



Rural Ontario Foresight Papers 2017

The Impact of
Megatrends on Rural
Development in
Ontario

The Impact of Megatrends on Rural Development in Ontario: Progress through Foresight

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Introduction

Recent research has identified six major trends — so-called Megatrends and eleven specific impacts of those trends — that will likely affect Ontario over the next two decades (Fenn, 2016). To a large extent, these impacts will be felt in infrastructure and related economic activity, but there will be equally important impacts on society and communities, the environment and public policy.

Too often Ontario's discussion of the future focuses on urbanization, globalization and cities, but the impacts on rural communities and the rural economy will, if anything, be even greater.

Rural and northern Ontario face major societal and economic changes in response to emerging megatrends. By anticipating these trends, rural Ontario can deal with them realistically — both anticipating the need for mitigation and identifying the opportunities that come with disruptive change.

However, there is no single, universal "rural" experience in Ontario. Issues in rural communities that are becoming suburbs are unlike those of communities in more remote locations. The issues facing northern and eastern Ontario rural residents are often qualitatively different than those facing southwestern Ontario rural residents. Those engaged in agriculture have a different range of challenges than those involved in other aspects of the rural economy or professions. But they all share many common and fundamental challenges. This is particularly the case with infrastructure and its impact on all Ontario rural communities.

We must also be modest and realistic in our efforts to anticipate the future. A lot can change in a couple of decades or several election cycles. For example, in 2000, millennium discussions did not mention global terrorism or a surplus of oil, neither the iPod nor the iPhone existed and GPS was for aircraft and cruise missiles.

We may be challenged to better understand how emerging trends will affect rural Ontario and its infrastructure over the next two decades. However, we can draw on evidence-based experience to guide us. As jurisdictions like Scotland have demonstrated (Skerratt, 2014), research can prove a useful tool when making practical choices.

Infrastructure's Role in Rural Ontario, Past and Future

Infrastructure in all its aspects is the nervous system of a successful modern society. Historically, Ontario's prosperity and quality of life stand "on the shoulders" of those who invested in public infrastructure and maintained it. Our generation (the Baby Boomers), however, has not been sufficiently committed to that proven course. Our public and private budget priorities have often been focused on other needs and desires, at the expense of infrastructure and the economic and social dividends that it pays. In both urban and rural Ontario, we are burdened with an "infrastructure deficit" that acts as a drag on our productivity and quality of life.

Somewhat belatedly, we have come to recognize the importance of restoring our public and economic infrastructure. We now recognize infrastructure's contributions to revitalizing our economy and to meeting the needs of a changing society. Governments at all levels are planning major investments and institutional investors (e.g., public-sector pension funds) are being invited to join in those efforts.

Will these efforts be primarily focused on urban regions, or will they include rural and northern

communities, as they did in the era of highway building and rural electrification? Does it still make sense to replicate the infrastructure networks and facilities supporting the economy of the twentieth century in rural and northern Ontario? How can communities facing economic or population decline use their resources and innovation to leverage the potential investments of others?

Understanding Megatrends and their Impacts

What are the "Big Six" Megatrends that will affect Infrastructure?

Based on research and analysis, several major trends have been identified that will affect infrastructure and infrastructure decisions over the next two decades. While various analysts have identified different trends or suggested more or fewer trends (Avent, 2014; Richard Dobbs et al., 2015), there are six megatrends particularly worth watching for their impact on infrastructure, and correspondingly, for infrastructure's impact on society and the economy (Fenn, 2016, p. 19-42).

1. Technological Trends and the Pace of Technological Change

At its heart, infrastructure is technology. As a result, technology trends will most conspicuously affect infrastructure. In particular, the pace of technological change can be even more important than the technological changes. Recent trends in technology in all fields have taught us a common lesson: many of our conventional assumptions and established practices can be swept away in a very short period of time by the advance of new technology — and the public's embrace of it. "Exponential growth ... looks negligible until it suddenly becomes unmanageable." (Avent, 2014, p. 4)

Technologies are tools without an agenda of their own, but their influence on society is never neutral. They blindly sweep aside the livelihoods of some people and enrich others. Politics must craft rules and institutions that harness technology to suit society's values and vision of itself (Avent, 2014, p. 18).

Technology can come to the rescue of the mounting problem of deferred maintenance obligations in rural waterworks, bridges, arenas and other public infrastructure, which now also burden the financial balance sheets of municipalities and public agencies. Nano-sensors built into roadways, bridges and under-road water and sewer networks, along with the expanded use of drones and other monitoring/inspection technology, will enable a more targeted "no-surprises" approach to maintaining existing infrastructure.

One of the challenges of rural and northern communities has always been the impact and cost of distance and sparse population. Contemporary technology will change that, especially with the infrastructure we use to support a variety of societal functions. Despite the rising cost and demand for health care and education, will we still need the expensive bricks-and-mortar facilities that we traditionally use to deliver these programs? Conventional social infrastructure — health, education, custodial facilities and housing for the elderly — may see big changes. Digital technology can bring global resources and the best minds in health, education, skills training and agricultural enterprise, readily and inexpensively, to every rural community and to every farm kitchen.

2. Urbanization, Globalization and Connectivity Trends

In their book, *No Ordinary Disruption: the four forces breaking all the trends*, McKinsey analysts include urbanization as one of the great forces that will affect all of our lives in the future (Dobbs, 2015). Advances in "intelligent" transportation technology will change the face and the future of our urban centres and the transportation and energy infrastructure that serves them (or fails them). Emerging technologies will change the ground rules and conventional assumptions. Land-use policies favouring compact urban form — for reasons of infrastructure efficiency and to reduce pressure on adjacent agriculture and natural areas — may need to undergo a fundamental re-evaluation. New developments already on the horizon paint the picture: driverless and shared electric vehicles;

automated inter-urban trains; and, internet-sourced sales and distribution networks. They will all combine to make living in small-town Ontario a practical option — for the first time— for many city dwellers facing high housing costs or retirement and, particularly, for entrepreneurs and professionals seeking to combine lifestyle and economic competitiveness.

Globalization trends will remind us that neither Ontario nor North America is an island. The growth of middle-class markets in the once seemingly far-off lands of China, Indonesia, India and Brazil will see a repositioning of supply chains to respond. We see it already. Once the focus of the steel industry's Great Lakes shipping, Hamilton Harbour's fastest growing commodities are now Ontario agricultural and processed food products destined for the Far East. Trump-inspired trade barriers could change our traditional markets, our patterns of commodity production and distribution, and even the wider "markets" for our post-secondary and healthcare institutions.

Correspondingly, commercial, environmental and political developments that were once safely on the other side of the world will increasingly affect our daily lives, much as the revolution in consumer products and durable goods manufacturing has altered North America's relationships with Asia and Mexico over the past three decades.

3. Social and Demographic Trends

Demographers have pointed out that since the Baby Boom generation learned to walk, Ontario's patterns of social demands — and related infrastructure demands — can be tracked closely to the annual aging of the post-war demographic cohort. Elementary and secondary schools built decades ago progressively empty, facilities for the frail elderly are in greater demand and someone in North America is turning age 65 every seven seconds.

Healthcare delivery will need to be integrated across the continuum of care, from primary care, diagnostics and specialists, through hospitals and community care, to long-term, hospice and palliative care. Institutional barriers, professional silos and the unintended barriers to care created by our health privacy rules will be eroded by technology in the hands of both providers and patients. This evolution is proving difficult in metropolitan settings, but it is a role already played well by rural hospitals and clinics.

Community-based services in rural and northern communities face the same financial pressures as any public entitlement program. Mass public entitlement programs, such as Medicare, the Canada Pension Plan (CPP) and large public pension plans, depend on a demographic pyramid where multiples of younger workers at the bottom of the pyramid support the benefits paid to older citizens at the demographic apex. When the pyramid begins to narrow at the bottom, the medium-term fiscal and social consequences can be dramatic.

With falling fertility rates in big cities and elsewhere, the need for more immigrants becomes acute, both to attract talent and skilled workers (and taxpayers), and to recruit less-skilled workers to support the health care and lifestyles of an aging population. But not since the beginning of the twentieth century has immigration been seen as the solution to the economic and social pressures facing rural Ontario. For a century, agricultural productivity gains and family succession have allowed farm operations, agribusiness and small-town commerce to cushion the impact. In recent decades, an unwillingness of the younger generation to stay in rural communities has eroded the vitality and even the sustainability of rural Ontario.

But that may be about to change. Out-migration from the cities, including first- and second-generation immigrants, may be a feature of the revitalization of rural communities and "second tier" urban centres. Sustained and expanding working populations may well be the key to keeping rural infrastructure viable.

Along with large-scale immigration, however, comes the domestic social and political reaction to the societal changes that other cultures and other values bring. Chancellor Angela Merkel may have reversed

the decline in the proportion of workforce population in Germany, but it will come with social and political consequences.

4. Economic and Workforce Trends

Consider our recent experience, where telecommunications and online marketing have increasingly overtaken the in-person retail experience, in areas as diverse as newspapers and magazines, consumer-products retailing, travel bookings, culture, sports, entertainment and department stores.

A century ago, every small town had a bustling commercial core, a number of churches and well-patronized public facilities. Today, many of those retail, institutional and entertainment functions have declined or disappeared in small towns.

If conventional commercial retail ceases to be the focus of our cities, suburbs and small towns, and if automated vehicles don't require ample parking and automotive infrastructure, what will take their place? Should we start to consciously re-design our rural centres, using infrastructure that produces new and different rural communities?

While the rate of unemployment has been declining, Ontario's obsolescent jobs are being replaced with large numbers of less well-paid and less dependable service-sector jobs. Particularly in smaller communities, this shift in employment profile means lower capacity to pay taxes for things like infrastructure and, correspondingly, more demands for public services that support lower-income citizens.

Some are suggesting that we may see a resurgence of manufacturing in North America, including Ontario. Political pressure, re-imposition of tariffs, attenuated Asian supply chains, geo-political instability and a desire to have some percentage of product suppliers ready-to-hand, could combine to influence corporate decisions. Before the widespread decline of Ontario's light manufacturing base in the 1980s, both domestic and foreign manufacturers were known to favour locating in space-extensive rural settings, with ready access to labour markets that boasted the practical skills of rural workers, without a tradition of industrial unionism.

5. Environmental and Energy Trends

Disturbing trends are appearing that affect environmental and energy infrastructure across rural and northern Ontario. Sanitary sewers, stormwater and agricultural drainage systems are increasingly incapable of managing periodic extreme weather events. Water quality issues continue to plague our First Nations communities, small communal water systems and septic systems on farms and in cottage country.

Water quality and availability are also emerging as major issues across North America, as others look enviously at rural Ontario's aquifers and surface water assets. However, cost-effective solutions may be around the corner. Environmental impacts and their high remediation costs using old technology are motivating new approaches.

Energy infrastructure will be under increasing demands from burgeoning electronic communications and electricity-powered transportation, with pinch-points in transmission and increasing demands for higher (millisecond) tolerances in electricity stability. A benign combination of favourable public and tax policy, technological progress and rising electricity costs will also give rise to a wave of localized micro-generation, from inexpensive rooftop solar generators to district heating and cooling systems (*The Economist*, 2015). Areas of rural Ontario have been in the contentious forefront of this new generation (and storage) activity, both in wind and nuclear. Among other things, it may change the business cases for building more transmission capacity and for attracting commercial investment to locate nearer the source of the power.

6. Political and Fiscal Trends

At the fulcrum of all of these trends lie government and the public purse. How will these megatrends affect those charged with the responsibility for leading change and mitigating its impacts? *The Economist* emphasizes the need to act in a way that is not an historic peacetime strength of governments: to be nimble and rapid in their evaluation and response to demands for the right infrastructure. Of equal importance, governments need to create the right social and economic policy environment to plan for and correctly select infrastructure by type and priority (*The Economist*, 2014).

Technology is also helping compensate for labour displacement and the loss of major industrial and service employers. Like Uber in the cities, online services like Etsy and Airbnb have democratized the local and global marketplace for rural Ontario, for everyone from vehicle owners and tourist operators, to craftspeople and organic growers. In June 2015, the BBC profiled how impoverished, traditional sari-makers in rural India were using basic CAD and web-based global “fulfilment” to earn much higher salaries than ever before. If rural Indian seamstresses can penetrate the large South Asian community in Britain, it should certainly be possible for rural Ontario enterprises to find markets for their products and services throughout urban North America, provided the infrastructure to support that activity is in place and barrier-free.

What will these Six Trends do to Planning for Future Infrastructure in Rural Ontario?

By reflecting on these megatrends and their own experience, rural Ontarians can better anticipate, prepare for and seize opportunities, early and with more confidence. Of equal importance, they can more easily pre-empt, deflect or mitigate the avoidable risks.

Here are eleven potential impacts of these megatrends.

Impact 1: Distances will Shrink

Distance and a perception of isolation have long been the burden of daily life in rural and northern Ontario. But that is about to change fundamentally. The internet does not care about distance and it does not charge based on distance or volume of customers.

The desire to move goods, people and information quickly, efficiently and economically across a region or across the world will continue and accelerate. Much of this shrinkage in distances will be abetted by new technology, from the Internet of Things (Howard, 2015a, 2015b) and 3D printing, to high-speed trains and low-cost autonomous vehicles.

In addition to the obvious positive aspects, shrinking distances will have a number of disruptive manifestations. It will expand the reach of urbanization by allowing long-distance commuting and the development or redevelopment of residential communities and business centres at some distance from major urban centres. It will pit local businesses against digital businesses and big-city competition.

These developments will have implications for Ontario’s Greater Golden Horseshoe Growth Plan and Metrolinx’s Big Move Plan, both of which are heavily influenced by concentrated and concentric growth assumptions that may not prevail in the future. Conversely, it could cause some rethinking of the underlying assumptions in the Growth Plan for Northern Ontario (Northern Ontario Growth Plan, 2011). While it may be a problem in metropolitan areas, these “reverse migration” trends could revitalize rural centres and boost employment options for rural residents, including young people.

Impact 2: Elapsed Times will Shrink

Like distance, the time lost in travel and poor connectivity has plagued rural and northern Ontario since the days of Mowat’s settlement of New Ontario. That, too, will change.

Based on their experience with telecommunications and e-business, users of infrastructure will transfer their expectations to public systems, activities and processes. Rural Ontarians will expect infrastructure and the programs it supports to perform instantaneously and simultaneously. They will not accept the pace or the sequence preferred by the public-agency provider. Based on their experience with the commercial world, they will be less inclined to accept that things must take longer, or be more limited, or be less accessible, when serving more remote locations. Demands will grow to deal with cycle-time issues, like reduced waiting times for medical services and more competitive transportation options. These changes will have dramatic implications for the design, location, operation and, especially, integration — convergence — of infrastructure serving rural and northern Ontario.

Impact 3: Scale will Shrink

Moore's Law predicted that miniaturization would exponentially expand the processing capacity of computer chips. The same pattern will be seen in the next generation of infrastructure. Lightweight, environmentally beneficial materials, energy-efficient systems, functions linked with robotics and radio-frequency identification (RFID) communications, and small-footprint engineering and architectural designs made possible by nano-technology, will all be features of the new infrastructure.

While some grand infrastructure projects like those of the past will doubtless be needed, modesty and restraint will be important characteristics of local infrastructure and infrastructure affecting designated natural areas. The constraints that "NIMBY" has imposed on our land-use planning and environmental assessment processes will cause us to rethink the scale, scope and impact of infrastructure (to say nothing of timing). While more defensible, the duty to consult with Indigenous peoples will also have an impact on the timing and scope of infrastructure projects.

Tweaking, refurbishing and technical innovations to improve existing capacity will stand equal with the big signature project or the innovative new design. To win its social licence and political and legal approvals, the new generation of infrastructure will often need to be unobtrusive, make minimal impact and confer conspicuous and compensating benefits, ideally at a competitive cost. However, the unique ability of rural communities to sit around a single table and reach consensus on a course of action could be a significant tactical advantage, in relation to the increasingly fraught decision-making environment for infrastructure investment in major urban centres. Smaller scale, more adaptable infrastructure is also much more suited to a rural community than a metropolitan centre.

One of the most significant implications of a "small is beautiful" approach is to ensure that existing systems are maintained in good working order and a state of good repair, extending their useful life where possible. In many rural communities, the infrastructure already exists, but the need is to refurbish and sustain existing infrastructure and to maintain its customer base, rather than to build entirely new basic infrastructure. This may be less glamorous than new projects yielding shiny new infrastructure. Ideally, we should be able to prioritize our investments, to achieve the greatest rate of return. Unfortunately, some of our biggest infrastructure assets lie below the ground, where they are difficult to monitor, hard to maintain and easy to neglect.

Recent government efforts have aimed to improve the asset-management practices of all municipalities. Even very small municipalities have been required to inventory their infrastructure assets, for both the municipality's balance sheet and the annual work plan — many of them for the first time. They have also been required to prepare asset management plans, in order to schedule and budget for regular maintenance and rehabilitation (Fenn, Burke and May, 2015).

All of this activity gives us reason to hope that infrastructure repair and refurbishment investment can be more targeted. We should aim to ensure a full lifecycle approach for past public investments and to put off major new infrastructure investments until, and if, they are needed. However, asset-management plans also provide sobering evidence of the degree to which we have neglected infrastructure over the years. They illustrate the need to be wise and to use evidence-informed investment choices, with the

limited funds available to the public sector for these purposes. They may also demonstrate that rural communities need new governance/organizational models to deliver and share the cost of basic infrastructure, particularly in northern Ontario.

Impact 4: Functions will Converge

Arising from their experiences with smart communications, both society and the marketplace will push mergers and interfaces between previously separate and even previously unrelated providers and organizations. This will have significant implications for the providers of infrastructure and for the ability of infrastructure to provide a suite of functions, rather than a single, closely related set of services or individual functions. In general, the public cares less about the ownership and provenance of an infrastructure service than they do about the quality, availability and flexibility of a service. (More simply, they won't care whose name is on the truck or the mobile site, as long as the service reflects good value.) But in rural Ontario, experience says that consolidation means jobs and suppliers leaving the local community, and neighbourly customer service being transferred to a call centre in some far-off urban (even foreign) setting.

To understand convergence, look at healthcare delivery in Ontario, which represents half of the Ontario government's operating budget each year. In major urban centres, hospitals were largely developed to deal with acute episodes (childbirth, work and car accidents, heart attacks), as the formal term "acute care" facility indicates. Now our aging population increasingly needs care for chronic disease — protracted illness or end-of-life care. Other than for complex, tertiary-care procedures, community-based healthcare facilities often achieve the same efficacy as hospitals, with higher satisfaction levels, lower risk of collateral acquired infections and, of course, at a dramatically lower all-in cost. This is an approach that is ideally suited to the existing rural healthcare model. It gives rural communities an important head start in modelling integrated health care, and in assuring rural communities that their care is as good as, perhaps even better, than that enjoyed by their urban cousins.

Rural and northern communities are often Ontario's healthcare pioneers. Existing models, such as the Sault Ste. Marie Group Health Centre and Sioux Lookout Meno Ya Win Health Centre, or the multi-site hospital corporations of Grey and Bruce counties, demonstrate that solid health results can be achieved using this integrated, regional approach. In the spirit of technological convergence, a patient's health information will need to be available to the full range of medical practitioners, including pharmacists and nursing staff in long-term care homes. In future, up-to-the-minute healthcare data will be collected and available from monitoring systems on the patient's wrist or in the patient's home through to various clinical settings, as well as being accessible to the informed patient and/or their trusted caregivers and clinical casemanagers (*Macleans*, 2015).

In years gone by, these requirements would have been a major hurdle facing medical practitioners and patients, involving travel, delay and inadequate information. Advances in areas like diagnostic imaging and remote surgery have reduced the perceived risk of medical isolation, for both patients and healthcare providers in rural settings. All of this represents a revolution in the way in which we build healthcare infrastructure and health information systems, to say nothing of the way that we educate, recruit, deploy and reimburse our healthcare professionals and healthcare workers.

This convergence story could easily be repeated for other areas of the public sector, again with significant implications for traditional physical and technological infrastructure.

Impact 5: Margins will Shrink

For generations, rural residents have lamented the cost escalation that occurs between the farm gate and the grocery shelf, little of which finds its way back to the rural economy. Generation X, Generation Y, the Millennials and new international consumers are rapidly becoming the marketplace for rural Ontario's products. The public's willingness to pay a significant added premium on the price of goods and services as they progress through the value chain will be resisted — and ways to avoid them will be

sought out by informed consumers, app developers and new entrepreneurs. Global competition in other fields has taught these end-users and consumers that they have options, especially when quality, price or availability of products and services do not meet their expectations. With the internet, increasingly they and suppliers can go directly “to the source.”

In addition to mounting pressure on marginal costs, there will be increasing efforts to link the cost of specific services to specific clientele. In some respects, government services are society’s last holdouts in embracing the principles of user-pay or beneficiary-pay. Beyond charging fees or user charges, in government there will be efforts to exclude customers or beneficiaries who either do not pay enough, if anything, for a public service, and who have cost-competitive alternatives, or whose economic circumstances do not warrant public subsidy.

Finally, as is the case with the rise of electronic banking, online retailing and travel planning, the citizen-consumer will increasingly be expected to provide the labour and transaction processing previously offered by providers such as bank tellers, counter staff in offices and retail staff in stores. Crucially for rural communities, this eliminates the need for “critical mass” geographically. On the internet, a customer is a customer, irrespective of his or her location or geographic concentration.

Impact 6: Expect Individual Customization

We will see a rise in customer-focused individualization, including less interest in universal, boilerplate and warehouse approaches, from retailing and logistics, to transportation, education and health care. Processes organized for the administrative convenience or cost-efficiency of public-sector suppliers and providers, from health care to governmental programs, will be forced to reorient themselves to the customer’s unique and differing preferences.

Fortunately, everything from user-designed smartphone apps to regulatory reforms will make it possible to match consumer needs to infrastructure options.

Impact 7: Global Impacts will become Local Impacts

The markets for goods and services will reflect changing values and preferences, reflecting the growth of the middle class in emerging markets. An increase in immigration will also alter domestic consumer preferences, for things ranging from housing choice to education, as they did after the Second World War. Likewise, the ability to source goods, services and information from a global marketplace will devolve to the household level, with implications for things ranging from logistics and order-fulfilment to local production, domestic taxes and regulatory enforcement. With these changes and the connectivity of global commerce, there will be impacts on conventional fiscal arrangements — especially property taxation and user-charges on which rural municipalities depend — in much the same way as the private service sector has had to adjust its business models to survive.

Beyond consumer impacts, there are other types of global impacts on infrastructure and the environment, such as the accidental introduction of invasive species. With the experience of Ebola, Mad Cow disease, SARS and hospital-acquired infections, our infrastructure — from health care and transportation to marketing systems — needs to anticipate a need to control and manage contagions and to certify the provenance of products.

Impact 8: Climate Change will be Accepted, but will its Consequences?

Extreme weather events will become more commonplace. Ontario may not yet feel the full impact being experienced by other jurisdictions, like drought-stricken California or Australia, or the flooding in Alberta and southern Manitoba. But already, so-called 100-year storms are now regular events. We will need more resilience and redundancy in stormwater infrastructure, bridge designs, water and wastewater treatment facilities, and electrical distribution networks.

Will altruistic policy goals on climate change translate into changing consumer habits or political support for infrastructure-related initiatives? It will depend on their relevance, their political marketing and the tolerance of the average citizen. Ontario's move away from coal-fired electricity generation is still accepted as a positive move. Without more practical alternatives, will we see a similar acceptance in areas like automobile use, localized-energy generation and land subdivision?

Impact 9: Demographics will change Society's Priorities

As the Ontario population moves through the Baby Boom demographic, the political and market influence of the post-war generation will wane, despite its demands on social and healthcare services.

We will see less emphasis on bricks-and-mortar infrastructure, more focus on electronic communication, in-situ processing and 3D printers, and universal connections to the Internet of Things. This change of emphasis may have some positive aspects. Local theatre, the 100-kilometre diet and home renovations have less economic leakage than buying the latest South Korean entertainment technology or importing Chilean vegetables.

Impact 10: New Consumer-driven Urban Designs

As the cost of home ownership continues to rise, new models of urban residential accommodation will emerge and be sought out.

The likely prospect is that Ontario will move beyond simple intensification and natural areas preservation policies. Those policies are already generating both community resistance and, ironically, a re-emergence of metropolitan-scale urban sprawl. Our cities and towns will need to be redesigned and to build new models, reflecting family and consumer housing preferences. And as noted, where they have the option, many may look to life in rural and small town Ontario as a viable, attractive and affordable lifestyle alternative.

Impact 11: Short-term Thinking will Threaten Progress and Sustainability

As we try to look two decades into the future, we must acknowledge that our political, media and investment horizons have diminished, what with the 24-hour news cycle and business performance based on the latest quarter and the closing stock or commodity price. These are more often seen as concerns for corporate boards of directors and political candidates. However, this same "social-media attention span" will make it increasingly difficult to anticipate, manage and motivate decisions focused on medium-term and longer-term trends.

The bottom line, however, is similar throughout the developed world. For business, long-term considerations are increasingly subservient to the here-and-now. This economic and legal environment makes it difficult for farmers and other business people to consider future opportunities, and to invest with confidence in the future. In this atmosphere, governments at all levels must help. They must play their historic role: setting the rules of the game; promoting productivity and broad-based prosperity; and considering the future, not just the near term.

What are some practical implications of these eleven impacts?

1. New Types of Infrastructure

Infrastructure is not static. In rural Ontario, railways displaced canals, then highways displaced passenger rail and now the digital age demands new types of infrastructure. The most obvious recent addition to the portfolio of public infrastructure is the advent of rural broadband networks (Levin, 2017).

The next generation of infrastructure will also benefit from new technology by altering the nature, weight, lifespan and footprint of traditional infrastructure. For example, we generally assume that our

existing water and wastewater network is universal and standard. In many parts of the US, parallel grey-water systems are commonplace: piping lightly treated or recycled water for use in landscaping, agriculture, industry and other non-potable applications. The work of the Gates Foundation, while targeted at low-cost innovation in Third World sanitation systems (Gates, 2014), could easily produce a next generation of domestic sanitary sewage systems that would revolutionize our vast and capital-intensive wastewater infrastructure.

Heavy infrastructure, like electricity generation and distribution, hospitals and college buildings may be paralleled or even displaced by lighter, more flexible, lower-cost options. If so, the pace of infrastructure investment may accelerate and resistance to projects decline. The challenge may lie in distinguishing the next generation of new infrastructure from the fads.

2. Long-distance Commuting

The next generation of infrastructure users will expect to be able to move considerable distances regionally, rapidly, conveniently, frequently, safely and at low cost. Rising housing prices in major centres will be a factor as well. Many may want to live in one community and work in another, as their spouse/partner travels from home in the opposite direction for his or her work or study.

As many more Ontarians will be self-employed, and seeking work where they can find it, they will want to be able to serve a much wider market area. These are commuting patterns that are not anticipated in our traditional concentric or hub-and-spoke transportation models, in which we have continued to invest so heavily. These new commuting patterns are an example of the kind of individual customization that will be expected. They will conspicuously reflect themselves in small-town Ontario and in a resurgent demand for land-severances.

3. Light and Adaptable Infrastructure: The Impact of Convergence

Infrastructure that will accommodate a highly mobile society will need to be inexpensive to build, maintain and operate.

Many traditional public and community functions will converge; the result is that traditional segregations will make less sense. Customary distinctions may erode, like those between school systems by physical plant and bussing or in the justice field. Most conspicuously vulnerable to convergence are the distinctions based solely on geography, history or municipal ownership.

With the convergence of miniaturization, pre-constructed components and new building materials, the infrastructure of tomorrow will include more “light” infrastructure. It will have a shorter life expectancy, new materials and designs, more capacity to be adjusted to meet changing use patterns, demographics or economics, and with a lower environmental impact and price tag.

Paralleling light infrastructure is the retrofitting and repurposing of existing infrastructure to increase its resilience, its through-put or its life expectancy, as an alternative to the daunting task of securing approval for major new heavy infrastructure projects, networks and utility corridors.

4. Think Globally, Act Locally

We can anticipate innovations from elsewhere being adopted here, overcoming idiosyncratic homemade policies. We can also anticipate Ontario communities being sought out for their products and services from a global marketplace seeking quality and distinctiveness, provided our rural enterprises are open to those overtures. But climate change impacts and policies will also drive some fundamental lifestyle changes and added resiliency in our infrastructure designs.

5. Demographics and their Implications

The demographic challenges facing the labour market will intensify. Young taxpayers and pension contributors will be needed to support the cost of services to the Baby Boom generation. There will be increasing diversity in our rural population. In the future, immigration will reflect our need for the skills and innovative drive of offshore talent and, realistically, the personal caregiving needs of an expanding frail and elderly population. Given the global migration pressures of war and poverty, we may also be affected increasingly by the pattern of “informal” immigration seen in Europe and the US.

The prospect of governments building long-term care homes, palliative care wards in hospitals and similar infrastructure for the whole Baby Boom generation appears unsustainable under the present fiscal circumstances, especially since they are the wealthiest generation of seniors in history. Technological and medical measures to maintain the elderly in their homes and in commercial residences for the elderly will expand dramatically. Relocation to communities with lower-cost, ground-related housing and readily accessible health care will be an attractive option to prosperous but aging Ontario urbanites.

The Next Generation of Infrastructure

In examining and responding to impending trends within infrastructure and the trends affecting infrastructure, the role of government has always been central. From ancient times, it has fallen to civic authorities to design, build and operate crucial civil infrastructure. This mantle has included the obligation to anticipate social and economic needs but also, to use infrastructure to create new possibilities. From Roman aqueducts to fibre-optic broadband networks, successful infrastructure often requires new ideas and new approaches to anticipate needs and to serve public policy and economic objectives, often before the markets can catch up. When done well, major infrastructure development can change a society for the better and assure its continued prosperity, as with the decisions to build Highway 401 and to electrify rural and northern Ontario.

Despite rapid advances in technology and engineering potential, both governments and their private sector and civil society counterparts are often reluctant or unable to break free of the constraints of convention, risk-aversion, complacency and cost. Third-sector organizations, like the Rural Ontario Institute (ROI) or the Northern Policy Institute (NPI) will have a crucial role to play in framing the concepts, describing the opportunities and risks, and pointing the way to the future.

Successful Strategies for Economic and Social Development in Rural Societies

The economic, social and environmental challenges facing rural communities are no longer confined by local municipal boundaries or traditional community identity. One promising approach is therefore to address the challenges facing rural communities from a regional, rather than purely local perspective. In northern Ontario, the absence of county governments has meant an expanded role for district social services administration boards (DSSABs), in areas ranging from social housing to social services, but outside urban centres, the existing structures really do not fulfil the need. In southern Ontario, however, a number of county governments have accepted this twenty-first century “regional” role.

Prince Edward County has re-invented itself, adopting a single-tier county government and moving away from an economy dominated by traditional agriculture and declining population, but without abandoning its roots and its assets. Prince Edward has embraced a 21st century economy that features tourism built on vineyards, farm products, and natural and heritage assets. From that base, it has attracted digital-economy enterprises and professional services that gravitate to communities with a high and affordable quality of life and superior digital connectivity, with accessible urban markets. Like some other counties, Prince Edward reduced the number of municipalities, both to expand the capacity and integration of local government and to facilitate the adoption of a broad common vision.

Other counties have developed economic development partnerships with major regional employers. With Bruce Power, the counties of Bruce, Grey and Huron have developed a unique working relationship — the Nuclear Economic Development and Innovation Initiative. That government/business partnership is already showing progress in recruiting new and existing suppliers and spin-off businesses to contribute to (and benefit from) the multi-billion-dollar long-term refurbishment of the Bruce nuclear reactors (Bruce, 2017).

The Eastern Ontario Wardens Caucus — an informal association of the leaders of rural county governments — showed how a 21st century vision could leverage municipal seed money into a \$100+ million investment in high-speed broadband connectivity across all of rural and small town Eastern Ontario. The Eastern Ontario Regional Network (EORN) is an economically and socially powerful initiative. EORN gives residents, professionals and businesses in rural communities a low-cost opportunity to enjoy many of the benefits of big-city services and institutions, and connectivity to global markets. It helps to sustain and attract those who want to live and do business in rural eastern Ontario.

Civil infrastructure remains a burden for many rural municipalities. A vast inventory of water and wastewater systems, drainage works and rural roads and bridges must be supported by small populations and limited fiscal resources. Across Ontario, hundreds of small bridges are in need of repair or replacement, like those in Wellington County (MMM, 2013). Individual bridge projects can be a major financial burden for a township municipality.

Jurisdictions like Missouri and Pennsylvania have found ways to bring a whole portfolio of bridge infrastructure up to contemporary safety and construction standards with a “big bang” approach called “project bundling.” Research suggests that results can be more assured through the use of Infrastructure Ontario’s Alternative Financing and Procurement (AFP) model (OGRA, 2013). Hundreds of similar bridges are bundled into an overarching evaluation, design, construction, financing and maintenance initiative. They are tendered to a single general contractor or bid consortium, in a time-limited, set-price contract, potentially financed by the private sector. The winning bid consortium uses repetitive processes and standardized designs to effect savings, often employing local delivery agents bound to centrally determined design specifications and execution provisions.

One example of the power of bridge bundling is found in Missouri, which in the fall of 2008 launched an ambitious \$685 million program to improve or replace 802 bridges statewide within five years. The 554 bridges slated for replacement were bundled into a 2009 mega design-build contract — the first of its kind in the nation — with a joint-venture contractor comprising national industry players. With an aggressive target completion date of December 2014, the contractor tackled the project by engaging, among other firms, more than 100 Missouri contractors and subcontractors, which lowered costs and boosted local knowhow. Such efficient sourcing, combined with collaboration and economies of scale unprecedented in bridge rehabilitation programs, contributed to the 554 bridges being replaced a full year early — and under budget. (Price, 2016)

Rural water, wastewater and drainage works face similar problems. What are the solutions for limitations on local municipal financial resources and technical capacity?

- Economies of scale
- Geographic footprint corresponding to the scope of the challenge
- Full-cost and lifecycle pricing
- Openness to private-sector financial and operational partnerships, and
- More professional and managerial capacity and depth.

“Regional” solutions can be designed and funded using upper-tier, watershed-based, or private-sector entities with the scale and expertise to do the job (Fenn and Kitchen, 2016, p. 14, 17, 21, 23, 76-77, and 105fn).

Conclusion

How can these opportunities be identified and initiatives promoted? Making better use of regional entities to advance the solutions to infrastructure challenges is one proven course. Allowing the private sector to play a bigger role in infrastructure delivery is another. However, transformative change in the face of megatrends will not come easily to rural Ontario, with its respect for tradition, competing interests and, understandably, cautious approach to economic risks.

A number of existing not-for-profit and university-based programs can assist with that difficult but exciting transformation. In part, it involves leaving behind stereotypes and ingrained self-perceptions. Like Scotland's SRU, Brandon University's Rural Development Institute (RDI) has been a pioneer in re-imagining rural communities for the 21st century. Among other contributions, RDI has helped rural Manitoba communities re-think their sense of identity in a way that looks at patterns of rural social and economic interaction, rather than traditional political, administrative or urban centre/hinterland paradigms (Ashton, 2015).

The Rural Ontario Institute is uniquely positioned to describe the nature of the challenges facing rural Ontario in clear sighted and evidence-supported ways. ROI also has the leadership network to develop and pursue the agenda for change. As this paper has attempted to illustrate, that change agenda will need to include using megatrends to anticipate the future, and using infrastructure to shape and create that better future for rural communities.

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NORTHERN PERSPECTIVES

The Impact of Megatrends on Rural Development in Ontario: Progress through Foresight

Charles Cirtwill & Emma Helfand-Green²

Michael Fenn's paper ties together a number of the themes discussed in the other *Rural Foresight Papers*. Overall, Fenn highlights the impacts that six megatrends will have on infrastructure and rural and northern development. These trends are clearly happening and will result in significant changes for rural communities, but the pace of change may not be as quick in the northern part of the province as compared to communities in southern Ontario.

The slower northern change is because many communities in Ontario's northern regions, especially those far from the Great Lakes or the Quebec border, are still without basic infrastructure that is commonplace in the rest of the province. Indeed, there are approximately 24,000 people living in what is sometimes referred to as the Far North (Government of Ontario 2017). The Far North communities in this region are still dealing with a lack of basic infrastructure such as roads, housing, drinking, broadband and other necessities. As Charles Conteh described in a paper commissioned by Northern Policy Institute:

The particular characteristics, potential, and constraints of the Far North are distinct from those of the other economic regions of Northern Ontario. It is a unique region with special needs based on issues of access, distance, and density. For instance, these communities need investment in rudimentary physical and social services infrastructure just to bring them up to par with other communities covered in this study [other communities in Ontario's northern regions]. The problems of isolation, lack of basic road and rail access, and subsequent socio-economic exclusion are particularly poignant in these Far North communities. The deliberations about strategic investment in the Far North, however, should not be restricted to thinking simply about road access. Rather, it should be a larger framework of community capacity building through the provision of basic necessities that most Canadians take for granted: safe drinking water, electricity, and broadband Internet access (Conteh 2017, 4).

What does this mean for the trends identified by Fenn in his paper? It is likely that some of the impacts discussed in his paper will not be as strongly felt in these northern communities, or that the change will take longer to materialize. More specifically, many of the impacts of the megatrends identified by Fenn are predicated on a community's and individual's ability to access reliable broadband and internet connection. However, as highlighted in the Northern Perspective response to Catherine Middleton's paper, there are still areas lacking the basic information and communication technology (ICT) infrastructure across Ontario's northern region. This will act as a drag on the speed of change for these communities.

The vast geography of the province's northern regions (which covers a land area of over 800,000 km²) has an impact on how the implications proposed by Fenn will be felt in the area. For example, the notion of long-distance commuting may be practical in rural areas in southern Ontario, but may be unrealistic for many communities in northern regions that would require significant technological advances to make

² The authors gratefully acknowledge the contributions to this piece made by James Barsby.

commutes possible. Finally, cultural differences in communities in northern Ontario — especially First Nations communities — may impact the time it takes for adoption of new changes. Overall then, the implications and trends identified by Fenn surely will have significant impacts on the future of Ontario's northern regions, but they may happen at a different pace and they will impact each of northern Ontario's diverse regions differently.

One interesting opportunity for rural and northern communities, that relates to a changing understanding of physical infrastructure, are community hubs — physical or virtual places that bring together a range of services and programs for clients. In many ways, community hubs are a response to a number of the practical implications of the megatrends Fenn identifies. For example, Fenn describes how going forward, functions will converge and society will expect infrastructure to provide “a suite of services.” Hubs are designed to do this very thing by bringing services together for easier access and better service delivery. The current trend in hubs — to re-purpose existing infrastructure like schools (an example being the community hub in Parry Sound) — is aligned with what Fenn describes as the “shrinking scale” of future infrastructure projects. As Cirtwill (2017) explains, “the province spends millions, indeed hundreds of millions, of dollars each year on new infrastructure. We love to build new things [...] Instead of allocating 100% of our infrastructure spend to maintenance or replacement, we could allocate a small portion of it to repurpose infrastructure.” Making use of existing assets will be one critical way to deal with the megatrends, and community hubs represent a great opportunity to make use of these assets to better meet the needs of residents in a changing society.

In sum, Fenn identifies six megatrends and a number of key implications of these trends for rural Ontario. Although it is clear that these trends are and will continue to be felt across both northern and southern Ontario, it is likely that due to existing differences in infrastructure, demographics and culture in communities in Ontario's northern regions, especially those in the Far North, the implications will be less strongly felt and may take a longer time to be realized.

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