only about 28% of the Canadian average (Table 4.1, based on data from the CVCA for 2015 through June 2017).

Table 4.1	**ATLANTIC: NUMBER OF DEALS**	**ATLANTIC: AVE. SIZE OF DEAL ($M)**	**ATLANTIC AS % OF CANADA: NUMBER**	**ATLANTIC AS % OF CANADA: AVE. DEAL SIZE ($)**
STAGE				
Pre-Seed	69	$0.65	17.0%	60.7%
Seed	51	$2.29	9.3%	36.3%
Series A	6	$4.83	2.3%	45.4%
Other	1	$1.00	7.7%	33.3%
TOTAL	**127**	**$1.51**	**10.3%**	**27.6%**

The financing of business activity is normally the responsibility of the private sector and, as a startup moves through its stages toward maturity, funding is increasingly undertaken by private investors and lenders. But there is an acknowledged role for government at the earlier stages when risk is high and the expected time to payoff relatively long. The case for taxpayer support of angel investors and the venture capital (VC) industry rests primarily on the following:

- Venture capital investment has been shown to have strong positive effects on innovation, wealth creation, economic growth and employment—all public objectives to varying degrees.
- The financing of innovative startups is subject to "positive externalities," meaning that the return for the whole economy is likely to be superior to the financial return for the venture capitalist.[27] Therefore, without government support, the level of VC investment may be less than optimal for society.
- The building of a sustainable technology startup ecosystem is the result of a virtuous circle with cumulative effects—i.e. it is easier to launch the 100th startup in a given place than the first one. Consequently, there is a proactive role for government to start the wheel turning.

Because the startup ecosystem in Atlantic Canada is still in the early stages of its evolution, the case for government support is particularly strong. This presumes of course that the interventions are well designed. Reflecting current best practice globally, there is:

- a trend in the delivery of government support toward indirect and arm's-length interventions, with the objective of stimulating development of a private sector VC industry able to attract experienced managers and implement best practices;
- less focus on geographic constraints, or on requiring a specified amount of investment within a given period of time, since these constraints may have adverse effects on returns and on alignment of interests with potential private sector co-investors; and
- an increasing recognition that business angels play a critically important role in the startup ecosystem because they provide not only funding but also experience, credibility, and connections which together improve the overall flow of high-quality investee firms.

Angel Investment Tax Credit

Although Atlantic Canada is well served by government investment at the pre-seed and seed stages, there is a dearth of "angel" capital—i.e. investment at the very early stage usually by individuals with considerable experience with startups in a specific area of technology.[28] This is a serious short-coming because there is particular value when the investor's money comes bundled with management and mentoring — so-called "smart money". Business founders benefit

[27] This is because early-stage endeavours in innovation-intensive activities usually generate new practical knowledge that diffuses into the broader community (analogous to R&D), and even when an early-stage innovative company fails, new knowledge and experience is gained that is valuable to the surrounding society.

[28] There are several successful Atlantic-based angel investors and private sector groups that invest in innovative startups—e.g., East Valley Ventures, Killick Capital, First Angels Network, Pelorus, Island Capital Partners. But in relative terms, the numbers are small.

enormously through mentorship or proximity with other entrepreneurs. Attracting experienced angel investors would therefore generate large benefits for the Atlantic innovation ecosystem.

> "The Atlantic provinces are all confronted by the same challenge of limited resources and distance from the main technology clusters. Outside investors that are much needed do not make much of a distinction between Nova Scotia and New Brunswick […] When facing the development of their tech ecosystem, governments should adopt as much as possible a regional approach." *–Gilles Durufle*

At present each of the Atlantic Provinces has its own version of an investment tax credit (ITC) in respect of investments in smaller companies and not restricted high-potential startups—see Annex 4.2 for a summary of the terms of the various ITCs. A regional approach, focused explicitly on investments in *innovative* small companies, would stimulate development of high-growth businesses and a deeper community of knowledgeable angel investors in the region.

***Recommendation 4.1*: Harmonize across Atlantic Canada the existing provincial investment tax credits, and make them refundable; available to an investor wherever located; and focused on small businesses that are innovation-based. Include as eligible investments: common and preferred shares, convertible debentures and units; and as eligible investors: individuals, corporations, trusts and limited partnerships**.

The precise harmonized terms would need to be agreed among the Provinces but should be made as similar as possible so as to present a unified picture of the region to non-resident investors and to avoid inter-jurisdictional competition regarding terms of the investment incentive. The common features might for example include:

- Eligible investee companies to be no larger than "X" (e.g., limits expressed in terms of assets or employee numbers or some other agreed metric—see Annex 4.2);
- Investee companies must be qualified as "innovative" according to criteria related for example to R&D spending, employment of highly qualified people, export intensity, certain targeted sectors. The "innovative" qualification evidently poses definitional issues and inevitably there would be some differences in priority among Provinces.[29] The important objective is to focus the incentive on high-growth, early-stage companies in order to expand the investor community that has experience in analyzing those kinds of risks.
- A common Atlantic-wide credit of "x%" on eligible investments up to "$Y"—e.g., 25% on investments up to $250,000. At present the maximum annual credits vary widely from $125,000 in NB (a rate of 50% on investments up to $250,000) to $7,000 in PEI (a rate of 35% on investments up to $20,000).

[29] Newfoundland and Labrador has by far the most explicit criteria regarding the business activities of eligible investee companies, restricting the tax credit to technology, R&D, aquaculture, forestry and agrifood, manufacturing and processing, export and/or import replacement businesses, tourism, cultural industries. The credit is largely untargeted in the other Provinces, but excludes most purely financial transactions, including lending, share repurchase, dividend payments, etc.

Many jurisdictions in North America have established tax credit support for business angel investment, and some are refundable—i.e. paid even in cases where there is less tax owing than the amount of the credit and thus, in essence, a form of grant. Refundable tax credits, provided for example by the State of Minnesota, are useful to non-residents who do not pay taxes locally and therefore help to attract investment from outside the jurisdiction.[30] Since the objective is to attract both risk capital and sector experience, the credit should be made as widely available as possible and on a refundable basis—i.e. at least on a pan-Atlantic basis and ideally across North America. The jurisdiction providing the credit does so to attract productive investment and knowledgeable investors. It should therefore be largely indifferent as to where the investor happens to be located. Given the type of investment targeted here, which is relatively risky and early-stage, the investor, wherever located, will usually want to be engaged with the investee company and will therefore often bring needed expertise into the jurisdiction that provides the investment credit.

Seed and Early-Stage Venture Capital.

The recent data in Table 4.1 show that Atlantic Canada has no general shortage of startup financing at the pre-seed stage, although the investment is heavily-weighted to direct government sources as distinct from private sector angel investors. Thanks in large part to government participation at the pre-seed end of the financing spectrum, the region accounts for roughly 17% of the number of deals nationally (compared with 6.6% of Canada's population and 5.5% of GDP). The shares of national activity drop off sharply after that and, at all stages, the average deal size in Atlantic Canada is far below the national average.

The next gap to be filled as the Atlantic startup ecosystem progresses is to build more companies that can attract "Series A" financing (approximately $3-$10 million). The gap extends from the initial funding stage to the demonstration of market traction and the possibility of an "A" round subscribed by specialized venture capital funds. It is emphasized that this is not only a funding gap but also an *expertise/experience* gap because most young entrepreneurs do not know how to structure a successful market strategy; to connect to markets and external sources of financing

[30] Minnesota's Angel Tax Credit provides a 25-percent credit to investors or investment funds that put money into startup companies focused on high technology, new proprietary technology, or a new proprietary product, process or service in specified fields. The maximum credit is $125,000 per person, per year. The credit is *refundable*. Residents of *other states and foreign countries* are eligible. For 2017, $10.7 million in credits is available, $5 million of which is reserved for minority- and women-owned businesses. Over the 2010-16 period, some US$90 million of credits were issued for investments in more than 390 startups. In 2017 the State Legislature has proposed cutting the Angel Tax Credit in favour of an increased R&D credit, a move that is opposed by the Governor who strongly supports the angel credit.

and talent; to bring in the right resources; and set up the milestones that will make them "Series A ready." To help fill the gap the Advisory Group recommends as follows:

***Recommendation 4.2*: Invest public funds in private-sector-managed regional funds making pre-seed as well as seed and early-stage venture capital investments. The provincial governments should invest, approximately on a pro-rata basis, together with federal government matching, BDC, and the private sector.**

There is never precise agreement as to the range of investment amounts that qualify as "pre-seed". For present purposes, pre-seed is taken to be roughly $250,000 to $1 million, whereas "seed" and "early-stage" venture capital investments are those between roughly $750,000 and $3 million or slightly more.

The announced $25 million "Nova Scotia Technology Seed Fund" could be extended to a regional project supported by federal agencies, thus making the new fund much stronger and beneficial to the entire region. Atlantic Canada has a regional seed fund, Build Ventures (Box 4.1), which is fully invested and is in the process of raising another fund. By implementing the foregoing recommendation, the funding gap in Atlantic Canada—i.e. getting startups from pre-seed to Series A—could be eliminated and the startup ecosystem would be positioned for the next step of its evolution.[31]

Fostering Later Stage Venture Capital Investment

The federal Advisory Council on Economic Growth observed that a fundamental problem with Canadian innovation is that even though the country's entrepreneurs are good at launching companies, very few achieve substantial scale, primarily due to insufficient sources of later-stage capital. Scaling-up companies (through VC rounds B and C) is a challenge across the whole country since Canadian venture capital funds are still relatively small compared to late-stage US funds and there is a shortage of managerial talent in Canada for these scale-up stages.

The availability of later-stage capital was significantly increased through the creation by the previous federal government of the $390 million Venture Capital Action Plan (VCAP) which is now being re-funded and up-dated in the form of the $400 million Venture Capital Catalyst Initiative (VCCI) managed by BDC. The VCAP and VCCI do not invest in companies directly but rather through investments in other venture capital funds. The four VCAP "funds-of-funds" did not invest in Atlantic Canadian-based venture funds. While the exceptional quality of technical talent in Atlantic Canada is acknowledged, the fact remains that the pools of potential

[31] An upcoming study by Saint Mary's University's Sobey School of Business, entitled *Factors for Success in Atlantic Canadian Growth Companies,* finds that private sector investment capital in Atlantic Canada tends to prefer safer investment as against cutting-edge technology. Growth firms surveyed perceived a major gap in investments in the $2 to $5 million dollar range.

venture capital and related expertise resident here are still shallow. This is evidence of the long time required to build an ecosystem that can sustain companies from concept to maturity.

At present, there are very few companies in Atlantic Canada that are candidates for the later stage of the VC funding spectrum and most of those that are have already attracted outside investors. So at this stage of development of the region's ecosystem, the best strategy to address the scale-up challenge will be to attract, early on, experienced outside investors that will take the lead in later stage rounds. This underlines the importance of the foregoing recommendation to add support at the seed and early VC stage. As the ecosystem matures and local funds become stronger and larger, they will be able to play an increasing role in later-stage rounds and will be able to take advantage of the federal initiatives like VCCI and successors. To set the stage, there is a need to create much greater awareness of the talent in Atlantic Canada by *connecting* local startups to later-stage venture capital. This can be done, for example, by bringing to Atlantic Canada VC firms headquartered outside the region; by hosting conferences that can attract large VC players; and by encouraging early-stage companies from the region to get on a plane and put themselves face-to-face with potential investors. In short, the Atlantic startup ecosystem has to become much more connected to the world.

Box 4.1 Build Ventures — An Atlantic Venture Capital Investor

Established in 2013, Halifax-based Build Ventures provides early-stage capital to high-growth innovative firms based in Atlantic Canada. Of the $65 million managed by Build Ventures, the four provincial governments and BDC and EDC together contributed about $57 million initial capitalization, with the balance coming from private sources and the fund's managers. Build Ventures holds equity in many Atlantic Canadian firms including, for example: Affinio and Springloaded Technology (based in NS), Celtx (Newfoundland), Introhive and Resson Aerospace (New Brunswick). To date, five of Build Ventures' portfolio companies have gone on to raise Series A investments (totalling $65 million) from an investor based outside the region. Dr. Gilles Duruflé noted that "the Build Ventures model…is perceived by funds based outside the region as a like-minded private-sector co-investor and as a value-added investor." Build Ventures employs public sector co-investment to grow the small pool of risk capital available in Atlantic Canada, while ensuring that funds are managed according to private sector objectives.

Corporate Procurement to Support Startups

New companies benefit greatly from an early, sophisticated customer to provide market validation and the scale to begin to move down the cost curve. There is extensive experience with strategic procurement by governments to foster the commercialization of innovative new products—for example; the long-standing Small Business Innovation Research (SBIR) program in the U.S. and its many imitators in other countries among which is a new federal program,

"Innovative Solutions Canada" announced in Budget 2017. The existing "Build in Canada Innovation Program" (BCIP) is another of the genre.

Larger corporations can play an even more important role to support the development of a start-up ecosystem by serving as a test bed and first customer, and by challenging the new companies to meet global standards of price and quality in order to earn access to the established corporation's supply networks. At the same time, the large corporation benefits from a window on technological trends and access to specific technologies, talent, and to a culture of innovation. These relationships would not be acts of charity but rather investments to strengthen an ecosystem of local suppliers to specific mature businesses or groups of businesses. This type of mutuality depends on a longer-term vision but is characteristic of all successful innovation ecosystems.

Atlantic Canadian business leaders need to step up and support innovative, early-stage companies with mentoring, inclusion in supply chains, and investment as required. Among examples would be the relationship of McCain Foods with Resson Aerospace and the Shaw Group with CarbonCure. Several large companies in New Brunswick have also shown the way with an initiative dubbed the "Business Living Lab." Government can provide incentives for this kind of partnership through the concept of an "Innovation Marketplace" proposed by the Advisory Council on Economic Growth and described in some specific contexts in Chapter 9.

Annex 4.1 Gilles Durufle on the Environment for Innovative Startups ♦

- Young, innovative startups are playing an increasingly important role in the development of new products, business models and markets:
  - The cost of starting new companies in ICT has declined sharply over the last decade: generalization of the "Lean Start-up" model and the accelerator model;
  - Large corporations are increasingly turning to open innovation models;
  - Governments are developing "Innovation Agendas" all over the world.
- Key success factors for startup ecosystems are talent, density, interactions, global connectedness (global customers) and "smart" capital (capital + expertise and networks). There is an urgency to enter the game in order not to be left behind.
- Start-up ecosystems develop by phase. During the early "activation" phase, the primary objectives are to support the entrepreneurial spirit, strengthen local connectedness, develop density, provide "seed" and "series A" funding, and link with global knowledge and funding.
- Canada is progressing. In 2015, it had three ecosystems among the global top 20 but challenges remain: global connectedness, scale-up, few large tech-based corporations.
- The tech ecosystem of the Atlantic region is facing specific challenges of low density and peripheral geography with four separate jurisdictions. Because the ecosystem is young there are relatively few serial entrepreneurs and tech savvy business angels.
- The region also has some strong assets and positive trends:
  - A few large exits have nurtured an entrepreneurial group and attracted outside attention;
  - Strong universities are revising their approach to tech innovation and entrepreneurship;
  - Revised government policies now support a stronger and smarter financing chain;

- There is a large network of accelerators and incubators, some with seasoned leadership;
- 21 companies and their local investors have been able to attract funds from outside the region, whereas 10 years ago there were virtually none.

- The challenges of the financing chain:
  - Over the 2015-2017 (H1) period, 94% of all financing rounds in Atlantic Canada were at the seed and early stage vs. 78% in Canada. Only 5% were at the later stage vs. 21% in Canada. The average size of rounds in the Atlantic is only 28% of the Canadian average.
  - There are business angel groups in the region but still very few experienced tech business angels able to take the lead on seed rounds.
  - In summary, the ecosystem is still relatively young and immature: many seed rounds are led by government organizations such as Innovacorp, NBIF and ACOA (rather than experienced tech business angels); few rounds with outside investors and very few later stage rounds.
  - The main challenge remains to make companies ready for "round A" (roughly $3-$10M): and attracting outside investors.

♦ This material draws on a paper—*The context for government policies to support tech innovation ecosystems in Atlantic Canada*; June 30, 2017—prepared for ISED by Dr. Gilles Durufle, a Montreal-based consultant and a globally-recognized expert on startup ecosystems and their financing.

Annex 4.2 Terms of Current Investment Tax Credits

	Nova Scotia	New Brunswick	PEI	Nfld. & Lab.♦
Name of the program	The Equity Tax Credit	NB Small Business Investor Tax Credit	Community Development Equity Tax Credit	Direct Equity Tax Credit
Credit as % of Eligible Investment	35%	50%	35%	20% to 35%
Max Credit/ Limits to Deduction	Maximum annual investment $50K; Maximum annual credit $17.5K	Maximum annual investment $250K; Maximum annual credit $125K .	Maximum annual investment $20K; Maximum annual credit $7K.	Maximum annual credit is $50K per investor with a total fundraising cap of $3M per company.
Eligible Companies	Involved in active business or investing in other eligible businesses	Private company incorporated or registered to carry on business in NB	Involved in active business	Must be a Canadian controlled corporation and not a publicly-traded corporation, and with a permanent establishment in NL
Eligibility Criteria re Investee Company Size and Locus of Activity	Less than $25M in assets and/or revenues. At least 25% of wages must be paid in Nova Scotia	Less than $40M in net tangible assets and the assets and income must be used to generate active business income in NB. At least 75% of wages	Less than $15M in assets and fewer than 100 full-time employees. At least 75% of the wages must be paid in PEI.	Less than $20M in assets and must employ in NL all of the capital raised from investment. Must have no more than 50 full time equivalent positions

		must be paid to residents of NB.		
Minimum Holding Periods	5 years	4 years	5 years	5 Years

♦ Newfoundland and Labrador outlines the areas of which businesses are eligible: Technology, R&D, aquaculture, forestry and agrifood, manufacturing and processing, export and/or import replacement businesses, tourism, cultural industries. Those not involved in these industries are excluded, and these include, for example: Oil and gas development and production/mineral resource exploration; fish harvesting and primary fish processing; any other activity which in the opinion of the Minister is not in keeping with the spirit and intent of this program.

5. ACCELERATING EXPORT GROWTH

The Atlantic economy is reliant on a small number of relatively large established companies and a large number of small and medium size enterprises (the SMEs) distributed throughout the region and forming the economic base of much of rural and small-town Atlantic Canada.[32] This chapter addresses these latter companies with a focus on those that are already exporting, or have the potential to do so. This focus is warranted because exports will largely determine the region's growth given the flat to possibly declining population of the local market. Therefore, those businesses that are able to compete and grow in the global market will be the drivers of Atlantic Canada's prosperity. The Atlantic Growth Strategy depends on their success.[33]

Export performance is the acid test of competitiveness over the longer term as the impact of fluctuations in currencies, commodity prices and business cycles average out. Successful exporters, almost by definition, tend to be innovative and growth-oriented. Compared with businesses that only operate domestically, exporting firms on average have greater productivity, faster growth, create more jobs, undertake more innovation, and tend to have better domestic market performance as well. In short, exporters are the principal source of dynamism in every economy. Based on the metric of export performance, Atlantic Canada has work to do:

- The region's share of Canada's merchandise exports has declined steadily from 7.3% in 2012 to 5.5% in 2016 as Atlantic Canada's exports of goods fell 18% from $31.1 to $25.5 billion.
- The strong merchandise export performance of New Brunswick and Newfoundland and Labrador--$12.2 and $9.1 billion respectively in 2015, which made those provinces the 1st and 4th leading exporters in Canada measured as a percentage of GDP—was sustained by the export of petroleum-related "mineral fuels". In fact almost 60% of Atlantic Canada's goods exports in 2012 were mineral fuels, a proportion that had fallen to 44% by 2016 in the face of global price declines, illustrating the region's heavy dependence on a volatile commodity.
- Atlantic Canada's merchandise exports, *other than* mineral fuels, have grown slowly, from $12.6 billion in 2012 to $14.3 billion in 2016, but still declined as a percentage of the national total from 4.1% to 3.7%, well below the region's share of population and GDP. At the provincial level, the trend in non-fuel exports varied:

[32] According to Statistics Canada definitions, SMEs comprise "small" companies with fewer than 100 employees, and "medium-size" companies with 100-500 employees. In 2015 there were 78,700 SMEs in Atlantic Canada of which 77,312 (98.2%) were small and 1,389 were medium-size. There were 191 "large" companies having more than 500 employees. As a percentage of the Canadian totals, these numbers closely track the region's share of the national population with only a very slight bias toward the smaller companies.

[33] The majority of Atlantic Canada's GDP and employment (as is the case in all provinces) is generated in domestic sectors including a great deal in public services, construction and others that are relatively shielded from international competition. These sectors are hugely important, and dominate the economy, but they are mostly not at the cutting edge of innovation and productivity, and their growth is largely limited by that of the provincial population and tax base. It is primarily exporters that will drive growth.

- NL from $4.0B in 2012 to $3.2B in 2016—down 19.9%
- PEI from $0.84B to $1.25B—up a strong 48.8%
- NS from $3.7B to $5.1B—up 40%
- NB from $4.1B to $4.7B—up moderately by 13.8%

- Approximately 2.7% of Atlantic Canadian companies—about 2,200 out of more than 81,000—exported in 2016 as compared with 3.9% of companies nationally. The percentage of the region's firms that exported actually declined from 3.0% in 2011 to 2.7% in 2016 with the drop concentrated in NL and NB, more than offsetting increases in NS and especially in PEI.[34]

Table 5.1 summarizes the provincial distribution of goods exports in 2014 and illustrates their concentration in non-Asian markets (principally the US of course) and in resource products—PEI being relatively the most diversified in both respects.

Table 5.1 International Exports of Goods: 2014

NL		**PEI**		**NS**		**NB**	
TOTAL ($ Billion)	**$13.08**		**$1.12**		**$5.37**		**$13.02**
Destination	**Share**	**Destination**	**Share**	**Destination**	**Share**	**Destination**	**Share**
US	52%	US	61%	US	72%	US	92%
Italy	11%	So Korea	4%	China	5%	India	1%
UK	7%	France	4%	Indonesia	2%	China	1%
Netherlands	5%	UK	3%	UK	2%	Turkey	1%
China	5%	Australia	3%	Netherlands	2%	Japan	1%
Top 5 as % Total	***81%***		***74%***		***83%***		***94%***
Top 5 Exports	**Share**	**Top 5 Exports**	**Share**	**Top 5 Exports**	**Share**	**Top 5 Exports**	**Share**
Mineral Fuels	75%	Preserved foods	19%	Fish & seafood	22%	Mineral Fuels	67%
Mineral Ores	16%	Fish & seafood	19%	Rubber & related	22%	Fish & seafood	6%
Fish & seafood	6%	Machinery	16%	Mineral Fuels	14%	Wood & related	4%
Paper & board	1%	Vegetables	6%	Paper & board	6%	Paper & board	4%
Prep. meat & fish	1%	Elec. Machinery	4%	Wood pulp	4%	Wood pulp	4%
Top 5 as % Total	***98%***		***64%***		***68%***		***86%***
Exports as % GDP	***40.7%***		***18.6%***		***20.7%***		***45.7%***

A substantial degree of resource dependence is inevitable for Atlantic Canada given its natural endowment and upstream, commodity-oriented position in North American and global supply chains—characteristics that the region shares with much of Canada. Resources can of course underpin prosperity and be the basis for many internationally successful companies. But the key to mitigating the volatility of a resource economy is to add greater value to each unit of the underlying resource and to establish broadly diversified export markets. There are many Atlantic Canadian companies of all sizes and sectors that have mastered the formula. There are just not nearly enough of them. As a *group*, the region's businesses—particularly small and medium-size enterprises in the traditional resource sectors, in manufacturing, and in tourism understood as an

[34] *Atlantic Canada needs more, larger exporters*; APEC Report Card, October, 2017.

export earner—need to raise their export game substantially if the Atlantic Growth Strategy is to achieve its objectives. There are two principal challenges to overcome.

The first relates simply to knowledge and awareness. As stated by the Advisory Council on Economic Growth (in the Canadian context, but likely even more the case in the Atlantic region): "The majority of small businesses in Canada do not export at all and do not know where to start. A recent survey showed that nearly 65 percent of Canadian companies do not know how to sell their goods and services overseas."[35] Pressed for time, many SMEs do not know very precisely their current competitive position, or where they need to invest in order to succeed globally. Many are not aware of, or do not fully understand, the export services and programs available to them or where to look for help at different stages of the export readiness process. They need direct and customized support to raise awareness of possibilities.

The second and more fundamental challenge is that many smaller businesses believe that the potential reward for the time and expense to enter an unfamiliar market; or to make a significant investment in a leading-edge piece of equipment; or in product development, is simply not worth the risk. Decades of experience trying to promote economic growth in Atlantic Canada have shown that the conservative attitude is very hard to shake. There is a reason for this. It is because the attitude is often quite *rational* given expectations regarding the trade-off between risk and reward in a chronically lagging economy. Better to stick with the tried and true, so long as it continues to provide a comfortable living, rather than put one's business on the line.

That is why a government program to improve the export performance of Atlantic Canadian SMEs must be tightly focused on reducing the perceived risk of an ambitious export strategy while increasing awareness of the reward and of how to achieve it. The effectiveness of such a program in changing behaviour will be greatly amplified if accompanied by a strong signal from the market. Fortunately this appears to be happening in manufacturing and resource sectors in Atlantic Canada. Officials in ACOA are seeing greater preparedness to invest in advanced equipment, at least in part to cope with a tightening labour supply. This trend augers well for productivity growth and greater export competitiveness and will increase business receptivity for government programs to encourage investment in advanced technologies.

To address these fundamental issues the federal and Atlantic provincial governments have committed to an "Atlantic Trade and Investment Growth Strategy" which calls for investment of $20 million over the next five years to implement firm-focused, strategic market development plans and targets to be achieved by 2025 (Box 5.1). Although the Trade and Investment Strategy is not limited to SMEs, these are the companies most in need of government program innovation to foster better export performance.[36] To that end, and in the context of the export-related goals

[35] *Positioning Canada as a Global Trading Hub*, February, 2017, p 10.
[36] In 2016 about 89% of the 2,200 exporting firms in Atlantic Canada were "small"—fewer than 100 employees. These 1,960 companies accounted for about 26% of the region's merchandise exports. Of the small exporters about 210 had between 50 and 100 employees and were responsible for approximately 8.5% of exports with a per-firm average of roughly $8 million. (Deduced from APEC Report Card, October 2017.)

of the Trade and Investment Strategy, the Atlantic Growth Advisory Group recommends as follows:

***Recommendation 5*: Establish, under the Atlantic Trade and Investment Growth Strategy, a pan-Atlantic "SME Export Accelerator" program.**

The objective would be to increase significantly the export ambition and capabilities of selected SMEs through an intensive program of export strategy development and coaching led by world-class experts. The SMEs targeted by this program would fall into three broad categories:

- *Dynamic firms*—those that are already growing and productive, investing in innovation and exporting widely, but have the early potential to scale and become large companies.
- *Opportunity firms*—those with global growth potential but are less productive, investing insufficiently in innovation to compete globally, but have demonstrated export ambition.
- *New exporters*—businesses, often still very small, with real growth potential but not currently exporting in any significant way and in need of extensive coaching and other encouragement to compete in export markets.

Box 5.1 Atlantic Trade and Investment Growth Strategy

The *Atlantic Trade and Investment Growth Strategy* aims to grow exports and boost foreign investment in the region. The Government of Canada (under the lead of ACOA together with Global Affairs) and the four Atlantic provincial governments have committed to working together to increase the number of exporters, the value of export sales, export markets and foreign investment in the region. To support the strategy, the partners have signed a joint Atlantic Trade and Investment Growth Agreement. This calls for investment of $20 million over the next five years to implement firm-focused, strategic market development plans to expand Atlantic Canada's international business activities. Specific goals of the Strategy are to, by 2025:

- Double the number of exporters;
- Increase the value of Atlantic exports by 30%;
- Increase the percentage of Atlantic firms exporting to more than one market to 40%; and
- Increase foreign investment in Atlantic Canada.

Activities under the *Strategy* will focus on four priority areas:

1. Foster an Atlantic culture for exporting.
2. Ensure Atlantic firms are prepared and have the skills to succeed.
3. Diversify and expand into international markets.
4. Attract foreign investment to Atlantic Canada.

The partners will engage other federal and provincial departments and organizations in the development and implementation of specific initiatives in support of this strategy.

Key Features of the SME Export Accelerator

a) Overall responsibility for the program would rest with ACOA in collaboration with its Provincial and federal partners in the Atlantic Trade and Investment Growth Strategy. If successful, the program concept could eventually be implemented nationally and perhaps extended to a broader group of established businesses in need of mentorship to accelerate their growth and scale-up.

b) The general structure and content of the program would be developed and run by a top-tier consulting firm with a global reputation (the "Leader"). The distinguishing feature of the program will be the quality and reputation of the "faculty". The Leader and Mentors—see (e) below—have to be genuinely world-class. Otherwise the selected SMEs will not be attracted and sufficiently committed, and the best Mentors will not devote their valuable time.

c) The SME participants would be selected based on assessment of likelihood to benefit, including, for example, the commitment of the CEO and metrics demonstrating growth, investment and willingness to pursue broader export opportunities. There would be a range of firm size and experience. The companies would have characteristics similar, but not necessarily identical to those being targeted by the new federal *Accelerated Growth Services* initiative (Box 5.2). The program would be sector agnostic apart from its export focus. A company could only be selected *once* to discourage "perpetual students" and to ensure opportunity for as many SMEs as possible.

d) The participants selected in a given year would be organized in one or more cohorts. The size and selection of a cohort will need to consider group dynamics so as to achieve manageable numbers (e.g., about 10-15 companies per cohort) and a good mix of experience, size and sectors. Because building sustainable export capability takes time, the participants in a particular cohort would remain together, meeting perhaps quarterly (e.g., over a weekend), for two to three years.[37] The final year should include visits to target markets to crystallize the export strategies that had been developed. Participants that turn out not to be fully committed and making progress toward agreed milestones should be cut. Only a genuinely committed group would "graduate".

e) The participating SMEs would be mentored by entrepreneurs and senior executives ("Mentors") that have significant export business experience.[38] Often these highly qualified individuals want to help others, but their assistance needs to be well-structured to fit with their available time. The program would provide that structured opportunity for the Mentors and would ensure actionable, nuts-and-bolts advice for the participants.

f) Participants, the Leader and Mentors would collaborate to: (i) understand the broad export landscape, its evolution and emerging opportunities; (ii) determine what the participating

[37] Details like this would be worked out in consultation involving government, the Leader and SME groups, in the context of a target number of "graduates" of the program over, say, five years and the budget available.

[38] Mentors from outside Canada could presumably be readily accommodated under the Global Talent Stream (of the Temporary Foreign Workers Program) which aims at a 2-week approval of an entry permit.

companies need to do to become globally competitive; and (iii) develop a plan to advance as an exporter including: specific detail regarding opportunities created by Canada's bilateral and multilateral trade agreements; requirements for people and investment in equipment, R&D, and market presence; identification of the appropriate existing government resources for export development. In the latter regard, the SME Export Accelerator program would complement and collaborate closely with the Accelerated Growth Services initiative.

g) Ideally, the program should be supported by an earmarked "Export Accelerator Fund" to provide customized financial support through grants/loans to promote export success. Alternatively, the various government programs and resources co-ordinated by the Accelerated Growth Services initiative could give preference to graduates of the SME Export Accelerator.
h) The operating cost of the SME Export Accelerator—i.e. fees for the Leader and Mentors; facilities and related costs associated with cohort meetings; and government staff resources—could be partially met from a portion of the $20 million identified for the Atlantic Trade and Investment Strategy. Participating companies should themselves bear a share of the cost and government assistance should be front-loaded to encourage up-take. A portion of the Leader's fee could be performance-related and based, for example, on metrics that track improvement in the export performance of participating SMEs. This would provide not only an incentive for the Leader but also the discipline of built-in assessment of the program's value.[39]

Benefits of the SME Export Accelerator

The objective of the program, and the measure of its success, will be a significant and sustainable improvement in the export performance of Atlantic Canada's SMEs.

- The program will build awareness of market opportunities backed-up by practical, customized advice from experienced exporters in order to instill confidence that ambitious export objectives can be achieved. Business mentors who have had on-the-ground experience will be the key to credibility.
- It will support planning and investment in the skills, equipment and intangible assets (e.g., data bases, business processes, R&D) needed to achieve the export objectives of a participating company. This would be accomplished by guidance in assessing existing government programs through the Accelerated Growth Service and by financing provided potentially by an "Export Accelerator Fund".
- The "cohort" feature of the program—in which a group of companies participate together—is an essential ingredient. It creates an environment in which participating companies share experience and insights that will (a) significantly amplify and complement the mentored aspect, and (b) result in an on-going network of relationships among program graduates as well as with mentors, and thus continue to deliver benefit long after the formal program

[39] The consulting firm (or firms) selected as Leader(s) would have the additional motivation of making contact with potential future customers. Some participants in the program could be expected to subsequently become clients.

experience ends. Indeed, many graduates of the program are likely eventually to become mentors themselves. The companies assigned to a given cohort should not include direct competitors so as not to discourage open discussion. Companies from the same sector might nevertheless be put together provided they were of very different size or addressed different segments of the market.

- Most importantly, the program should generate, via a "demonstration effect," a new success dynamic among Atlantic SMEs as more and more graduates of the program achieve their export goals. That is why it is so important at the beginning to select and support potentially strong businesses to get the program successfully launched, rather than try to prop up weak performers. Because the program is selective, targeted on strength, and delivered by world-class experts, it will confer prestige and create a strong incentive to be selected and to graduate. Eventually a *tipping point* would be reached where skepticism evaporates and everyone wants "to get with the program". By that time, the program will have induced a culture shift that leads many more Atlantic SMEs to succeed as exporters.

Box 5.2 Accelerated Growth Service

The Accelerated Growth Service is a national initiative, launched by the federal government in June 2016, with a mission to seek out new high-impact firms and help them grow. ACOA has been leading the delivery of the Service in Atlantic Canada in collaboration with other federal organizations, including ISED, BDC, Export Development Canada, NRC, and the Trade Commissioner Service. In January 2017, the Atlantic premiers agreed to join as full partners to coordinate both federal and provincial support for high-growth companies in the region.

The Accelerated Growth Service *coordinates* (but does not deliver) government support in areas such as financing, advisory support, export and innovation services. Acting as a 'one-stop shop', each participating company has a dedicated client lead supported by a team consisting of one representative from each participating government department. The team, in partnership with the company, identifies growth challenges and works collaboratively with the company to develop a plan to determine how government resources can help address these challenges. The delivery model is designed to save the companies valuable time and to provide them with assistance closely tailored to their needs. Participating companies must meet the following eligibility criteria:

- Annual revenues of more than $5 million
- A capacity and willingness to grow
- A strong management team
- A focus on export markets
- A focus on innovation
- An ability and willingness to invest time and resources to expand

Participating companies are monitored to assess jobs created; increase in sales both domestic and export; and the array of government programs accessed. (There is no time limit for a company's

participation in this initiative.) A number of Atlantic Canadian high-growth companies are already engaged in the Accelerated Growth Service—37 as of May, 2017. They are distributed among the four provinces in both urban and rural areas and represent a variety of sectors including manufacturing, agriculture, clean tech, information and communications technology, food processing, aerospace, and services. It is anticipated that 60 firms in Atlantic Canada will have joined the program by the end of this fiscal year.

Engaging New Talent to Promote Export Success

The effectiveness of the SME Export Accelerator could be amplified substantially if it were complemented by measures to encourage SMEs to hire individuals with the skills and motivation to pursue export expansion vigorously. For example, a new graduate with a Master's degree in a technical subject, and with a yen for business, can have a transformative impact on a smaller enterprise that has been reluctant to invest in equipment or R&D to improve export competitiveness, or to explore a new export market opportunity. Recent graduates from foreign countries bring special value in this regard in view of their fluency in the language and cultures of their home market as well as a demonstrated willingness to engage with the world.

One potentially powerful initiative would be to "infect" SMEs with highly-qualified talent trained at the leading edge of a relevant field, equipped with a global outlook, young enough to see a bright future, and lacking the experience to know that "it can't be done". People with this kind of talent and outlook are, in effect, a type of "benign virus" capable of spreading an export culture through Atlantic SMEs. Government can hasten the replication of the "virus" through a program that creates a compelling incentive for SMEs to hire qualified young graduates, typically (but not necessarily) at the Master's level, and certainly including those who have come from countries or regions with potential to be new or growing export markets.

The Export Accelerator program should be complemented with an "Export Talent Attraction" incentive that would provide time-limited wage subsidies to selected SME exporters that hire recent highly-qualified graduates of Atlantic Canada's post-secondary institutions.

a) Support should encourage employment for an extended period—e.g., at least three years—in order to be effective in changing the behavior of the host business. It can be expected that some portion of the hirees would remain with the host company indefinitely and eventually be candidates for executive positions or owner succession.
b) The incentive might need to be quite large initially to meet the salary expectations of highly-qualified talent and front-loaded to increase the incentive to hire—e.g., as much as 50% of first year salary, declining to perhaps 10% in the third and final year of support.
c) Eligible hirees would include foreign grads of Atlantic PSEs that also qualify under an immigrant program.

Looking Forward

The entry into force of CETA—the Comprehensive Economic and Trade Agreement with the European Union—has created exceptional new opportunities for Atlantic Canada's SME exporters. Our region has an obvious locational advantage and more than half of Atlantic SME exporters already have traded with EU countries. The SME Export Accelerator will certainly help businesses develop export strategies not only for Europe but also for Asia, the Middle East, Latin America and Africa, many of which remain virtually untapped by Atlantic Canadian SMEs.

Beyond market knowledge and strategy is the very practical need for small companies to get their products in front of customers, sometimes as samples, and sometimes as small shipments well short of a full container load. In the case of Europe, for example, there is a need for bonded warehouse facilities where SME exporters can hold goods from which to provide samples and small shipments. As small Atlantic exporters begin to focus intently on the CETA opportunity, a period of government assistance will likely be needed to offset some of the leasing cost of warehousing until sufficient volume builds up to make unit cost affordable. This will have to be integrated with a logistical system reaching back into Canada and with the full range of government export support programs. It will be important to achieve economies of scale—e.g., to efficiently consolidate small shipments into containers.

Collaborative pan-Atlantic approaches are clearly needed to achieve scale. These will likely be most effective if managed on a sectoral basis that can bring together all the elements of a supply chain and businesses that have the shared interests and common needs associated with a particular sector like "agfood" for example. An organizational structure that could serve the purpose—dubbed an "Innovation Marketplace"—is described in Chapter 9.

6. RECONCILING REGULATION ACROSS ATLANTIC CANADA

Regulation is an essential feature of governance, serving not only to protect health and safety but also to enable efficient functioning of the economy.[40] That said, badly designed regulation saps economic performance and in some cases regulation can be misused in an attempt to benefit one jurisdiction at the expense of another, often through explicit or implicit restrictions on trade, investment or labour mobility. Reform to reduce the cost of regulation, while preserving its necessary objective, therefore needs to be an on-going feature of good economic management. The task is to ensure the efficiency and effectiveness of regulation both within a jurisdiction and among the jurisdictions with which one has significant economic interaction. The focus here will be on measures to make commerce *across* Atlantic provincial boundaries as efficient as possible.

The Atlantic Provinces cannot afford regulatory barriers, often unintended, that limit trade, investment and the mobility of workers within the region, or with the rest of Canada for that matter. Such barriers—in the form of costs to business due to compliance, administrative burden, and sheer inconvenience resulting from *unnecessary* differences among provincial regulations—are particularly damaging to the Atlantic economy. This is because they fragment a market that is already small, thus increasing diseconomies of scale and discouraging business investment. It has been estimated for example that removing all interior barriers to trade would produce more than twice the relative economic gain for Atlantic Canada as for Canada as a whole. The Atlantic provinces will therefore gain disproportionately from measures that reduce or eliminate regulatory barriers to commerce within the region.

The four provincial governments have recognized what is at stake, having (i) agreed to a common Charter of Governing Principles for Regulation; (ii) passed Regulatory Accountability and Reporting Acts; and (iii) established in 2015 a Joint Office of Regulatory Affairs and Service Effectiveness. In particular, Nova Scotia has been among the leaders in Canada in implementing standing procedures to ensure that the cost and benefit of regulations are rigorously assessed and that businesses receive advice regarding compliance. More broadly, there has been encouraging progress by the Provinces regarding regulatory reconciliation in several key sectors including, for example, technical measures affecting aspects of trucking, procurement, workers' compensation and labour standards. While demonstrating what is possible with collaboration, these have still only scratched the surface.

[40] The free, unregulated market is an idealization that can never work in practice due to a number of well-recognized "market failures". Regulation is usually needed to mitigate these failures, in which case it promotes economic efficiency. For example, one of the most common market failures arises from collective action dilemmas—situations where the rational actions of an individual are destructive when carried out widely. The classic example is the parable of the Tragedy of the Commons, where each livestock owner has an incentive to graze as many animals as possible on a common pasture; but when all do so, the pasture is destroyed by over-grazing and everyone ends up worse off. Analogous situations arise everywhere in the economy and regulation is needed to change incentives to curtail self-defeating behaviors. In short, modern economies cannot function without intelligently designed regulation.

A challenge remains to *increase* momentum toward regulatory optimization and to harmonize, or otherwise reconcile,[41] differences in regulation among the Atlantic Provinces that have the effect of discouraging trade, investment and economic development of the region as a whole. The problem is that maintaining focus on regulatory reconciliation is inherently difficult because the work is technical and thus rarely on the public radar screen, except when controversy erupts. It can conflict with a variety of vested interests in each jurisdiction, and it may be seen in some cases as undermining provincial legislative autonomy. That is why a commitment to regulatory reconciliation in Atlantic Canada *must* be championed and clearly communicated from the top. In practical terms, this will require from each Province the assignment of modest *full-time* resources and sustained senior priority.

There would be a further, more indirect, benefit from broad-based regulatory reconciliation within the region. The Atlantic Provinces are often criticized in media and policy circles for doing too little to "get their act together" by collaborating to reduce many of the costs associated with operating four sub-scale jurisdictions. While such criticism is often not justified by the facts, it can negatively condition the national political attitude. An initiative to achieve Atlantic regulatory reconciliation would be a compelling counter to an image problem the region can ill afford.

Fortunately, the subject is on the front burner now with the entry into force on Canada's 150th birthday of the Canadian Free Trade Agreement—a modernization and strengthening of the 1995 Agreement on Internal Trade. The new CFTA has established a national Regulatory Reconciliation and Co-operation Table (RCT), a federal-provincial-territorial forum to address barriers to trade, investment and labour mobility within Canada (Box 6.1). It would serve the collective economic interest of the Atlantic Provinces to show leadership in regulatory reconciliation within the region and by so doing to demonstrate to the nation what the RCT can achieve. This would, at the same time, create broad benefits for the Canadian economy at a time when trade liberalization is under attack in the US and some other advanced nations.

Box 6.1 Regulatory Reconciliation Under the Canadian Free Trade Agreement

The CFTA establishes a regulatory reconciliation process that will help to address barriers to trade, investment or worker mobility that companies may experience when doing business across provincial borders. The process would be brought into play when, based on information provided by stakeholders or other sources, a potential barrier to internal trade is identified by a government. A diverging regulation that impedes the flow of goods is an example of the kind of barrier that the process seeks to address.

Once a barrier to trade has been identified, a government can submit the matter to the Regulatory Reconciliation and Cooperation Table for reconciliation. The members of the RTC are appointed by the First Minister of each jurisdiction. To deal with any specific case, the RTC appoints a working group of

[41] The term "reconciliation" is broader than "harmonization" since the former encompasses a variety of approaches including mutual recognition, equivalency, or any other agreed method that reduces the cost of non-reconciliation.

relevant experts who then negotiate a consensus "Reconciliation Agreement" which details how the barrier will be addressed—e.g., mutual recognition, harmonization, or some other method—and the timeline for implementation. (Reaching consensus will often be difficult, so there will be a need for innovative approaches to the process. One possibility is proposed in Recommendation 6.) Governments may opt out of negotiations if they determine that reconciliation is not a desirable option for their jurisdiction. Governments that agree to adopt a Reconciliation Agreement will be bound to adhere to the commitments that it contains.

***Recommendation 6*: Implement a process to reconcile, in a much more timely way, existing regulations that unreasonably impede trade, investment and worker mobility within Atlantic Canada.**

There is an enormous body of existing regulation—in transportation, employment standards, occupational safety, public procurement, business registration, licensing of physicians, environment, among others—that differs among the four Provinces in ways that impede commerce or efficient service to the public but are not essential to the regulatory objective(s).[42] They are distinctions without a difference. The result is what has been called "the tyranny of small differences." The great majority of regulations in fact address issues common to the four provinces, but because they were developed independently in legislative silos, they inevitably contain differences, mostly inadvertent but occasionally to favour local vested interests. Experience has shown that, despite the small differences, inter-jurisdictional reconciliation is difficult and usually painfully slow. It resembles chipping away at an iceberg with a teaspoon. Procedural innovation is therefore needed to accelerate the process.

The key roadblock arises from the fact that when "sovereign" jurisdictions (like the four Atlantic Provinces) attempt to reconcile, there is no supervening authority to break a stalemates and force a timely conclusion. So even though substantive differences may be slight, why should jurisdiction A's version of a particular regulation be favoured over jurisdiction B's? Moreover, there will always be a case to be made that B's circumstances are not quite the same as A's.

How might such impasses be broken? The easiest solution would be through mutual recognition—acceptance by each Province of those who are compliant with the comparable regulation in another Atlantic province. In cases where this approach fails, harmonization to a common Atlantic regulation would be an alternative. The following procedure—which is compatible with, although an extension of, the reconciliation procedure in the Canadian Free Trade Agreement—might be employed to efficiently reach a *timely* conclusion in the case of regulatory harmonization.

a) Agree first on a set of regulation topics to be harmonized—e.g., all those dealing directly or indirectly with interprovincial transportation. It is very important at this initial step to be guided by the advice of stakeholders as to the regulations that should receive the highest

[42] One example of relevance to the Atlantic "digital health" strategy recommended in Chapter 10 concerns regulations regarding the practice of telemedicine across provincial borders. There are differences among the Atlantic Provinces in respect of licensing requirements to provide telemedicine services *into* a province. While the differences do not appear to be warranted for any compelling policy reason, they have nevertheless persisted. They might be addressed through the procedure proposed in Recommendation 6.

priority for harmonization. Stakeholder input will identify the opportunities with greatest payoff and will also help the individual jurisdictions to reach agreement, which might otherwise be difficult, on the scope of the harmonization initiative.

b) For any specific sub-topic—say winter load restrictions for trucks—there will typically be four versions of the regulation, one for each province. In what follows, each such group will be referred to as a "quad."
c) Select at *random* a quad from the set of regulations agreed at (a). Also select at random one of the four Provinces whose version of the regulation is then designated as the *default* version. (As the process continues from one quad to the next, a new Province is selected to have the default version until all four have been chosen once. Then the procedure iterates ensuring that no Province is favoured.)
d) When a particular quad and default version have been selected there is discussion among expert representatives of the four Provinces as to improvements that might be made in the default version. A time limit would have been set *beforehand* for this stage of the process (e.g., a week) and this would vary depending on the complexity of the particular regulation.
e) If consensus is reached within the time limit, the (revised) default version becomes the harmonized regulation. If full agreement cannot be reached within the allotted time, the original default automatically becomes the harmonized regulation, although revised if possible with those specific changes for which there is unanimous agreement. The key innovation in this procedure is that it *forces closure* and creates a powerful incentive for those not holding the current default position to make constructive suggestions as to improvement and to reach a common position. The default holder, on the other hand, might initially feel little pressure to concede anything. But this is an iterated process which cycles repeatedly to step (c) above until all of the regulations selected at step (a) have been addressed. The current default holder will only have that position a quarter of the time. So non-cooperative behaviour will be disciplined by the other parties. The net result of peer pressure will be to create a potent incentive for all-party collaboration.
f) The foregoing procedure would be overseen by the existing Joint Office of Regulatory Affairs and Service Effectiveness.

On the assumption that the recommended procedure would be applied in cases where distinct versions of a regulation constitute "distinctions without a difference," no Province should feel aggrieved. On the contrary, the process would engender a spirit of compromise and almost certainly would result in *improved* regulation (four heads being better than one) as well as harmonized regulation. Of course the procedure could only be applied if there were agreement at the outset by the provincial governments to be bound by its results. To that end, it might be trialed first on a group of regulations that were relatively uncontroversial or for which there was strong stakeholder pressure for harmonization.

There may be concern that implementation of Recommendation 6 at the Atlantic regional level could cause confusion, or even conflict with the national process of regulatory reconciliation just established as part of the Canadian Free Trade Agreement (recall Box 6.1). This is a valid concern but is mitigated by the following considerations:

- The novel reconciliation process described in Recommendation 6 is far more likely to be first tried at the Atlantic scale than at a Canada-wide scale and could be explicitly recognized by the RTC as a pilot "experiment."
- The Atlantic pilot project could be implemented quickly given the experience and existing administrative capacity of the Joint Office.
- Any regulatory harmonization achieved by the Atlantic Provinces would set an example and in that respect would also reduce the number of jurisdictions to be harmonized nationally (since four provincial regulations would collapse to one regionally harmonized regulation.)
- To further reduce the risk of overlap with the national RTC process, the Atlantic pilot procedure could first address some regulations that were very unlikely to be taken up in the early phases of the RTC.

For these reasons, friction and confusion between the RTC and the proposed Atlantic reconciliation process can be avoided provided there is good communication and a collaborative spirit. In fact, the procedure outlined in Recommendation 6, if it can be made to work in practice at the Atlantic scale, would significantly enhance the prospects of regulatory reconciliation nationally.

7. SUPPORTING INNOVATIVE COMMUNITY DEVELOPMENT

Communities are the fundamental building blocks of society. Strong communities therefore provide the bedrock that is needed to support social, cultural and economic development. How then can we strengthen communities? The first step is to acknowledge that every community begins with some inherent strengths, although they may not be recognized at first even by residents themselves.

Asset based community development ("ABCD")[43] is a form of social innovation that focuses on the assets and capacities of communities rather than on their needs and deficiencies (Box 7.1). As a result, energy is directed toward *opportunities* made possible through the discovery and mobilization of the talents and resources present in every individual and every community. A focus on assets rather than on liabilities provides a better way to harness the creativity, entrepreneurship, and local knowledge of Atlantic Canadians to complement the initiatives of governments to implement the Atlantic Growth Strategy.

But how precisely? The asset-based approach relies on processes of self-realization *within* communities, so one might ask whether there is a role for governments at the provincial or national levels. Is there a risk that the "program" orientation of larger governments, despite being well-meaning, might actually get in the way of the attitude change that is needed to think in terms of a community's capabilities rather than its needs? After all, individuals and communities have become conditioned to identify "needs" and then reflexively look to government for a programmatic solution. This habit is not easy to break. Nevertheless, an ABCD-like process sometimes takes hold spontaneously in a community; often as the result of an initiative by a committed individual or group. The problem is that this can be hit or miss. Might there be a way to plant the ABCD seed more systematically through some generic initiative that powerfully motivates communities to come together collaboratively to seize an opportunity or overcome a challenge?

One way to inspire innovative approaches to new opportunities and challenges has been the use of "prizes" awarded for the best solutions to what has been identified. For example, the XPRIZE is a competition that pushes the limits of what is possible to change the world for the better. It captures the imagination and inspires others, thus accelerating the rate of positive change. Several Atlantic Canadian firms have been involved in XPRIZE applications, including

[43] The term Asset Based Community Development was coined by John McKnight and Jody Kretzmann at the ABCD Institute, now at DePaul University in Illinois. The acronym "ABCD" is a catchy mnemonic for a particular approach to social innovation at the community level. It is the asset-based focus that is the distinguishing feature and this may of course be described by terms other than ABCD. The first international conference on ABCD was held in July, 2009 at the Coady International Institute in Antigonish, Nova Scotia. Established by St. Francis Xavier University in 1959, Coady is a world-renowned centre of excellence in community-based development and leadership education.

Satlantic, Squiggle Park, and CarbonCure. The idea of setting a challenge and providing funds for the best ideas has been finding application in many contexts—see examples in Annex 7.2 to this chapter.

The use of a government-funded "challenge" approach to stimulate community initiatives, and in that way help to implant an asset-based attitude, would have a number of advantages:

- Most significantly, challenges stimulate innovation and community team spirit and, by bringing out the best, act as a creativity amplifier.
- Proposals could be expected to attract commitments of financial and in-kind support from collaborative partners and thus would not only increase the engagement of those in the community with financial resources or special skills but would also multiply any contribution by government.
- The selection of awardees by independent panels, according to transparent criteria and procedures, would insulate the process from political partisanship and charges of bias.
- The challenges could be conducted with relatively modest administrative overhead—essentially a small group to manage the calls for proposals and to support the adjudication panels.

Box 7.1 What is Asset Based Community Development?

Asset Based Community Development (ABCD) is a *strategy* for sustainable community-driven development. The basic premise is that communities can drive the development process themselves by identifying and mobilizing existing but often unrecognized assets, and thereby responding to and creating local economic opportunity. The essence of ABCD can be illustrated by contrasting two views of community development:

A Traditional View	**The "ABCD" View**
The Glass is Half Empty	The Glass is Half Full
Focus on what is NOT here	Focus on what IS here
• Services to meet needs • Clients/Consumers • Programs are the answer	• Connections/Contributions • Citizens • Local people are the answer

An ABCD Parable

The village elders had failed time after time to resolve a difficult problem. They invited a very wise person from another village to come and help them. She asked them: "Do you know what I am going to tell you?" In unison they responded, "NO". The wise woman replied, "You will only learn what you already know, and if you don't know, I am leaving." She left. Months passed and the problem didn't go

away. The elders debated and issued a second invitation to the wise woman. In advance of her arrival, they coached the villagers.

When the woman arrived the second time and again she asked, "Do you know what I am going to tell you?" "YES" they all said. "But if you already know, then I have nothing to tell you." She left. After many months, they issued a third invitation. This time they were ready.

"Do you know what I am going to tell you?" Half the villagers shouted "YES"; the other half shouted "NO". The wise woman looked at the people and said, "Those who know should now get together with those who don't; and then you will all know." She never returned.

That night, an elderly woman had a dream. "A voice told me the meaning of the message from the wise woman. We already know that the wisdom of locals will always exceed the knowledge of the experts. We just don't have the confidence to believe in ourselves."

In view of the beneficial features of the "community challenge" as a way to foster asset-based development, the Advisory Group recommends as follows:

***Recommendation 7*: Create a "Community Challenge Fund" that would invite Atlantic Canadians to develop proposals to build on local assets to be employed in innovative community development projects.**

The Challenge Fund might be implemented as follows:

a) Individuals and groups would be invited to collaborate to bring forward proposals containing their best ideas for leveraging local assets in any of the social, cultural, environmental or economic domains. For example, a community might develop a way to welcome immigrants of widely varying backgrounds; implement the approach; and then prepare and communicate to other communities a "toolkit" so that the approach could be replicated widely. Or a community could identify one or more cultural assets which, if developed more fully, would enhance not only a sense of self and place but also the local tourism economy. The possibilities would be limited only by the imagination of Atlantic Canada's communities which, with a nudge of encouragement, would be unbounded.
b) Proposals to the Challenge Fund would be adjudicated by an impartial panel outside of government consisting of individuals of broadly recognized integrity as well as experience regarding social innovation in a community development context.
c) The selected proposals would receive support from the Challenge Fund augmented by an amount[44] from the Province(s) in which the project is to be located.

[44] The Provincial contribution could be in the form of a percentage of the contribution from the Challenge Fund—i.e. a form of matching.

d) A Challenge Fund toolkit should be prepared to provide assistance to community groups in the development of proposals. There are a great many resources already available on the web that can assist—e.g., Bank of I.D.E.A.S.
e) To initiate the process, a joint ACOA-Provincial steering group should consult broadly with community stakeholders, and others with social innovation experience, as to the best design and governance of the Challenge Fund.[45] This would include, for example, the scope of eligible proposals, selection criteria, eligible participants, and method of selection of adjudication panel(s).
f) The federal contribution to the Community Challenge Fund could draw on ACOA's Innovative Communities Fund.

Further work will be needed to develop the application and selection criteria, but considerations such as the following might apply, not all of which would be of equal weight:

- *Excellence and Impact* —Extent and quality of contribution to community development employing innovative methods
- *Collaboration*—Breadth and depth of the group of community stakeholders and private sector contributions making the proposal; some projects might be able to achieve regional collaboration
- *Leverage*—Contribution of non-government resources (cash and in-kind) and use of existing assets in the community; potential of the proposed initiative to be shared and applied in other communities
- *Sustainability*—Prospect of the initiative continuing after support from the Challenge Fund ends
- *Diversity*—Involvement in the proposal of disadvantaged groups and areas
- *Additionality*—Extent to which proposed actions would be unlikely to happen without the Challenge Fund award.

Initially, the most compelling proposals would likely come from communities that already possess considerable social capital—e.g., a high level of volunteerism and many active community improvement groups. That is to be welcomed since the Challenge Fund will need excellent proposals at the outset to demonstrate value and set a standard. The philosophy is that success breeds success, and as examples accumulate others will realize that they can do it too.

---

[45] The Regional Growth Fund in the United Kingdom is one excellent example of using a challenge model to drive local community development. The Fund, established in 2010, awards significant amounts in support of a broad range of community-based economic development activities. Proposals are judged by a panel of individuals outside of government. The Fund supports projects and programs—including capital, training and innovation—and complements private sector investment.

Annex 7.1 The Aviva Community Fund

Aviva invests in community initiatives across Canada and has provided more than $8.5 million in project funding through 2017. There are four project categories for submission that address community development, health, resilience, and legacy. There are three funding levels: (1) smaller projects receive up to $50,000; (2) "large" ideas $50,000-$100,000; and (3) one community legacy idea receives $150,000. Projects are selected based on a combination of community voting and panel decision. In 2015, the Dartmouth, NS "North Good Food Market and Café" won a "large" award for a project to increase access to low-cost, fresh, local produce and to provide a community space where residents can interact.

Annex 7.2 Supporting Innovative Responses to Challenges

Grand Challenges Canada encourages ideas with big impact by funding innovators in low- and middle-income countries as well as in Canada. Supported by the federal government and other partners, Grand Challenges Canada has funded over 800 innovators in more than 80 low-and middle-income countries and Canada to encourage bold ideas that integrate science and technology with social and business innovation. Grand Challenges Canada estimates that these innovations have the potential to save up to a million lives and improve up to 28 million lives by 2030.

The Swedish International Development Agency (SIDA) Challenge Fund uses challenge funds to finance entrepreneurs that have a strong commitment to drive sustainable development. The objective is to discover innovative and unconventional solutions to development issues. The funds are mostly aimed at entrepreneurs who lack the capital to start up their business or to scale a small project or business venture into a larger one. SIDA seeks to give social businesses a chance to try their innovative ideas. By taking some of the initial risk via investments through a Challenge Fund, SIDA can help social businesses to become self-sustaining.

Smart Cities Challenge: Canada's Budget 2017 embraced the "challenge" approach to catalyzing innovation and growth through the Smart Cities Challenge. Smart cities have the potential to improve every aspect of community life – how people move around, live and play, learn and are empowered to participate in society, interact with the natural environment, and how they create safe and secure public spaces. Under the new program, the Government of Canada will work in collaboration with cities that are ready to innovate and take risks – providing financial and in-kind support for their "smart" transformation.

---

8. GROWING EXPERIENTIAL TOURISM

Tourism is one of the world's fastest growing industries, driven by rising affluence, falling air fares, and the widespread adoption of tourism development strategies by national and local jurisdictions worldwide. In Canada, tourism accounts for a little more than 2% of GDP and 720,000 jobs. In 2016 the industry in Canada contributed an expenditure of $92 billion including $20 billion from international visitors. Tourism in Atlantic Canada directly supported almost 9,600 businesses in 2015 and some 57,000 full-time equivalent jobs—almost 8% of the national total as compared with the region's 6.6% share of population. Atlantic Canada's tourism revenue was $4.9 billion—5.3% of the national total and below the average on a per capita basis.

Clearly, tourism is a very important industry in Atlantic Canada, reflecting the region's many advantages as a destination—physical beauty, history, remarkable variety within a reasonably accessible geographical area, and an old-fashioned charm. Despite these, tourism and related cultural activities continue to under-perform relative to the opportunity. Tourism is too often seen as a seasonal employer of last resort, and not as a potential leading sector. But initiatives like the development of Fogo Island and the golfing destination at Inverness show what is possible given vision matched with resources.

The problem is that, with notable exceptions, Atlantic Canada's tourism product has not kept up with the times. What has changed are the expectations of today's more affluent and/or younger traveller—a transformation from *passive* tourism, like sight-seeing, to *active* tourism that emphasizes participatory experiences and learning. The tastes of the prime tourism market are increasingly oriented toward sustainable environmental experience, ideally delivered by those whose cultures are believed to embody respect for, and authentic knowledge of Nature—e.g., the lobster fisherman who takes people in his boat to show how it's done; the marine biologist who teaches the behaviour of whales in the course of sightings; the Indigenous guide who knows where the salmon and moose are. Atlantic Canada is exceptionally rich in such experiential opportunities thanks to two particular advantages: first, plenty of natural and wild space, some of which is reasonably accessible from population centres in the region; and second, a deserved reputation as a relatively unspoiled and charming area of eastern North America.

Atlantic Canada is nevertheless falling well short of the experiential tourism opportunity. This needs to change by building more ambitiously and proactively on the exceptional cultural richness of the region—Indigenous peoples; those of Acadian ancestry; and other groups centered in various parts of Atlantic Canada who have retained distinct cultural identities and have thus sustained a strong sense of place. Developing a world-class experiential tourism industry based on the region's cultural resources would generate not only significant new economic opportunity but would also enrich and sustain Atlantic Canada's unique cultural heritage.

An experiential tourism strategy for Atlantic Canada can build on many entrepreneurial initiatives that have already been undertaken. But a more focused and proactive approach is needed to take the opportunity to the next level. The overall objective is to catch the global wave of experiential tourism by developing the outstanding physical and cultural assets of the region

and substantially up-grading their potential to global standards. It all begins at the community level. Two examples among countless others are described in Box 8.1.

Box 8.1 Experiential Tourism in PEI

Expanding experiential tourism is a key recommendation of Vision 2021, the new five-year tourism strategy for P.E.I. The Province has a website featuring an inventory of what it calls "authentic P.E.I. experiences," with a goal to add 25 new products in 2017. Provided that "experiential businesses" meet a set of criteria, they qualify to join the inventory of authentic P.E.I. experiences which allow the tourist to become intimate with the individuals for whom the experience is their daily life.

One good example is Margaret McEachern♣ of Knit Pickers in North Rustico who realized the potential of creating visitor experiences while working for more than a decade at Avonlea Village. "Workshops give visitors a chance to experience a little bit of what goes on here on the Island." Encouraged by the fact that knitting is making a huge comeback, she is offering workshops in loom knitting, traditional needle knitting and weaving. She is partnering with a neighbouring sheep farm, carrying his wool, and also hoping to team up with a local inn to offer weekend workshops in weaving. "People can stay at the inn, experience some of the lovely restaurants that are in the area, and have a workshop." The provincial tourism department is providing key support with marketing and business plan advice.

Another inspiring example is Tranquility Cove Adventures in Georgetown, founded in 2008 by Perry Gotell, formerly a lobster fisherman, and his wife, Patsy. The Gotells offer a variety of tourist experiences that build on local and professional expertise—a 4-hour giant bar clam dig; deep sea fishing with an on-deck barbeque of the catch; walking tours hunting for starfish and pearls; and guided snowmobile tours that help overcome the seasonal limitations that plague many tourism ventures in Atlantic Canada. The secret to Perry Gotell's success? "When reaching for the bar or industry standards, we always try to exceed them," he says.♦

Individual experience-based businesses may appear to be too small to make a difference. But with encouragement and mutual support, an "experiential ecosystem" can eventually grow to achieve a tipping point where it becomes a widely recognized "branded" destination for the global experiential tourist.

♣ This example is adapted from an article by Nancy Russell, CBC News, March 10, 2017. ♦ Adapted from *Taking Tourism to the Next Level*, EXPLORE Summer 2017.

Within the broader context of tourism in Atlantic Canada, Indigenous experiential tourism, based on authentic cultural practices and skills, is a particularly timely opportunity since it is closely aligned with the preferences of a growing number of global travellers. The Maori of New Zealand provide among the best examples of the potential (Box 8.2). Here at home, the Indigenous Tourism Association of Canada (ITAC) has developed a five-year plan, *The Way Forward: 2016-21*, with national goals to increase the contribution of Indigenous tourism to GDP from $1.4 to $1.7 billion; to increase employment by more than 10,000 from 33,000

currently; and to increase the number of export-ready Indigenous tourism experiences, festivals and events from 80 to 130 by 2021. To achieve these goals and more will require a long-term commitment to concrete measures to develop Indigenous experiential tourism products that meet challenging global standards as well as the marketing skills and resources to make them known to the world. More generally, an experiential tourism strategy for Atlantic Canada will need to focus intensively on developing a better understanding on the international travel market and travellers' expectations.

Box 8.2 The Significance of Maori Culture for New Zealand Tourism

According to Tourism New Zealand, a government agency, the country's unique Māori culture is one of the main reasons visitors come to New Zealand. The number, variety and quality of Māori tourism businesses have increased dramatically over the last few years and the sector now makes an important contribution to New Zealand's regional economies. New Zealand's Māori culture is second only to landscape as the main attraction in the country's burgeoning tourism economy. Experiences such as hiking, white water rafting, art and cultural tours, and interpretation and storytelling are combining the best of New Zealand's spectacular landscape with Māori stories and legends.

Tourism New Zealand's work in Māori development is focused on a few key areas: building TNZ's own internal capacity and understanding of Māori culture; helping build the capability of Māori tourism businesses; and working with international travel sellers to raise awareness of Māori tourism products.

The Advisory Group commends the many steps being taken by the federal and provincial governments to develop experiential tourism broadly, of which Indigenous experiential tourism deserves to be an integral and growing part.

Recommendation 8.1: **Increase support for experiential tourism in Atlantic Canada including a new multi-year initiative to develop Indigenous experiential tourism based on authentic cultural practices and skills.**

The steps outlined below illustrate in fairly broad terms what will be needed to accomplish this recommendation. Although the requirements are described in the specific case of Indigenous experiential tourism, most would have counterparts in a strategy to develop the experiential tourism capacities of other cultural groups in Atlantic Canada.

a) Indigenous groups, in partnership with the federal, provincial and local governments, and private entrepreneurs, would develop and implement an Indigenous experiential tourism strategy in Atlantic Canada. It would feature cultural, skill-building, and investment components to underpin a diverse set of unique tourism experiences. The proposed plan must be distinguished from Indigenous tourism activities involving ownership or operation of conventional tourism facilities. While those have a place and represent important growth opportunities, they are only tangentially related to the concept recommended here.
b) Experiential activities could include, for example: fish and game stalking; backwoods trekking and survival skills; constructing canoes, shelter and clothing; archeology; history

and "politics" from an Indigenous perspective; lessons in Indigenous languages and customs; native cuisine based on both traditional and fully modern recipes (the ultimate locavore experience). Many of the activities can continue year-round.

c) The strategy must ensure delivery of high-quality, authentic experiences. This will require intensive re-skilling since many of the traditional activities are no longer widely practised. But there remains a core group in Indigenous communities who can form the nucleus of teachers who will teach the teachers—see Box 8.3 in respect of canoe-building. The renaissance in Indigenous language education is another example of the approach.

d) Aspects of the core training would be undertaken by Indigenous communities and elders, while other elements could be provided through Community Colleges complemented by private specialists like the Gros Morne Institute for Sustainable Tourism. These institutions would be mandated in partnership with, and under the guidance of, Indigenous experts to develop the required specialized curricula.[46] In addition, government and private benefactors might establish one or more "Indigenous Cultural Colleges"—e.g., functioning in a way roughly analogous to the 77-year-old Gaelic College in rural Cape Breton (Box 8.4) though with a mission focussed on supporting the Indigenous experiential tourism strategy.[47]

e) Government funding would be needed on a sustained, predictable basis (i) to establish and maintain the specialized training programs, and (ii) to assist capital investment in physical facilities and marketing for specific experiential tourism initiatives. The latter would ideally be competitively awarded based on the merit of proposals from Indigenous groups or individuals.

Box 8.3 Keeping a Traditional Skill Alive ♦

The six-year-olds, Tepkunaset and Nakuset, are the great, great, great grandchildren of Joe Jermey, the famed Mi'kmaq birch-bark canoe builder. Their mother, Melissa Labrador, will be helping them dig the 700 feet of spruce roots required for one 16-foot birch bark canoe. "I am the bridge between my children and my father," said Labrador. Other than her father, Todd Labrador, Melissa doesn't know any other Mi'kmaq still building birch bark canoes.

Todd Labrador and Melissa had just finished building a 14-foot canoe with three Mi'kmaq apprentices in Millbrook during a six-week program this summer that aimed to rekindle the traditional skill in a new generation. For Melissa, who has helped her father build nine birch bark canoes, the goal is to build one on her own with his grandchildren. They'll find birch trees around their community of barely a dozen homes and peel the bark back as the sap runs up the tree during the summer months. They'll find a

---

[46] For example, the Nova Scotia Community College has already established an "Experiential Tourism concentration" which might be sub-specialized to offer instruction closely tailored to the Indigenous strategy.

[47] The various training programs would of course be aimed at Indigenous individuals to develop the human resources needed to implement the experiential tourism strategy. But, space permitting, others might be admitted to programs while ensuring priority for Indigenous students. Regarding the potential Aboriginal Cultural Colleges: in addition to the primary mission of training Indigenous people, a College could be an experiential tourism asset in its own right, offering short courses on a fee basis to visitors. This model could naturally be extended to serve other cultural groups in the development of a comprehensive experiential tourism strategy for the Atlantic region.

stand of black spruce and dig up the webs of fine roots. Like Joe Jermey, they'll steam cedar ribs and frame the canoe up with a fair curve. Then they'll launch it in the Wildcat River.

♦ Based on "A Celebration of Mi'kmaq Culture"; Halifax Chronicle-Herald, 25 August, 2017

The Atlantic Indigenous Experiential Tourism initiative needs to be approached with a view to the long term. Although some are ready now, it may take more than a decade to build a critical mass of the capacities, skills and infrastructure to ensure delivery of experiences that meet the demanding tastes of today's tourists, many of whom literally have the world to choose from. That is the challenge. But the opportunity, if done right, is to attract visitors for whom a culturally and environmentally authentic experience is worth almost any price.

Indigenous experiential tourism, as described here, would be a far-reaching initiative to create a new *permanent* industry in Atlantic Canada. It would emphatically not be a make-work sideline. The trained individuals would have lifelong careers conferring prestige and economic success.

Beyond the economic opportunity provided, experiential tourism is an important way to preserve and re-vivify the variety of traditional Atlantic Canadian cultures in a modern context. The initiative is therefore as much cultural as it is economic. But without an economic base, cultures will always be challenged to survive, and without cultural authenticity, experiential tourism cannot be viable economically.

Box 8.4 The Gaelic College

Located in Cape Breton on the edge of St. Ann's Bay near Baddeck, *Colaisde na Gàidhlig* is an educational non-profit institution offering year-round programming in the culture, music, language, crafts, customs, and traditions of the immigrants from the Highlands of Scotland. Currently, students are able to choose to study from over ten traditional arts, including Cape Breton fiddle, piano, guitar, step-dancing, and piping, highland dancing, weaving, and of course Gaelic language.

As the only institution of its kind in North America, students of all ages and skill levels visit the College every year to study under the finest instructors in Nova Scotia Gaelic culture. With an international reputation for its contribution to the preservation and promotion of Gaelic culture, the Gaelic College offers a truly one-of-a-kind learning experience.

Increased support for experiential tourism in Atlantic Canada would be undertaken in the context of the federal government's New Tourism Vision and, in the specific case of Indigenous experiential tourism, in close collaboration with the Indigenous Tourism Association of Canada. ITAC has recently moved to establish an Atlantic Canada chapter with funding support from ACOA's Business Development Program. Collaboration with Parks Canada will also be essential for both Indigenous and other varieties of experiential tourism since national parks are well-endowed with experiential opportunities and parks like Kejimkujik in Nova Scotia and Torngat Mountains at the northern tip of Labrador (Box 8.5) are profoundly rich in Indigenous tradition.

The experiential tourism strategy needs to be spearheaded and implemented by entrepreneurial leaders. It needs to start modestly with public sector support allocated to those who demonstrate genuine commitment. There will be a learning curve. Early successes will inspire others to try. The reputation will grow—among Indigenous and other cultural groups, and within the global experiential tourism community.

History's great wheel has turned full circle. Traditional knowledge and culture, in an authentic lived setting, is a movement whose time has come.

Box 8.5 Torngat Mountains National Park

Located on the northern-most tip of the Labrador Peninsula, Torngat Mountains National Park was formed officially when the *Nunavik Inuit Land Claims Agreement* came into legal effect on July 10, 2008. This magnificent wilderness area will be protected into the future for the benefit of all Canadians in large measure due to the vision and generosity of both the Labrador and Nunavik Inuit. The Torngat Mountains Base Camp Project was created in 2006 to facilitate ease of access and enjoyment for visitors, while maintaining a cost-effective, authentic and reliable system for researchers engaged in scientific and archaeological work.

The Indigenous Canada website expresses eloquently what can be so attractive to the experiential tourist: "Let an Inuit guide lead the way. Soak up the dazzling northern lights and allow them to stir your soul. Go fishing for Arctic char. Then cook it on hot rocks in the tradition of the people who have walked this land for thousands of years. Learn to make bannock. Feeling courageous? Go for a refreshing dip in the Arctic Ocean. The Torngats are a very spiritual place. You meet elders and you feel the history of the Inuit around you and the land speaks to you. You leave with a sense of what the land can provide for people."

Connecting tourists to experiential destinations

The experiential tourist in Atlantic Canada may aspire to a destination in a small, even remote, community or in wilderness back-country. But first, they need to get within range, and in many cases that requires an air connection. It is of course possible to reach Halifax from global points of origin, though certainly not always convenient. A direct service from China—perhaps connecting from some of the large, but second tier cities—would enormously facilitate access to Atlantic Canada by the world's largest source of potential visitors. Connection to secondary centres like St John's, Moncton, Saint John, Fredericton, Charlottetown, Deer Lake, Gander, Sydney exists but would need to be upgraded to accommodate the eventual tourism potential. Since *convenient* air access is a major competitive selling point in tourism, a denser network will be required if tourism is to become a major economic engine in Atlantic Canada. That is why air transportation needs to be a key consideration in an experiential tourism strategy that aspires to be globally competitive.

Among small countries that have recognized the requirement, Iceland stands out. With barely 340,000 population, and in a remote part of the planet, this tiny country has built a world class air network globally and complemented it with a primarily internal carrier, Iceland Air Connect, which also maintains international routes to relatively nearby locations (Box 8.6).

The need for better air connections to and within Atlantic Canada has long been recognized and attempts have been made to lure operators with subsidies, although with limited results at best. There is a "chicken or egg" dilemma because new routes are not viable without tourist and other traffic, but the traffic will not materialize until the air route is provided. This situation can only be resolved with the intervention of a party that has a long-term vision and sufficient financial resources to carry a service until viable traffic levels are achieved. Occasionally this can be done by a private business, but usually the subsidy must come from government as part of a long-term regional economic strategy.

Fortunately, the operating economics of short-range aircraft are improving steadily and the willingness of affluent tourists to pay for high-quality experiences is increasing. The time may therefore be at hand when certain intra-Atlantic routes could be subsidized, or otherwise facilitated, at reasonable cost relative to the developmental potential.

***Recommendation 8.2*: Identify an initial set of high-potential but under-served air routes to and within Atlantic Canada, and provide subsidies or other incentives sufficient to attract operators for at least a five-year trial period.**

This recommendation should be regarded as an integral component of a strategy to promote experiential tourism and, more generally, rural economic development in Atlantic Canada. Access—delivered by broadband and efficient transportation—is the essential enabler.

Box 8.6 Air Iceland Connect

With strong roots that extend back to the dawn of aviation in Iceland, the aim of Air Iceland Connect is to operate an extensive and flexible domestic flight schedule in Iceland and the West Nordic countries. Co-operation with other airlines enables interregional connections, both domestically in Iceland and to Greenland and the Faroe Islands.

Air Iceland Connect has benefitted from the growth in tourist arrivals in Iceland over the last five years. Product development has increasingly been focused on foreign tourists, with marketing efforts concentrated on offering a wide variety of day tours and multi-day tours combining domestic and regional flights. This trend is expected to continue. A milestone was passed when the first Bombardier Q-400 arrived in Iceland in early March 2016. A total of three Q-400 aircraft will replace the Company's Fokker aircraft. The Bombardier planes are faster than the Fokkers, which will enable flights to farther destinations, such as Aberdeen in Scotland in partnership with Icelandair, and the addition of a new destination in Greenland, Kangerlussuaq, the company's fifth.

---

9. BUILDING ON STRONG SECTORAL CLUSTERS

Chapters 4 and 5 addressed the exceptional growth opportunities presented by Atlantic Canada's innovative startup community and by its dynamic smaller exporters. A comprehensive Atlantic Growth Strategy needs to complement the recommendations in those chapters with measures to fully develop the region's principal sectoral strengths. In short, there needs to be a focus on "clusters" of competence integrated with sectors whose competitive strength signifies that they are well-adapted to Atlantic regional conditions and already equipped with a base of know-how and investment on which to build.

With all the recent emphasis on clusters, one might assume that the concept is simply the latest policy fad. But in fact clusters of related economic activity—like entertainment in Hollywood, infotech in Silicon Valley, finance on Wall Street, aerospace in Montreal, auto production in southern Ontario and Michigan, oil and gas in Alberta, among countless other example—have long been understood to constitute the structural foundation of the world's most dynamic regional economies. Annex 9.1 (at the end of the chapter) outlines authoritative thinking on the economic significance of clusters and certain of the policy implications.

When it comes to specific sectors of the economy, policy-makers in the OECD countries have for several decades been reluctant to implement explicitly sector-based policies—what used to be called industrial policy—out of a belief that market forces were far better than governments at identifying and supporting the best opportunities. In many respects that is certainly true but it is now being (re)-recognized that there is a role for well-designed public policy to enhance the competitiveness of sectors that are already well-grounded in a region. In other words, government does not have to pick winners; it just has to complement what the market has already created but where there are opportunities to do even better. In the words of the Advisory Council on Economic Growth[48]: "The need for a focused sector approach to economic development is particularly acute for Canada. Although our economy is advanced, it is small in absolute terms, and particularly small relative to the US. Achieving global scale and competitiveness requires 'clearing the path' to growth in our most promising sectors." This conclusion applies all the more to Atlantic Canada which is even smaller relative to Canada than Canada is to the US.

A focus on sectoral clusters is now seen as a market-based approach to economic policy that develops new roles for government and companies, as well as for universities, trade associations, and others in the "cluster ecosystem." There is a number of federal and complementary provincial programs designed to support clusters and strategic sectors in Canada, several of which were introduced in the federal case in Budget 2017. For example:

- $950 million over five years to support a small number of business-led "superclusters" that have the greatest potential to accelerate Canada's economic growth. The superclusters are being determined through a merit-based national competition.

[48] "Unleashing the Growth Potential of Key Sectors"; ACEG; February, 2017; p 3

- $1.26 billion Strategic Innovation Fund to support four types of innovation activities: R&D and commercialization of new products; growth and scale-up of high-potential firms; attraction of new investments to Canada; and public-private collaborations in developing and demonstrating new technologies.
- In the context of the Pan-Canadian Framework on Clean Growth and Climate Change, more than $2.3 billion for a range of initiatives to support the development, commercialization and use of clean technology in Canada and the growth of Canadian clean technology firms; including $200 million to support clean technology in the natural resource sectors.

In addition, the Atlantic Premiers established in April, 2017 an "Atlantic Clean Energy Partnership" that will see Provinces working together and with the federal government to identify potential enhancements to electricity generation and transmission infrastructure; to promote energy efficiency, and to support the demonstration, deployment, and export of clean energy technologies.

There has not been any "official" designation of the principal strategic sectoral clusters in Atlantic Canada. Significant regional growth sectors would certainly include Tourism and Culture (addressed in Chapter 8); Health and Life Sciences (Chapter 10); and Information and Communications Technologies, both in respect of the startup community (Chapter 4) and ICT as an established industry serving businesses and the broader society with implications for all aspects of the Atlantic Growth Strategy. In this regard, the technologies and methods that constitute what has come to be called "Industry 4.0" must become an integral part of Atlantic Canada's economy, serving as the principal source of productivity growth and industrial competitiveness and thus of key importance for all sectoral clusters—see Box 9.1.

Box 9.1 Industry 4.0—How the Digital Revolution is Reshaping Production ♦

Industry 4.0 refers to the shift towards more automated, data-driven, smart manufacturing. It is set to shake up production to an extent not seen since the rise of steam power in the 19th century. Governments are scrambling to fund Industry 4.0 initiatives, and experts predict it could disrupt everything from the way workers are managed to global trade networks, mainly for the better.

Industry 4.0 is the fourth major upheaval in modern manufacturing, following the lean revolution of the 1970s, the outsourcing phenomenon of the 1990s, and the automation that took off in the 2000s. It is principally the result of: (i) the exponential rise in data volumes, computational power, and connectivity; (ii) the related emergence of "big data analytics"; (iii) improvements in transferring digital instructions securely and reliably to the physical world, such as advanced robotics and 3-D printing; and (iv) new forms of human-machine interaction such as touch interfaces and augmented-reality systems. Consider for example that the German logistics company, Knapp AG, has developed a "picking" technology using augmented reality. Pickers wear a headset that presents vital information on a see-through display, helping them locate items more quickly and precisely. With both hands free, they can build stronger and

more efficient pallets, with fragile items safeguarded. An integrated camera captures serial and lot ID numbers for real-time stock tracking. Error rates are down by 40 percent, among many other benefits.

Closely related to Industry 4.0, and sometimes used synonymously, is the "Industrial Internet of Things" (IIoT); a term which focuses specifically on the use of Internet-connected devices and objects in manufacturing and other distributed processes. IIoT offers new tools for smarter energy consumption, greater information storage in products and pallets (so-called intelligent lots), and real-time yield optimization. Most IIoT solutions are cloud computing based, and therefore require only limited physical infrastructure, and thus a lower cost investment. This means that smaller companies can get in on the act and can exploit their nimbleness which is critical for leveraging the speed of operating improvement that results from effective IIoT strategies. IIoT is also reshaping the workforce. While in the past manufacturing employees were typically dedicated to a specific piece of equipment or function, the 'smart plant' will house 'free-range' employees who take on a wider variety of responsibilities leading to substantial improvement in morale.

By making manufacturing less location-dependent, enhancing productivity, and cultivating a new kind of workforce, IIoT and Industry 4.0 more generally have the potential to upend the patterns that have defined manufacturing over the past several decades. The productivity gains combined with higher-capability workforces will erode the pure labor cost advantages that led to manufacturers to move production into low cost countries. In the world of Industry 4.0, destinations will be evaluated not only on wages and real estate prices, but also on their technological infrastructure, computing or robotics talent and data practices.

♦ Adapted from *Technology set to rewrite the laws of manufacturing*, The Economist, Nov 6, 2016; and *Manufacturing's next act*, McKinsey&Company, June, 2015.

Based on submissions to the federal supercluster competition it might be inferred that among the most strategically important sectoral clusters in Atlantic Canada would be the following three:

- **An Oceans** cluster representing a world-scale agglomeration of talent and investment anchored in St. John's and Halifax, but with activity throughout the region and strong linkages internationally. The activities, in both the private and public sectors, encompass the fishery; offshore oil and gas exploration and production; sophisticated monitoring and data collection and analysis; marine security; shipbuilding; marine logistics; and advanced research related to the foregoing. (See also Annex 9.2.)
- **An Agfood and Bio-resources** cluster, centered in PEI, but with activities throughout Atlantic Canada. Particularly significant, in addition to the solid base of established products, are opportunities (a) to further develop aquaculture on shore, in-shore, and eventually off-shore, (b) to intensively develop specialty crops including orchards, vineyards, game and other locally-distinguished foodstuffs to supply "locavore" tourism and to meet growing global demand for high quality exports; and (c) to intensively employ advanced manufacturing, materials handling, and big data technologies to improve productivity, quality, and marketing. (Annex 9.3)

- **A Clean Technologies** cluster concentrated on (a) leading-edge activity in "smart grid" R&D and deployment centered in a New Brunswick-based collaboration among NB Power, Emera, Siemens, UNB and many small companies; (b) complementary development of clean renewables, particularly Fundy tidal, wind, and energy storage; and (c) ensuring sufficient transmission infrastructure to maximize opportunities for the export of clean electricity from Atlantic Canada (Annex 9.4). This activity is part of a growing agglomeration in Atlantic Canada of highly innovative cleantech companies working to reduce atmospheric CO_2 emissions; mitigate pollution of air, water and soil; and to use energy more efficiently.

These three clusters stand out not only because of the scale of activity, but more importantly because of their growth potential and current relevance. While at most one ("Oceans") may potentially be selected in the federal supercluster competition, the collaborative experience of developing proposals for that competition has already demonstrated the value of pursuing an on-going version of cluster support at more limited scale. To maintain the momentum, new measures are needed to further encourage Atlantic businesses to collaborate with research institutions and governments on joint activities in sectors of significant strategic opportunity. The Advisory Council therefore recommends the following:

***Recommendation 9*: Create "Innovation Marketplaces" in Atlantic Canada to support collaboration among large and small businesses, research performers, and governments in sector clusters, including Oceans, Agfood and Bio-resources, Clean Technologies, and potentially others.**

The concept of an *innovation marketplace* was described by the Advisory Council on Economic Growth and is summarized in Box 9.2. An innovation marketplace gives organizational form to initiatives to promote existing clusters by structuring collaborative innovation activities such as: joint pre-competitive R&D, prototype development and testing, procurement to encourage market-readiness of innovative products, specialized skills attraction and training, market expansion, and sector strategy formulation. The innovation marketplace *must* be led by key private sector players in the particular cluster in order to ensure market relevance and the deep commitment of business.

Box 9.2 Innovation Marketplaces ♦

Canada has a strong base of talent, large firms, high-growth SMEs, and research infrastructure. But these stakeholders are not collaborating sufficiently…The Advisory Council on Economic Growth recommends that government catalyze "innovation marketplaces" to achieve national and globally significant scale in key sectors. The concept builds on best practices from Germany, the United Kingdom, and the United States, among others.

What are innovation marketplaces? They are centers of technology and industry activity that are developed and driven by the private sector. An innovation marketplace brings together researchers and entrepreneurs with public and private customers around a common business challenge. The marketplaces match innovation demand from corporations and governments with innovation supply from researchers and entrepreneurs. This matchmaking strengthens supply-chain relationships and the flow of information. By connecting firms, start-ups, SMEs, and research institutes, innovation marketplaces could set in motion network effects and eventually reach national and then global scale. By spreading risks, marketplace participants would be better placed to invest in game-changing technologies.

To qualify for investment, innovation marketplaces must address real business needs articulated by private-sector stakeholders who demonstrate commitment by putting financial "skin in the game," as well as committing people and other resources. Innovation marketplaces would:

- co-fund projects for which the risk and cost of innovation would be difficult for a single actor to bear. The private sector would provide 50 percent of the capital required, at a minimum;
- possess the potential for significant impact in target sectors where Canada already has strong momentum and some form of competitive advantage;
- engage all relevant players in a single ecosystem, and connect with programs sponsored by provinces, local governments and research institutions to maximize the "spillover" of innovation in the community;
- drive competitiveness and exports through commercialization and adoption of innovation, *not* to support product or process improvements that should be the normal course of business;
- actively connect the best people in their domains, forging links between experts in established and emerging firms, young talent and stakeholders in the ecosystem, supply-chain partners, regulators, and so on. The marketplace for talent would serve as a resource for participants beyond the boundaries of a given project, and thus spawn further collaboration.

♦ Adapted from *Unlocking Innovation to Drive Scale and Growth;* Advisory Council on Economic Growth; Feb., 2019

While the term "innovation marketplace" may be unfamiliar, the basic concept already has many manifestations in Canada and abroad. Box 9.3 contains highly summarized descriptions of three Canadian examples—CRIAQ in the aerospace sector; FPInnovations in forest products; and SGIN in the smart grid space in Atlantic Canada. These examples, while not necessarily mirroring the model in Box 9.2 in every detail, nevertheless demonstrate the value and practicability of the innovation marketplace concept. In fact, it is an idea whose time has clearly come since various versions are being implemented in several countries. For example, in 2014 Norway launched a "Norwegian Innovation Clusters" program that is already supporting 36 clusters in three stages of development—*Arena* (for the most immature stage); *Norwegian Centres of Expertise* (for the next stage of evolution); and *Global Centres of Expertise* (for the most mature). The program represents a potential model for Canada and is described with examples in Annex 9.5. Another recent international model Australia's "Industry Growth Centres," focused on six strategic sectors and funded beginning in 2017-18.

Box 9.3 The Innovation Marketplace Concept in Action

The Consortium for Research and Innovation in Aerospace in Quebec (CRIAQ) is a non-profit organization established in 2002 with the financial support of the Quebec government. CRIAQ promotes collaboration between industry and research specialists to identify and implement pre-competitive projects that meet aerospace industry requirements. Through CRIAQ, businesses have access to the expertise of renowned researchers and financial resources that will greatly enhance their initial R&D budget. For a small business, this can represent up to 30 times its project contribution. Researchers thus benefit from financial support from a range of sources and contribute to technological advances in the industry. CRIAQ has achieved over $115M in total value for completed and ongoing projects; has 55+ industrial members and 20+ academic members (universities, colleges and research centres); and has trained 1,050+ students.

FPInnovations is a non-profit organization that specializes in the creation of innovative scientific solutions in support of the Canadian forest sector's global competitiveness and responds to the priority needs of its industry members and government partners. It performs state-of-the-art research, develops advanced technologies, and delivers innovative solutions to complex problems for every area of the sector's value chain, from forest operations to consumer and industrial products. With staff numbering more than 525 and R&D labs in Montreal, Quebec City, and Vancouver, FPInnovations fuels the growth and prosperity of the forest sector by creating opportunities beyond traditional markets and by accelerating innovation and enabling partnerships among industry, governments and academia.

Smart Grid Innovation Network (SGIN) was formed in 2015 as a partnership among Siemens Canada, NB Power and UNB with the objective of providing companies from New Brunswick and beyond with a testing platform to drive commercial innovation in smart grid products. It is an excellent example of what has been called a "business living lab," a concept that had been pioneered by the New Brunswick Business Council. In SGIN, UNB's Smart Grid Research Lab provides the R&D component. Next, the Siemens Interoperability Lab offers a highly configurable "sandbox" environment to bring the vendor's innovation to the point where it is smart-grid-ready. Finally, to test the product to see how it works with an actual electrical grid, NB Power's Products and Services Lab gives the potential solution real-world validation. Funding to establish the labs and the Network has been provided by the three partners as well as by ACOA and the provincial government.

Taking a cue from the Norwegian Innovation Clusters program, the federal government should adopt a tiered approach to cluster/sectoral support. The current Canadian supercluster competition targets only the most internationally competitive clusters, analogous to Norway's three "Global Centres of Expertise". Beyond the small number of selected superclusters, there will be several other excellent submissions to the supercluster competition that are now primed to undertake the collaboration needed to greatly improve specific sectoral performance even if

they are not ready to be among the global leaders. The innovation marketplace model provides a *structure* for support of clusters at different scales and stages of maturity—more specifically:

a) Private sector initiators and architects of an innovation marketplace would assemble groups of like-minded companies and research and educational institutions interested in investing in a technology platform, collaborating to solve a shared problem, and strengthening sector capacity overall.
b) Government could provide substantial convening and informational support to marketplace formation and also provide operational support—for example, by co-funding with business sponsors the overhead cost of the marketplace and projects that benefit multiple industry players.[49]
c) It will be particularly important for government, as well as larger business participants in a marketplace, to serve as a "first customer" through strategic procurement of innovative new products developed within the cluster ecosystem of the marketplace.
d) Most marketplaces will be in sectors that are subject to regulations associated, for example, with customer service (e.g., various utilities); building codes and other engineering standards; environmental protection; and various issues related to health and safety. While obviously important for general public welfare, certain regulations can have the unintended consequence of severely impeding the small-scale trials that may be needed to prove out innovative approaches to a problem/opportunity. The concept of a "regulatory sandbox," described in Box 9.4, was developed in the context of financial product innovation but is an approach that could facilitate innovation in many other sectors and should be applied, with appropriate safeguards, in innovation marketplaces.

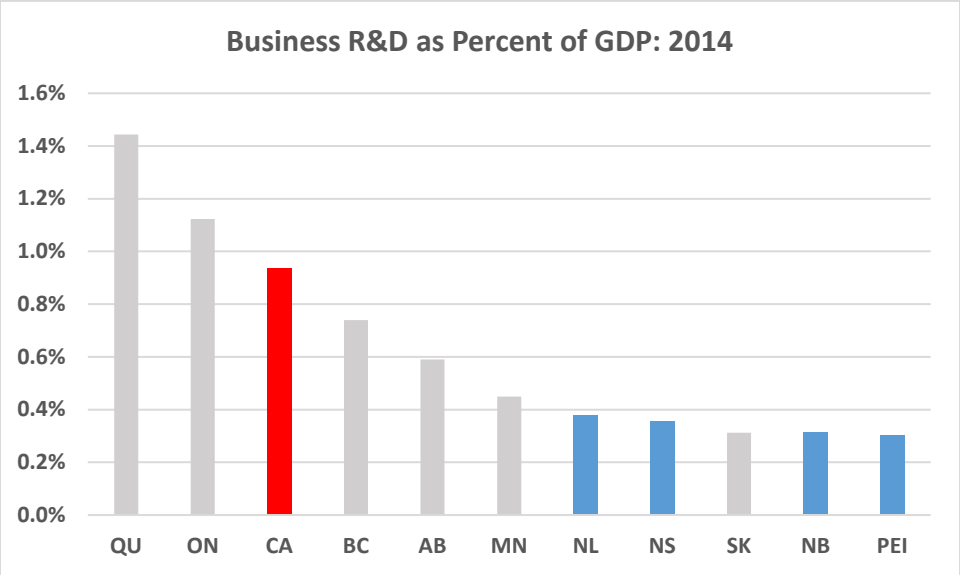
In Atlantic Canada, the three strategic sectors identified earlier—oceans, agfood, and clean technologies—are each well-placed to serve as a pilot trial of the innovation marketplace design.[50]

- There is a particularly pressing need in Atlantic Canada to encourage innovation arising from greater collaboration among larger and smaller businesses and with the excellent research capabilities in the region. Chart 9.1—showing that business R&D in the Atlantic provinces lags behind the rest of the Canada (while Canada itself lags internationally)—illustrates both the need for, and the opportunity presented by, one or more innovation marketplaces.

[49] An innovation marketplace will require some formal organizational structure—a board, a small staff, probably one or more advisory bodies on specific (technical) topics, and the means to obtain and manage funds accountably. All of this could be accomplished through a non-profit corporate model of which there are many examples in Canada including the federal Networks of Centres of Excellence.

[50] In the context of the Agfood opportunity, the Advisory Council on Economic Growth proposed as a pilot project the creation of four to six agfood processing "hubs" across Canada (see "Unleashing the Growth Potential of Key Sectors", pp14-15). Anchored by one or more large industry players, a hub would provide shared state-of-the-art infrastructure and an organizing body to facilitate collective marketing, innovation and access to various services. The "hub" as described appears to be very similar to an "innovation marketplace" and might be an alternative form of organization, depending on the sector.

Chart 9.1



- There are several potential sources of funds for the government share of support for the marketplaces, depending on the particular sector involved—e.g., the Strategic Innovation Fund; several sources for cleantech; programs to support agfood innovation (including the next iteration of "Growing Forward"); on-going ACOA programs; and several business development and sectoral programs in the Provinces. Innovation marketplaces promise to substantially amplify the impact of government resources by leveraging both funds and creativity from business and other non-government sources.

Box 9. 4 The "Regulatory Sandbox" Concept

A number of countries have initiated "regulatory sandboxes" to facilitate growth in their financial sectors. A regulatory sandbox usually implements a set of rules that allow trailblazers to test their products and business models in a live environment with much reduced legal requirements. The adoption of these regulatory sandboxes confirms that governments are taking a more progressive and proactive approach toward the idea of fintech innovation. The majority of "sandboxes" come with predefined restrictions, such as limitations on clients, time-limited testing, predetermined exceptions, and testing under regulator supervision. Their purpose is to minimize legal uncertainty, improve access to investment, and create rules for new products and business models.

On February 23, 2017, the Canadian Securities Administrators (CSA) announced the launching of a regulatory sandbox initiative that is open to business models focused on energizing the Canadian market. This includes cryptocurrency ventures, the utilization of artificial intelligence for trading, regulatory technology, and online investment platforms. During the application process, CSA staff may request live environment testing, a business plan, and/or a demonstration of how potential investors can benefit.

Although the regulatory sandbox concept has so far been formally implemented only in the financial sector, the idea is potentially applicable to other heavily regulated industries and should be generalized to foster innovation in, for example, cleantech.

Annex 9.1 Clusters and Economic Performance ♦

Countless examples ranging from textiles in northern Italy to financial services in New York City, reveal the powerful role of geographic concentration of related economic activity or "clusters." The presence of complementary activity via clusters is a strong driver of growth by allowing firms ready access to key inputs, better interactions with customers, and facilitating experimentation and innovation. Industries located within a strong cluster are associated with higher employment growth…clusters foster growth in wages, the number of establishments, and patenting. Clusters may not simply reduce the cost of production but also the cost of exchange by enhancing trading relationships and the transparency of local input and output markets. The impact of local knowledge spillovers likely does not simply accrue to a single firm in an isolated way; rather, local discoveries may simultaneously enhance the knowledge base of multiple local firms. In addition, qualitative studies of clusters emphasize the central role of specialized local institutions (from training facilities to infrastructure investments) in allowing potential complementarities to be realized. Regional economic performance depends crucially on the cluster composition across nearby regions rather than within narrow political boundaries. The benefits arising from clusters often span multiple jurisdictions. Policies that enhance complementarities across jurisdictions, such as supporting infrastructure and institutions that facilitate access to demand, skills or suppliers in neighboring clusters, may be important tools for regional development.

Our findings suggest that the highest return policies, from the standpoint of local employment growth and other performance metrics, are likely to be those that prioritize *complementarities* across related economic activities. Such policies appear to be more effective than those that seek to attract a particular type of investment, offer incentives to benefit a small number of firms, or favor particular fields if the region has little strength in those areas. Instead the focus should be on how to leverage a region's strong clusters. New industries will grow out of the most successful existing clusters.

♦ Adapted from "Clusters, Convergence and Economic Performance" by Delgado, Porter and Stern; NBER WP 18250; July 2012

Annex 9.2 Atlantic Canada's Oceans Supercluster

The development of technologies that are relevant to the ocean economy is occurring at an unprecedented speed—e.g., sensors, connected devices and the "Internet of Things," advanced analytics amplified by machine learning, automation and robotics, new materials, marine energy and storage, and genomics. Taken together, these technologies are finally rendering the ocean transparent and therefore more amenable to efficient and environmentally responsible development. Canada is missing its share of ocean opportunity and Atlantic Canada has a disproportionate ability to change this for the benefit of the region and the nation. That is because the region possesses an impressive foundation on which to build—e.g., the $30 billion dollar naval ships contract; recent investments in the Centre for Ocean Ventures and Entrepreneurship (COVE); the Ocean Frontier Institute (OFI); and the Marine Institute. These and many other assets in the region can create a world-class centre of ocean innovation. Atlantic Canada can build on this with a private sector-led "Ocean Supercluster" initiative comprising an agglomeration of: multi-national enterprises operating in all major sectors of the ocean economy; export-oriented ocean technology SMEs; top-flight universities and federal research facilities; incubation and acceleration sites; vibrant ports and shipping activity; and a modern navy. The mission of the Ocean Supercluster would be to build and scale companies that can deliver ocean technology solutions for some of the world's biggest challenges--climate change, sustainable food production, and clean energy.

Annex 9.3 Atlantic Canada's Agfood and Bio-resources Potential

One of the biggest challenges facing the world is how to feed, with sustainable sources of protein, an ever-growing global population and middle class. That is why the Advisory Council on Economic Growth identified the "Agfood" sector (i.e. the combination of primary agriculture and aquaculture and processed foods) as one of Canada's most promising economic opportunities. The sector already contributes well over $100 billion to national GDP and employs more than two million. Canada's agfood exports are currently more than $50 billion, ranking fifth in the world, and the federal government has set a challenge target of $75 billion by 2025.

Meanwhile, looking forward, *aquaculture* is the fastest-growing source of animal protein production in the world today—e.g., farmed fish production now exceeds beef production globally. Aquaculture will inevitably continue to expand for years to come since "capture fisheries" and carbon-intensive terrestrial protein sources such as livestock appear to be at, or even beyond, sustainable limits. There is large untapped potential for terrestrial and near-shore aquaculture production in Atlantic Canada but development requires transparent, predictable regulatory regimes and a commitment by governments and producers to thorough public consultation and strict environmental standards. Aquaculture will evolve beyond coastal sites to include open ocean production that employs new science- and technology-intensive approaches with highly sophisticated levels of automation and at much larger

industrial scale. Offshore aquaculture will also have significant requirements for "Industry 4.0" technology such as ocean sensors, advanced analytics, robotics, heavy engineering, and genomics; and thus draws on research and business strengths across Canada's ocean supercluster.

The Atlantic Provinces are supporting the expansion of the "bioeconomy," with initiatives in all four provinces to support growth and diversification. In PEI for example, the BioAlliance is an organization formed to foster the growth of a biosciences cluster that has seen the number of companies more than triple since 2005. There are presently more than 40 with combined sales in excess of $150 million. More than 1,350 are employed in the sector in PEI which includes research organizations with over 150 PhDs.

Annex 9.4 The Clean Electricity Opportunity in Atlantic Canada

Climate change is a defining issue of our generation, reshaping how countries around the world meet their energy needs and how they think about growth. Consequently there is a great wave of innovation based on technologies that reduce greenhouse gas emissions, promote energy efficiency, reduce pollution, produce cleaner air and water, and cut the cost of environmental protection and/or remediation. Atlantic Canada boasts several highly innovative early-stage companies in these cleantech sub-sectors. The generation and transmission of clean electricity is one area where there is considerable collaboration among established and young firms.

- *Smart grid and energy storage*: The next frontier for transformational change in the energy sector is to implement a "smart grid", and to develop new solutions to store electrical energy cost-effectively so as eventually to enable virtually all electrical energy to be supplied by renewable sources which are otherwise intermittent and unpredictable. The integration of smart grid technology with new energy storage systems would create significant export opportunities for Atlantic Canada. Summerside, PEI is a leader in the integration of wind, solar, storage, and smart grid. The University of New Brunswick (UNB), Siemens, NB Power and Emera lead the Smart Grid Innovation Network (Box 9.3). Dalhousie University has an exclusive 5-year research partnership with Tesla Motors to increase both the energy density and lifetime of lithium-ion battery cells, which marks the first time the California-based company has collaborated with a university anywhere. These companies and research universities have the knowledge and motivation to undertake an ambitious project to develop and implement the first large-scale utility project that would combine a smart grid with novel battery storage technology—e.g., flow batteries.
- *Tidal power:* The Bay of Fundy is estimated to hold tidal energy potential of as much as 50,000 MW, of which approximately 2,500 MW can be safely extracted based on currently envisioned technology. With significant investments in R&D and commercialization, the first tidal turbines are now being tested.
- *Hydro-electricity:* Newfoundland and Labrador has enormous hydro-electric assets—in addition to the existing 5,400 MW Upper Churchill and the new 824 MW Muskrat Falls, the Gull Island project represents a further 2,000 MW. The Maritime Link project is connecting the existing grids in Labrador, Newfoundland and the Maritimes, facilitating the export of clean electricity.
- *Wind Power:* The Canadian Wind Energy Association has stated that Atlantic Canada has not only some of the strongest wind regimes in Canada, but because of the way production correlates with

periods of peak demand, also has among the country's highest-value wind resources. The Wind Energy Institute of Canada has a project in PEI ("Wind R&D Park and Storage System for Innovation in Grid Integration") to determine how battery storage can best be used to manage wind farm output.

Atlantic Canada is well-positioned to export clean energy to the northeast US. But the relatively small, fragmented electricity markets in the Atlantic region make it a challenge to integrate the potentially large amounts of renewable energy these emerging sources of demand will require. To take advantage of these opportunities, interjurisdictional co-operation is required, including transmission reinforcements within the provinces and new cross-border transfer capacity. This is an area where provincial governments have agreed to work together under the Atlantic Clean Energy Partnership. Now is the time to build large scale infrastructure investment to take advantage of clean electricity export opportunities. This will require major transmission connections from New Brunswick to Maine, enhanced transmission through Nova Scotia, and more transmission capacity from Newfoundland to Nova Scotia and Quebec. A transmission upgrade from PEI to New Brunswick has unlocked wind export opportunities for PEI which already generates about a quarter of its electricity from wind.

Annex 9.5 Norwegian Innovation Clusters

"Norwegian Innovation Clusters" is a government supported program launched in 2014 that aims to trigger and enhance collaborative development activities. A cluster can be a very concentrated local group of participants or something more extensive as is typical in resource-based industries. A cluster will always have collaborative relationships extending outside the core of the cluster.

The program is organized by Innovation Norway, jointly with Siva (The Industrial Development Corporation of Norway) and the Norwegian Research Council. The clusters are supported with partial funding, as well as advisory services, cluster development support, networking activities and profiling services. Through annual open calls, clusters compete to be part of the program. It is essential that the initiative is founded on the participation and leadership of the enterprises that have a common interest in the cluster project. They must take ownership of the initiative.

Clusters are supported on three levels: (1) **Arena**: Immature clusters that are in an early phase of organized collaboration. Arena is a 3-5 year program with 19 currently active clusters; (2) **Norwegian Centres of Expertise (NCE):** Mature clusters with a strong national position whose participants normally have strong international ambitions. NCE is a 10-year program with 14 active clusters; (3) **Global Centres of Expertise (GCE)**: Mature clusters that have already established systematic collaboration. Educational programs of a high international calibre are available that have clear relevance to the cluster, and the cluster comprises global market and technology leaders that are integrated in global knowledge networks. GCE is a 10-year program with 3 active clusters. Following are brief descriptions of two NCE clusters and one GCE cluster.

NCE Aquaculture Cluster develops and delivers farmed fish, seafood and supplies to the world market. The goal of the cluster is to be a locomotive in the development of Norwegian aquaculture and related businesses. NCE Aquaculture is working on fish health and the environment, technology for safe

operation, product quality, sharing and dissemination of knowledge, education, as well as the framework for future development. Participants: 20 companies, 4 knowledge and development actors.

NCE Maritime CleanTech Cluster contains activities throughout the maritime value chain, suppliers of renewable energy, and research and education institutions. The main objective is to strengthen participants' competitiveness through innovative solutions for energy-efficient and environmentally friendly activities. Participants: 38 companies, 9 knowledge and development actors.

GCE Subsea Cluster develops and delivers skills and technology for installation, operations and maintenance of subsea installations globally. The cluster has one of the strongest research groups in subsea technology, and aims to develop subsea installation beyond oil and gas. GCE Subsea provides meeting places and competence, and initiates joint projects on research, innovation, skills development and international business. Participants: 82 companies, 18 knowledge and development actors.

10. LEADING IN DIGITAL HEALTH INNOVATION

The digital revolution has been disrupting one industry after another but has so far had relatively limited impact on innovative products and practices in the health field. Now that is changing rapidly as the Electronic Health Record[51] becomes ubiquitous and the range of services that can be delivered remotely grows both in functionality and cost-effectiveness. On the horizon are revolutionary advances as clinical and related cost data accumulate exponentially, eventually enabling healthcare of higher quality to be delivered more accessibly and affordably.

A "digital health"[52] revolution is inevitable. The question is who will be in the vanguard and thus in the best position not only to reap benefits earlier, but also to host an out-sized share of the new industry that the digital health revolution is already creating. Atlantic Canada can benefit disproportionately by being among the leaders. Here's why:

1) The Atlantic population is the oldest in Canada, creating a heavy burden of chronic conditions which can more effectively be managed via digital health methods, thus relieving the strain on acute-care facilities (Box 10.1).
2) The region is the most *rural* in Canada and therefore greatly in need of means to deliver quality health services cost-effectively where full-service hospitals are not available and the number of doctors may be severely limited.
3) The availability of quality healthcare is essential if younger people are to be attracted and retained in Atlantic Canada's rural and smaller communities. The prospects for rural economic revitalization will depend heavily on attracting skilled people who can work anywhere provided there is adequate internet and mobile service, as well as quality education, recreation and especially health services. Thus leadership in provision of digital health is integral to an economic development strategy for the region.
4) Atlantic Canada needs new growth engines of which the still embryonic digital health industry is poised to be among the world's largest and most dynamic. (Healthcare already contributes roughly 10% of GDP on average in advanced countries—17% in the US—and growth will be driven by demographics, technology and affluence.) By being among the

[51] An Electronic Health Record (EHR) is a comprehensive digital record of an individual's health status including, ideally, a record of all of one's interactions with the health system and the related outcomes. An Electronic Medical Record (EMR) is a more limited digital file that is usually compiled and maintained by one's doctor or clinic—e.g., an individual may have several EMRs that become components, together with other data, of one's EHR. About 85% of primary care physicians in Canada currently use an EMR but the up-take in NL (55%) and NB (62%) is the lowest in the country. Alberta is at the top (91%) and NS (85%) at the national average.

[52] The term "digital health" (sometimes referred to as "e-health") is very broadly inclusive and encompasses the application of information and communications technologies to all aspects of health including, for example: diagnosis and care provision at a distance (telehealth); personal health monitoring/management via digital applications; electronic health information; health data analytics and applications employing artificial intelligence; analysis of genomic and other sources of "big data" in a health context.

leaders in the implementation of digital health services, and custodian of the data that such services generate, the Atlantic region can position itself to attract the talent and investment to also be leaders in niche segments of the global digital health industry.

5) While healthcare is a growing fiscal challenge everywhere, it is an out-sized burden in Atlantic Canada in view of the region's ageing and dispersed population combined with a relatively weak tax base. Provincial governments in the region would therefore benefit disproportionately as digital health innovation reduces healthcare cost relative to quality and accessibility.

Although the health sector is usually thought of as a source of *consumption* of publicly funded services, it can also be a *growth* generator and thus appropriate for inclusion in the Atlantic Growth Strategy. The reasons are outlined in bullets (3) to (5) above. In summary—The development and sale of digital health products and services will be a leading global industry of the future; digital health services will be essential enablers of rural population retention and thus of rural/small community economic development; and the cost-efficiencies eventually derived from digital healthcare will ease the growing pressure on public finances and thus increase the resources available for growth-promoting public and private investment. Healthcare is biggest sector in the advanced economies. It cannot be ignored in an Atlantic Growth Strategy for the long term.

Box 10.1 Digital Health and the Hospital of the Future ♣

High-speed internet, remote-monitoring technology and the crunching of vast amounts of data are about to change the way hospitals work as phones become more powerful and patients take control of their own diagnosis and treatment. Communicable diseases are no longer the big problem; now it is chronic ones related to unhealthy lifestyles and longer lifespans. The gap between populations' health needs and the care offered by systems organised around hospitals has grown ever wider.

"When I think of the hospital of the future, I think of a bunch of people sitting in a room full of screens and phones," says Toby Cosgrove, the Cleveland Clinic's head. In such a vision, a hospital would resemble an air-traffic control tower from which medical teams would monitor patients near and far to a standard until recently only possible in an ICU. The institution itself would house only emergency cases and the priciest equipment. Fewer people would be admitted as hospitals co-ordinated care remotely and led population-wide efforts to keep people well.

Last year, half of consultations offered by Kaiser Permanente were virtual with medical professionals communicating with patients by phone, e-mail or videoconference. Gupta Strategists, a Dutch research company, reckons that around 45% of care now given in Dutch hospitals could be done better at home. A command centre could watch over patients not only in hospitals, but also at home. Wearable devices that track vital signs, contact lenses that monitor blood-sugar levels and smart-stitches that measure the pH level of fluid in wounds would all mean fewer patients in hospital for monitoring.

Although hospital managers insist that technology would not replace staff, this is unlikely to be the case. Basic tasks, such as carting laundry around, are already being taken over by robots. Everyday care, such as keeping patients clean, could be next. Radiologists and pathologists, whose skills are primarily visual, are at risk of being elbowed aside by machines. But mostly such technological advances would make doctors better, not replace them. In the future, every big hospital could have a Star Trek-style holodeck where surgeons could plan and rehearse complex operations on a 3D projection of the patient.

As technology amplifies the reach of each health-care professional, one useful consequence would be to ease a looming labour shortage. High rates of stress and burnout are already a problem in health care. But if medical staff are made more productive with the help of computers, monitoring devices and robots, they can be freed up to do the work that only humans can do, and helped to do it better and more happily. The next iteration of the hospital is tantalisingly within reach—and it is more the co-ordinating node in a network than a self-contained institution. We have reached the peak of bringing patients to the healing centres. We are on the brink of bringing the healing to patients.

♣ Adapted from "Prescription for the Future"; The Economist, April 8, 2017.

The Atlantic Provinces should be powerfully motivated to be among the future leaders in digital health. But is it a realistic ambition? It is, for at least the following reasons:

- The four Provinces have already made a good start with a number of digital health[53] initiatives—e.g., promotion of a single EMR system in NB and NL to support interoperability; computerized physician order entry (PEI); integrated clinical information systems (the "one person, one record" project in NS); telepathology in NL in collaboration with Ontario and Manitoba.
- There are two primary medical schools in the region.[54] Dalhousie ranks among the health research leaders in Canada and Memorial University's "Translational and Personalized Medicine Initiative" is exploring digital methods to change behaviour in the use of health resources (Box 10.2). There are complementary capacities in IT—both established and start-up—in all four provinces. In short, there are ample intellectual and training resources to support leading-edge initiatives in digital health.
- The resources of Canada Health Infoway, which facilitates collaboration among Provinces across a broad range of digital health activities, can be further mobilized to provide world-

[53] Digital health is a much broader concept than "telehealth" (or telemedicine) which is just one element of the digital health spectrum. Various "horizons" can be foreseen for applications of digital health technology—Horizon I (to the present) involves, e.g., telephone and video consultation and the transition to the Electronic Health Record; Horizon II (3-5 years out) will bring into the mainstream, e.g., chronic disease monitoring, integrated data sharing, clinical decision support tools, prescription management; Horizon III (5-10 years) is expected to see, for example, advanced data analytics driving AI applications; vastly more sophisticated monitoring (e.g., chip-on-a-pill), among other data-intensive innovations.

[54] In addition to Dal and Memorial medical schools, is the Centre de Formation Medicale du Nouveau-Brunswick, located on the University of Moncton campus but administered by the Universite de Sherbrooke; and "Dalhousie Medicine New Brunswick" based on the campus of UNB Saint John while offering a Dal MD and providing video conference access to Dal classes.

class advice and support to digital health implementation in the Atlantic region. For example, CHI is funding a multi-year national initiative to initiate "e-prescribing" in which NB, NL and NS will participate.

Still, each of the Atlantic provinces is sub-scale. But collectively they have a population of 2.4 million which is perhaps close to ideal as a "living laboratory" for digital health innovation—i.e. large enough to provide needed diversity, yet not so large as to be stymied by inertia. Nevertheless, realization of these twin advantages depends on collaboration among the Provinces. Here lies the greatest opportunity but also the greatest challenge. The challenge is that separate jurisdictions have separate political accountabilities which often translate to a zero-sum attitude and competition for scarce national resources even if a collaborative approach would result in a larger benefit to be shared. In the case of digital health, the four Provinces also have somewhat different, though not incompatible, priorities; are at different stages of readiness; and consequently have varying conceptions of the best way forward. Understandably, none wants to be held back by a difficult and time consuming process of forging a four-way consensus on an Atlantic digital health strategy. This implies the need for flexibility to build on the strengths of each province with, for example, an individual jurisdiction taking the lead regionally in areas in which it is already most advanced.

Box 10.2 Translational and Personalized Medicine Initiative (TPMI)

TPMI, which is funded by the Province of Newfoundland and Labrador (NL), ACOA, the Canadian Institutes for Health Research and IBM, comprises two components: (i) a Centre for Informatics and Analytics, and (ii) a Support Unit to undertake patient-oriented research. The latter includes a "Quality of Care" program aimed at getting the right intervention to the right patient at the right time. The program collaborates with "Choosing Wisely Canada" to implement guidelines to reduce unnecessary interventions. The Quality of Care /Choosing Wisely initiative, in collaboration with the NL Medical Association and the NL Centre for Health Information, undertakes projects related to changing behaviour in the use of health resources. If successful, such evidence-based behavioural change can result both in very significant cost savings and in better patient outcomes. Currently the strategies being pursued include audit, feedback and education of doctors, e-ordering of imaging, public education and system change.

The CT scanning project is an example of an e-ordering proposal that addresses the fact that NL orders 50% more CT scans than the Canadian average, contributing both to cost and potential patient harm from CT radiation. TPMI proposes to develop an e-tool that will facilitate application of the Choosing Wisely Canada guidelines for appropriate use of CT scanning. It comprises:

- Access to ordering through the e-health record (EHR)
- An algorithm to digitize the guideline when ordering the test with the increased clinical information required offset by pre-population of the order form from the EHR
- A decision on the appropriateness of the test, with information to download on why a test may be inappropriate

- An e-schedule to provide an immediate date for the test
- An e-report to the ordering doctor on the results of the test together with download of relevant guidelines from a central repository, and
- An analytics package to match actual ordering vs. best practices for evaluation by the doctor ordering.

A key element of an e-strategy is behavioural change in the use of health care resources. The challenge following development of the e-tool will be to achieve its use in practice by all doctors in the health region.

Fortunately, the circumstances of the four provinces are sufficiently similar, and the opportunities flowing from digital health leadership are sufficiently great, that the required collaboration should be possible to achieve. That will nevertheless depend on political commitment and leadership from the Provinces combined with support from the federal government and Canada Health Infoway. In fact, as with so many aspects of the Atlantic Growth Strategy, a collaborative digital health initiative among the four jurisdictions in the region can be a pilot demonstration of what could be needed for a national approach.

It cannot be emphasized too strongly that if Atlantic Canada is to be among the leaders in the digital health revolution there must be a commitment to *transformation*, not simply to "modernization." Modernization is something that will happen in the normal course as digital technologies and methods diffuse gradually into health practice. Obviously, this is the path of least resistance but it would not make Atlantic Canada a digital health leader, and it would not bring the exceptional economic and health system benefits that will come to jurisdictions that embrace digital health in transformational terms.

The digital health strategy being advocated has *two* principal objectives. One is to be a leader in the use of digital health technology integrated with practice to deliver better, more cost-efficient care to Atlantic Canadians. The second, parallel, objective is to be among the leaders in aspects of the global digital health industry. The two objectives are compatible, indeed mutually supportive, but they speak to often different stakeholders having different priorities. As an Atlantic digital health strategy is developed, it is essential that the parallel objectives be well articulated and constantly borne in mind.

Pan-Atlantic leadership in a digital health transformation will neither happen by itself nor in a business-as-usual environment. There are of course many examples of inter-provincial collaboration, often dictated by practical necessity. But jurisdictional silos and the press of daily operational priorities will stymie collaborative innovation at a larger *strategic* scale unless there is institutional machinery with a strong mandate and resources to implement a multi-province digital health strategy. A collaborative Atlantic digital health strategy needs to be initiated with a set of concrete actions—basic steps up the early rungs of the ladder to establish trust and to demonstrate that the commitment is real; therefore:

***Recommendation 10*: Create an "Atlantic Digital Health Innovation Foundation" to drive a collaborative strategy and to manage a "Digital Health Innovation Fund" that will support**

digital health pilot projects and finance small-scale procurements from Atlantic-based technology and service innovators in digital health.

Why is a Digital Health Innovation Fund needed? It is because the day-to-day delivery of care must continue unimpeded by the parallel need to test digital health innovations at pilot scale under realistic conditions. The unfortunate fact is that such pilot "experiments" will be at a severe disadvantage in the competition for attention and funding from health ministries that are always facing more urgent priorities and stretched budgets. The separate ring-fenced funding being recommended for early-stage digital health initiatives is *essential.* Relative to the potential benefit, the fiscal requirement would be modest. Annual spending on health by the Atlantic Provinces approaches $10 billion. In this context, an investment equivalent to roughly 0.5 to 1 percent of the collective health budget−about $50-100 million annually, with some pro-rata share from the Provinces together with a negotiated federal contribution[55]−would be justified to support the "R&D" requirements of a digital health strategy and to demonstrate commitment. These funds would be substantially augmented by private investment in, and by, digital health solutions providers.

The Atlantic Digital Health Innovation Foundation (ADHIF) would be the institutional embodiment of the collaborative digital health strategy, responsible for sustaining momentum. The mandate, governance and composition of the ADHIF would be negotiated and agreed among the four provincial governments and might have characteristics such as the following:

a) Responsible for allocating the Atlantic Digital Health Innovation Fund subject to a funding agreement with governments. Decisions regarding use of the Fund would be an essential part of the Foundation's mandate and would enable the ADHIF to attract a first-rate, action-oriented board and staff. That is because to attract the best people, an organization must have the responsibility and *resources* to effect real change in pursuit of an inspiring mission. The proposed Foundation structure will also ensure that financial resources provided to the Digital Health Innovation Fund would be used only for the intended purposes—pilot projects and small-scale procurements directly related to the digital health innovation strategy.
b) Mandated to provide *advice* to the four Provinces regarding specific elements of the digital health strategy—for example, regarding various harmonization initiatives (see below). The Foundation would serve as a formally neutral advisor thus facilitating pan-jurisdictional consensus.
c) Structured as a mixed public-private organization, with a non-government majority of board members and possibly having an appointment structure similar to the Canada Foundation for Innovation (with the Provinces in the role played by Canada in the CFI).
d) A board appropriately balanced across the provinces and relevant disciplines—including government policy makers; healthcare providers and administrators; the patient perspective;

[55] For example, Budget 2017 set aside $6 billion over 10 years for improving access to home and community care that will be available to Provinces under the recently agreed "Common Statement of Principles on Shared Health Priorities". This will include "Enhancing home care infrastructure, such as digital connectivity, remote monitoring technology…" Regarding procurement from innovative digital health solutions providers, support could be provided from the federal *Build in Canada Innovation Program* and the *Innovative Solutions Canada* initiative announced in Budget 2017.

technology experts (e.g., Canada Health Infoway); digital health entrepreneurs. Such a composition would imply membership of 15-20. A strong private sector, business-oriented perspective must be included to balance the twin objectives of Atlantic Canada to be among the leaders both in the quality of digital health care and in the digital health industry.

e) Equipped with research capacity to remain current with developments in digital health technology and practice so as to enable Atlantic Canada to operate and contribute at the global frontier.
f) To fulfill its orchestration role, ADHIF would need to be supported by a permanent secretariat, the funding for which might be provided by the federal government.

There may be understandable concern that the Foundation would simply be another heavy layer of bureaucracy and thus just the opposite of the nimble flexibility needed to operate in the fast-paced, entrepreneurial digital environment. This is a legitimate worry which underlines the importance of (i) selecting as members of the board and executive leadership individuals who are passionate about digital health transformation, and (ii) providing the Foundation with substantially independent authority over the use of the Digital Health Innovation Fund.[56] Given operational independence, the Foundation should be expected to adopt the best contemporary practices regarding priority setting and project management—e.g., "agile project management"[57]—so as to maintain an innovator's culture.

Item (b) of the Foundation's mandate suggested above refers to a role in which the Foundation would serve as a neutral expert advisor to the Provinces regarding specific aspects of the digital health strategy, thus facilitating pan-jurisdictional consensus. As examples, consider two issues that are currently on the front burner.

Compatible Infrastructure for Electronic Health Records (EHRs): There should be a pan-Atlantic "open architecture" infrastructure for health data sharing, including interoperability standards for EHRs. There is a strong base on which to build thanks to the work of Canada Health Infoway which has, for example, defined interoperability standards for EHR systems. Nevertheless, important gaps exist—e.g., primary care data is still far from completely digitized; there is a lack of connectivity between the home care and acute care sectors; there are multiple legacy systems in hospitals; there is insufficient alignment in standards implementation—i.e. too

[56] The 20-year experience of the Canada Foundation for Innovation is instructive and encouraging. The CFI was given a clear mission and substantial independence in allocating federally-provided funds to support acquisition of academic research infrastructure. The board of CFI includes a minority of government appointees but the organization has remained sensitive to its public role, in part because it has to return to government periodically for new funds. Nevertheless, the day-to-day independence of CFI has motivated the board to be very engaged and the staff to sustain high morale.

[57] "Agile" is a flexible approach to project management based on rapid cycles of development, feedback, and path adjustment as necessary. Agile Project Management is suited to situations where the end-product is uncertain; or where the environment is changing rapidly; or for highly complex situations where managers are "feeling their way forward". These are all characteristics of the environment in which the Atlantic Digital Health Innovation Foundation and Fund would operate.

much variance and customization among jurisdictions in technology procurement according to equipment vendors. This is an urgent issue since new provincial EHR procurements (to implement "one patient one record") are imminent and delay is not an option. If the proposed Foundation were in place it could objectively review the state of the various provincial EHR initiatives and recommend harmonization around the best option for the region as a whole. Provinces would obviously not be under any obligation to accept such advice but if the Foundation became respected as an informed, neutral party, its views would carry weight.

Digital health data sharing and privacy: The ability to aggregate patient and cost data across the four provinces to achieve *scale* is essential for digital health leadership. The promise of digital health is all about data. Consequently, to achieve scale, there should be harmonization, or some other form of reconciliation, of regulations in the Atlantic Provinces regarding digital health data sharing and privacy. The data should be amalgamated into an anonymized "Atlantic Health Data Base" which would be available without charge to researchers (as Alberta is doing), clinicians, and approved applications developers through open architecture to develop digital health solutions (Box 10.3). Moreover, the ability to link data on patient outcomes with cost of care will enable more accurate "value-based reimbursement" by the public insurer. Seamless data sharing within and among provinces would be a significant advantage for Atlantic Canada relative to US jurisdictions where administrative and competitive roadblocks have so far largely stymied progress. The Digital Health Innovation Foundation would be ideally placed to put an issue like this on the table and then to provide impartial advice regarding how to proceed to a consensus.

Speed is now of the essence since big players like Google and Apple, intent on shaping the future of digital health, are looking globally for the right jurisdictions in which to base their innovative initiatives. The future "digital health clusters" of economic dynamism are already forming.

The proposed digital health transformative strategy would be complemented by several other recommendations of the Atlantic Growth Advisory Group; specifically:

- Ubiquitous high bandwidth communications will enable state-of-the-art digital health services to be delivered throughout Atlantic Canada.
- Venture financing will support early-stage, Atlantic-based digital health suppliers.
- Customized programs in the FutureSkills Lab will provide leading-edge digital health training.
- Targeted recruitment of exceptionally skilled immigrants will round out world-class digital health talent.
- Regulatory harmonization/reconciliation will be a key requirement of a pan-Atlantic digital health strategy.
- The SME Export Accelerator initiative will provide coaching to foster a vibrant digital health export sector in Atlantic Canada.

Taken collectively, the Advisory Group's recommendations provide an actionable strategy to put Atlantic Canada among the leaders in digital health globally.

Box 10.3 How Healthcare Systems Can Become Digital Health Leaders ♣

Health systems around the world recognize the potential of digital health, yet most have delivered only modest returns when measured by greater efficiency or better patient outcomes. That's because ambitious information-technology initiatives are typically beyond the core mission of healthcare systems, which also often struggle with legacy systems that impede data integration. Digital-health companies would appear to be best positioned to deliver solutions--innovation is in their DNA and they have the flexibility to design applications that cater directly to patient groups. Yet digital-health companies have been impeded by a lack of access to health data along with uncertainty about how to distribute the economic benefits.

The answer is to promote collaboration among providers and digital-health companies by enabling the exchange of health data. To drive technology advancement and adoption, each health system should consider an "open innovation" platform that holds healthcare data and provides access that is enabled for application programming interfaces. With appropriate patient privacy safeguards and regulatory changes, these platforms will enable health systems to offer patients innovative ways to improve their health while avoiding wasting money on ineffective applications. The open innovation platform would serve as the basis for an ecosystem of digital-health-services innovation by certified third parties. Such a data platform could revolutionize health-service delivery and also help health systems bend the cost curve.

Most companies developing today's digital-health applications lack proof that their apps produce a long-term improvement in user health that leads to economic benefits to health systems. The absence of such evidence complicates a fundamental question: who should pay for the applications? One solution could be to introduce a "value-based digital health" reimbursement model. Since health systems hold the data needed to measure outcomes, why not use this information to measure the outcomes of digital-health services? If cost reductions or quality improvements can be found in the data, the benefits can be shared with the digital-health solution providers. This approach would make digital-health innovation the first innovation in healthcare that is not leading to higher cost but to a more efficient and effective health system.

♣ Adapted from "How healthcare systems can become digital-health leaders"; by G. Aue, S. Blesdorf, N. Henke; McKinsey & Co.; January, 2016.

CONCLUSION: ADVICE ON IMPLEMENTATION

The Advisory Group believes that the recommendations developed in the previous chapters can make a significant contribution to the success of the Atlantic Growth Strategy. They form a coherent whole that is mutually reinforcing. They address opportunities where pan-Atlantic collaboration can achieve far more than individual governments acting separately. The recommendations build on good work already underway but they break a lot of new ground. They are, above all, practical, specific, and actionable. If implemented, the recommendations will have real impact.

Experience has shown that implementation is the stage at which many advisory projects like this fall far short of what was intended. To avoid the proverbial dusty shelf, the recommendations that the Leadership Committee decides to accept will need a focal point of accountability to drive implementation. Otherwise the constant distraction of the urgent, or the inertia of business-as-usual, virtually assure that not much will happen.

Implementation is particularly challenging in the context of the Atlantic Growth Strategy because the AGS not only cuts across five governments but also across many areas of departmental responsibility within each government. Fortunately the Leadership Committee can provide collaborative direction at the highest level. But premiers and federal ministers need "arms and legs" to implement that direction. In this regard, the primary federal accountability would naturally reside with ACOA and that of the Provinces with the Council of Atlantic Premiers and its secretariat. ACOA, having the most pan-Atlantic resources "on the ground," will need to be counted on to provide the majority of day-to-day operational leadership and should be assigned the requisite authority and accountability for the job.

The Advisory Group's recommendations cannot, of course, be implemented all at once. Many will unfold over several years. This creates a requirement for periodic reporting on progress, ideally bi-annually, to the Leadership Committee and to Atlantic Canadians. The public reporting function might be through a small group of well-qualified private citizens appointed by the Leadership Committee.

LIST OF RECOMMENDATIONS

1. BROADBAND ACCESS

***Recommendation 1*:** Create and implement an Atlantic Broadband Action Plan with the objective of providing all Atlantic Canadians with access to Internet service of at least 50 Mbs (down) and 10 Mbs (up).

2. FUTURE SKILLS

***Recommendation 2*:** Establish the "FutureSkills Lab" in Atlantic Canada on a pilot basis, governed by a joint federal-provincial-stakeholder board having a majority of members not from government.

3. IMMIGRATION

Recommendation 3.1: Increase annually over the next five years Atlantic Canada's *percentage share* of the Provincial Nominee Program under the Canada Immigration Plan so long as the region is able to fulfill its allocation.

***Recommendation 3.2*:** Establish a procedure to proactively identify and recruit to Atlantic Canada small numbers of exceptionally accomplished individuals with demonstrated entrepreneurial talent and the ability to scale-up businesses in areas that support the Atlantic Growth Strategy.

***Recommendation 3.3*:** Enhance the Express Entry program for foreign graduates from Atlantic post-secondary institutions to assign greater weight to their personal suitability—age, skills, and prior work experience—than to possession of an immediate job offer; and increase efforts to inform international students of possible pathways to permanent residence after graduation.

4. **FINANCING STARTUPS**

***Recommendation 4.1*:** Harmonize across Atlantic Canada the existing provincial investment tax credits, and make them refundable; available to an investor wherever located; and focused on small businesses that are innovation-based. Include as eligible investments: common and preferred shares, convertible debentures and units; and as eligible investors: individuals, corporations, trusts and limited partnerships.

***Recommendation 4.2*:** Invest public funds in private-sector-managed regional funds making pre-seed as well as seed and early-stage venture capital investments. The provincial governments should invest, approximately on a pro-rata basis, together with federal

government matching, BDC, and the private sector.

5. SME EXPORT ACCELERATION

***Recommendation 5*:** Establish, under the Atlantic Trade and Investment Growth Strategy, a pan-Atlantic "SME Export Accelerator" program.

6. REGULATORY RECONCILIATION

***Recommendation 6*:** Implement a process to reconcile, in a much more timely way, existing regulations that unreasonably impede trade, investment and worker mobility within Atlantic Canada.

7. COMMUNITY DEVELOPMENT

***Recommendation 7*:** Create a "Community Challenge Fund" that would invite Atlantic Canadians to develop proposals to build on local assets to be employed in innovative community development projects.

8. EXPERIENTIAL TOURISM

Recommendation 8.1: Increase support for experiential tourism in Atlantic Canada including a new multi-year initiative to develop Indigenous experiential tourism based on authentic cultural practices and skills.

***Recommendation 8.2*:** Identify an initial set of high-potential but under-served air routes to and within Atlantic Canada, and provide subsidies or other incentives sufficient to attract operators for at least a five-year trial period.

9. SECTOR CLUSTERS

***Recommendation 9*:** Create "Innovation Marketplaces" in Atlantic Canada to support collaboration among large and small businesses, research performers, and governments in sector clusters, including Oceans, Agfood and Bio-resources, Clean Electricity, and potentially others.

10. DIGITAL HEALTH

***Recommendation 10*:** Create an "Atlantic Digital Health Innovation Foundation" to drive a collaborative strategy and to manage a "Digital Health Innovation Fund" that will support digital health pilot projects and finance small-scale procurements from Atlantic-based technology and service innovators in digital health.

APPENDIX ATLANTIC GROWTH ADVISORY GROUP

Henry E. Demone
Chair

Henry Demone is a native Nova Scotian, who grew up in Lunenburg and graduated from Acadia University in 1976. He is Chairman and CEO of High Liner Foods and serves on the boards of Emera and Saputo. He is Chairman of Eosense, a successful Nova Scotian technology company, focused on the measurement of environmental gas flux. He serves on the Board of Governors of Acadia University and was an active member of the One Nova Scotia Commission. He has held leadership positions in many volunteer organizations over the course of his career, including Young Presidents' Organization, the National Fisheries Institute in Washington DC, the Groundfish Forum, and Fisheries Council of Canada.

Zita Cobb
Member

Zita Cobb is co-founder and CEO of the Shorefast Foundation and founder and innkeeper of the Fogo Island Inn. Prior to taking on this role, she was the Chief Financial Officer of JDS Fitel, and Senior Vice President of strategy for fiber optics manufacturer JDS Uniphase, where she contributed to building the company into one of the most successful high-tech innovators in history. Zita retired from her business career in 2001 and returned home to Fogo Island and co-founded the Shorefast Foundation, a registered charity of Canada with an integrated approach that employs business-minded means to achieve social ends. In 2016, Zita was awarded the Order of Canada in acknowledgement of the work of Shorefast Foundation in collaboration with the community of Fogo Island to help secure a more resilient future for this singular rural place.

Glenn Cooke
Member

Glenn Cooke is CEO and co-founder of Cooke Aquaculture Inc., an Atlantic Canadian family owned company and North America's largest independent salmon farming company. He is also the President of Cooke Seafood USA Inc. and his family now owns seafood companies in the USA and South America. He was born and raised in Blacks Harbour, New Brunswick. Glenn's vision, entrepreneurship and business savvy have been recognized by the business community in Canada and overseas. In 2007 he was named Entrepreneur of the Year for Atlantic Canada and has been named as one of Atlantic Canada's top 50 CEOs for several consecutive years. On May 20, 2011 Glenn received an Honorary Doctor of Science Degree from the University of New Brunswick in Saint John.

Esther J. Dockendorff
Member

Esther Dockendorff is President and CEO of P.E.I. Mussel King Inc., the most established mussel aquaculture company in the Canadian industry. The Dockendorff Family's group of companies comprise one of North America's largest mussel farming operations, and the most modern processing facility in the industry. With over 30 years of experience in the seafood industry, Esther has extensive experience in both the growing and processing aspect of cultivated mussels. She was a member of the Board of Directors of the Fisheries Council of Canada from 2004-2011. She was President of the Seafood Processors' Association of Prince Edward Island from 2004-2008 and continues to be an active member. Esther is involved in numerous community organizations. She is past President of the Morell Consumers Co-operative and past Vice President of the North Shore Funeral Home.

Pernille Fischer Boulter
Member

Ms. Fischer Boulter is the founder of Kisserup International Trade Roots Canada Inc., Kisserup Europe and Kisserup Arctic. She has over 25 years of business experience providing advisory services, project management, trade training and consulting services to public and private sector organizations worldwide. She has worked on projects in over 90 countries, on 6 continents and in 25 sectors. She is frequently retained as a keynote speaker on international trade, investment and entrepreneurship in both private and public sector and she is an internationally recognized Subject Matter Expert on SME development. Originally from Denmark, Pernille immigrated to Canada in 1998. She has a Master's of Business from the Copenhagen School of Business; she is a Certified International Trade Professional, CITP by the Forum for International Trade Training in Ottawa, Canada and holds a Certificate in Project Management from Saint Mary's University, Nova Scotia, Canada.

Chief Brian Francis
Member

Chief Brian Francis was first elected Chief of the Abegweit First Nation in August 2007. He was re-elected in 2011 and 2015. Chief Francis was born in Lennox Island, Prince Edward Island. After receiving his early education in Lennox Island and Summerside, he completed four years of apprenticeship training and became a journeyman carpenter. He was the first Indigenous person in PEI to receive his inter-provincial red seal trade certificate. He worked in several departments, including the Department of Veterans Affairs, Human Resources Development Canada and the Department of Fisheries and Oceans, prior to his election as Chief and Band Administrator for Abegweit First Nation. Among his most notable accomplishments are being appointed to the Independent Senate Advisory Board and the executive of the Fathers of Confederation Building Trust. In addition, Chief Francis was elected to the executive of the Atlantic Policy Congress of First Nation Chiefs and the Ulnooweg Economic Development Financial Board. Chief Francis is also a proud recipient of the Queens Diamond Jubilee Medal.

Anne Hébert
Member

Anne Hébert is the CEO of Bingham Law. Ms Hébert has a Bachelor of Psychology, a Law degree and an MBA from the Université de Moncton. She has been a member of the New Brunswick Bar since 1993. Prior to taking on the role as CEO of the largest independent law firm in New Brunswick, she was the first woman CEO of the Conseil économique du Nouveau-Brunswick, a position she held between 2006 and 2016. She has actively participated in the economic development of the province's Francophone community. She has served on a number of economic and socio-economic committees, and she holds a seat on the board of directors of Le Pays de la Sagouine, as well as the board of directors of the Canadian Bar Association, New Brunswick Division.

Dean MacDonald
Member

Dean MacDonald is the Chair of Tuckamore Capital, a diversified company that invests in successful Canadian private businesses and also the Executive Chair of ClearStream Energy Services, an oil and gas services company which operates in Western Canada. Dean has had a long and successful career as an operating executive and entrepreneur, he was the Chief Operating Officer of Rogers Cable and Chief Executive Officer of Persona Communication. In addition to sitting on the Boards of numerous businesses in which he is a prime investor, he is also owner and CEO of Deacon Investments Ltd., a company which invests in commercial real estate and operating businesses across Canada. Mr. MacDonald has also served as Chairman of Newfoundland and Labrador Energy Corporation, which manages the province's oil and gas assets. Mr. MacDonald is also the founder of the ClanMac Foundation, a charitable foundation dedicated to helping improve the health and well-being of those in need in his home province.

Robert Niven
Member

Robert Niven is the Founder of CarbonCure Technologies and serves as its Chief Executive Officer. He is a pioneer in the creation of a new class of clean technologies in the global race to develop scalable CO_2 utilization technologies for the concrete sector. As the leader of CarbonCure Technologies, he has overseen the technology development through commercialization and expansion into international markets. His work in the climate change field has been recognized by invitations to present his research and perspective at numerous international conferences, including the United Nations climate change conferences. Mr. Niven holds a M.Sc. in Environmental Engineering from McGill University and a B.Sc. in Chemistry from the University of Victoria.