

THE CATALYST

TOWARDS
AN ONTARIO
HEALTH
INNOVATION
STRATEGY

**ONTARIO HEALTH
INNOVATION COUNCIL**

A Report to the
Government of Ontario



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The Ontario Health Innovation Council is in the process of making this document fully accessible.

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EXECUTIVE SUMMARY



The Ontario Health Innovation Council was established in November 2013 by the ministries of Research and Innovation, Health and Long-Term Care, and Government and Consumer Services. The Council was created to provide strategic advice on how Ontario can:

- facilitate technological innovations that promote health and well-being, improve access to health and health services, and deliver effective, efficient, and quality care
- use the purchasing power of the province and broader public sector strategically to accelerate the growth of the health technology sector
- expand the adoption of innovative new technologies more broadly across the health care sector (e.g., including in hospitals, but also in home and long-term care settings).

The Council includes experts from the health care, research, industry, and not-for-profit sectors. In developing its recommendations, the Council conducted interviews with small- and medium-sized enterprises, consultations with key stakeholders from across the health technology innovation ecosystem and met numerous times as a full Council and in subcommittees. These recommendations are outlined below.

Recommendation 1 – Establish an Office of the Chief Health Innovation Strategist

The Office of the Chief Health Innovation Strategist (OCHIS) will provide the leadership to make Ontario a major centre for health technology innovation. The OCHIS will work with government and other stakeholders from across the province to identify health system priorities and population needs. It will also work to align innovation efforts with these priorities and needs.

Recommendation 2 – Appoint Innovation Brokers to Connect Innovators with Resources

Innovation Brokers will connect innovators with the resources needed to advance health technology innovations into practice. These brokers will be a single point of access to health system decision makers, test sites for gathering feedback from patients and clinicians and funding for the development and commercialization of innovative health technologies. They will also work with the OCHIS to coordinate, integrate, and ensure alignment of innovation with health system priorities and population needs.

Recommendation 3 – Invest in Made-in-Ontario Technologies

A four-year, \$20-million Health Technology Innovation Evaluation Fund will be created to support pre-market evaluations and early adoption of home-grown innovative health technologies, facilitating evaluation of innovations in specific care settings and across the health sector.

Recommendation 4 – Accelerate the Shift to Strategic, Value-Based Procurement

To better support development and adoption of innovation, a broad range of key stakeholders – including procurement officials and health professionals – will be engaged in defining health care procurement priorities and strategies on an early and ongoing basis. Stakeholders will focus on addressing health system priorities and population needs rather than the day-to-day purchasing of specific goods and services. In addition, individual health care providers will work with shared service organizations to efficiently procure innovative technologies. Finally, the health system will invest in the skills, knowledge and competencies needed to enable strategic procurement.

Recommendation 5 – Create Incentives and Remove Barriers to Innovation

The OCHIS will conduct targeted, evidence-based reviews of opportunities presented by emerging health technology innovations and provincially funded programs and organizations. These reviews will address the incentives and barriers to innovation, while the program and organizational reviews will ensure the innovation ecosystem remains aligned with current health system priorities and population needs.

Recommendation 6 – Optimize the Pathways to Adoption and Diffusion of Innovation

The OCHIS, working with stakeholders throughout the innovation ecosystem, will develop, evaluate, and coordinate pathways for the adoption and diffusion of innovative health technologies across the full continuum of the health sector (e.g., including health promotion, community care, hospitals, and home care).

This report builds on previous initiatives supporting innovation in Ontario. By acting on these recommendations, the province will maximize existing investments, increase the competitiveness of Ontario's health technology sector, and create value for the health system and Ontarians.

This is a call to action.



INTRODUCTION



Catalyst (kəd(ə)ləst)

Someone or something that causes a big change
Cambridge Dictionary

Health technologies can be a catalyst for positive change. Today, leading health systems around the world are moving towards more person-centred models of care supported by health technology innovations. In these new models of care, people are being empowered with the knowledge and tools to improve their health and wellness.¹ In Ontario, where public expenditures on health care amount to more than \$50 billion a year, taking advantage of these opportunities to enhance quality of life and reduce health care costs is critical.²

Innovations in health technology also represent a significant economic opportunity. Many jurisdictions are struggling to contain rising health care costs associated with factors such as population growth, aging, and the growing prevalence of chronic diseases.³ Although investments in technologies can add to health system costs in the short term, many have been shown to generate substantial value over the longer term. This is why there are now thousands of new medical devices being developed and brought to market every year,⁴ with some estimates projecting the global market for these devices will reach US\$440 billion by 2018.⁵ It is also why the United Kingdom, the United States, and several other major jurisdictions have created comprehensive initiatives to support their own health technology sectors.⁶ Like these other jurisdictions, Ontario has the opportunity to encourage and support the development and commercialization of innovative

health technologies that strengthen our health care system while also supporting the economic growth of Ontario-based companies (Textbox 1).

Ontario can be at the forefront in the development, commercialization, and adoption of health technology innovations (Figure 1). The province is a leading centre for research in areas such as cancer care, diagnostic imaging, stem cells, gene therapy, and neuroscience.⁷ It is home to world-renowned academic hospitals and research centres, top medical schools and post-secondary institutions, as well as major global pharmaceutical companies and medical device manufacturers. Among G7 countries, Ontario has the lowest costs for biotechnology research and development and for pharmaceutical and medical device manufacturing, and the second lowest costs for clinical trials.⁸

Yet Ontario is not currently maximizing its strengths. Innovators often face major challenges in connecting with the right people and resources to advance their ideas to market, and in navigating a fragmented and price-driven procurement

**IT IS ESTIMATED THAT
THE GLOBAL MARKET
FOR MEDICAL DEVICES
COULD REACH US\$440
BILLION BY 2018.**

system. Across the health care sector, there is also a culture of risk aversion, a lack of appropriate incentives for early adopters of innovation, and other systemic barriers that make it difficult to adopt and diffuse best practices throughout the full continuum of care.*

Achieving Ontario's full potential as a major centre for the development and adoption of health technologies will require a transformation in the culture of its health care system – from the processes used in everything from procurement to patient care. It will also mean that, like other leading jurisdictions, Ontario must provide targeted support for innovators in strategic sectors such as health technology. In doing so, the province can create a 'fertile ground' where research and commercialization can thrive as never before.

Council Recommendations

The recommendations in this report are a call to action. They are based on interviews, consultations, research, and the Council's collective expertise and experience (Appendix C). They also align with the priorities of the government, and are intended to build on existing strengths to enable person-centred care and grow Ontario's health technology sector.

* For a more detailed overview of key challenges identified in the Council's research, consultations, and deliberations, see Appendix B.

Textbox 1: Examples of Value Generated by Ontario-Based Companies

ApneaDx

ApneaDx is a portable device that allows users to monitor their sleeping patterns in the comfort of their homes, without the need for other bulky and expensive equipment. ApneaDx provides a minimally invasive way to monitor sleep apnea at a fraction of the cost of undergoing testing at a sleep lab.⁹

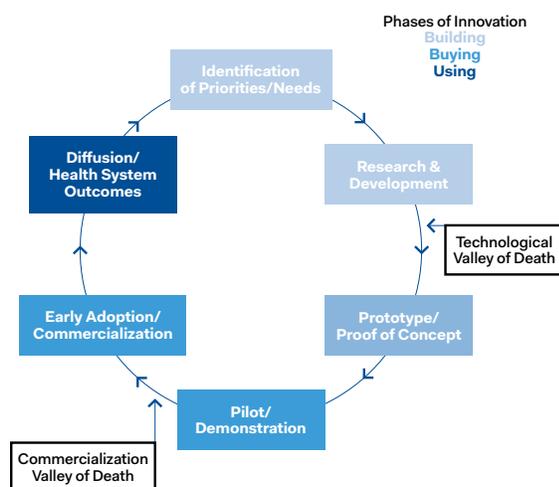
Figure 1

Figure 1 is a free photo-sharing application that allows licensed practitioners to use their smartphones to upload and share medical images and request diagnostic input from other clinicians, while still protecting individual privacy. Also useful as a learning tool, as of August 2014, Figure 1 was being used by more than 140,000 participating health care professionals worldwide.¹⁰

Newtopia

Newtopia is a personalized health company leveraging genetic testing and the latest engagement science to inspire individuals to make healthy lifestyle decisions. Newtopia's patented enterprise health engagement platform combines personality-matched coaching with mobile social health communities and genetically tailored health products to keep clients motivated and on track.¹¹

Figure 1: The Health Technology Innovation Cycle¹²



The Health Technology Innovation Cycle: There are five stages in the health technology innovation cycle: research and development, prototyping and proof of concept, piloting and initial evaluation, early adoption and commercialization, and maturity and diffusion.

The Valleys of Death: For health technology innovators, all of these stages can be fraught with various barriers. However, there are two stages (technological and commercialization valleys of death) that are particularly difficult to traverse. The first is the stage between the original conception of the idea and the development of a prototype (or proof of concept); the second is the stage between pilot demonstration and the early adoption phase, where the product begins generating sufficient revenues to sustain investor interest and finance further expansion. Many innovations fail in one of these two areas.

Sometimes, innovators cannot develop a working prototype or proof of concept before their financing runs out, or they fail to find enough early adopters to sustain investor interest. In other cases, there may be contributing factors such as lack of opportunities for gathering feedback from patients and clinicians, or a need for early stage financing support and mentorship from entrepreneurs with health technology experience, and so on.

The Recommendations



Recommendation 1

Establish an Office of the Chief Health Innovation Strategist

The Office of the Chief Health Innovation Strategist (OCHIS) will provide the leadership and coordination to make Ontario a major centre for health technology innovation.

Why is this needed?

The need for improving the strategic alignment and coordination among the key players and resources involved in Ontario's health innovation ecosystem was a recurring theme in the Council's interviews, consultations, and deliberations. The Council notes that among other leading jurisdictions this challenge has been addressed through the creation of some form of central authority. For example, the UK's National Health Service has a Director of Innovation, while Israel has an Office of the Chief Scientist.¹³ Both offices share the principle that innovation requires coordinated effort through dedicated leadership.

How will this be implemented?

The OCHIS will improve the coordination of innovation efforts province-wide. It will bring together key players in research, industry, government and not-for-profit sectors to accelerate innovation, improve health outcomes, and enhance economic competitiveness and job creation.

This coordination will require:

- working with the provincial government to develop a strong and clear mandate
- experienced leadership to create clear, transparent and effective cross-ministerial and cross-sector mechanisms for delivering on the mandate
- authority to make public recommendations regarding changes to legislation, funding, and the feasibility of innovation programs as a result of policy and program reviews.

The OCHIS will be held accountable for advancing the recommendations in this report and realizing Ontario's potential as a major centre for the development, procurement and adoption of innovative health technologies.

Within six months of appointment, the OCHIS will produce a plan to deliver on the mandate. It will also publicly report on its recommendations and achievements each year.

Who will be involved?

The OCHIS will be a senior executive reporting to the ministries of Research and Innovation, Health and Long-Term Care, and Government and Consumer Services. The individual appointed must have strong credibility and extensive connections across the innovation ecosystem.

The OCHIS will be supported by a secretariat, as well as an advisory board comprised of senior leaders from the provincial government, industry, research, health care delivery, and the not-for-profit sector. The three ministries will set the overall strategic direction for the OCHIS, while the advisory board will provide support in coordinating health innovation efforts across the province.

Suggested timeline

The OCHIS will be established by mid-2015.

Recommendation 2

Appoint Innovation Brokers to Connect Innovators with Resources

Innovation Brokers will connect innovators with the stakeholders and institutional supports needed to advance health technology innovations into practice (Figure 2).

Why is this needed?

In the Council's consultations, innovators emphasized the challenges they encountered in navigating Ontario's large, fragmented, and complex innovation ecosystem. The number and diversity of stakeholders and institutional supports makes it difficult to move a promising idea into widespread practice, requiring coordination with health providers, research institutes, postsecondary institutions, industry, funders, and investors, among others. There is a need for a single point of access to CEOs, procurement officials, and other decision-makers in the health care sector. There is also a need for coordinated access to sources of funding, test sites for gathering feedback from patients and clinicians, as well as guidance and mentorship in moving innovators' ideas from development to adoption.

How will this be implemented?

To overcome these challenges, Innovation Brokers will:

- provide a single point of access for innovators, helping them connect to the right people and resources to develop their technologies and move their ideas to market
- work with the OCHIS to coordinate and integrate innovation efforts across the province, and ensure alignment with health system priorities and population needs.

Who will be involved?

To be successful in integrating existing knowledge and expertise, Innovation Brokers will collaborate with a broad range of stakeholders across the health technology innovation ecosystem, including but not limited to:

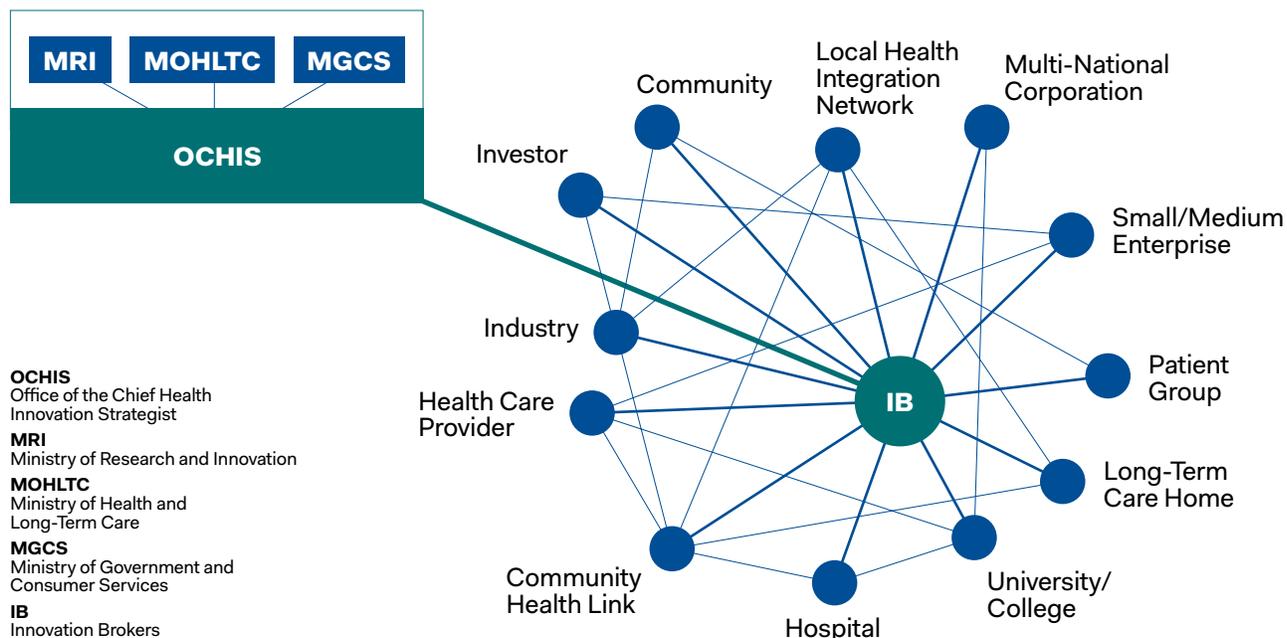
- clinicians, patients, and caregivers
- health care delivery organizations from across the care continuum
- researchers, including those from universities, colleges, and other research organizations
- health care procurement officials
- industry representatives, including innovators, small businesses, multinational corporations, and investors in health technology innovation
- government officials
- not-for-profit organizations.

The brokers will be accountable to the OCHIS. Given the number and diversity of stakeholders and institutional supports, the Council recommends there be different types of brokers for different parts of the ecosystem (e.g., health system, research, or investment/funding).

Suggested timeline

The first Innovation Brokers will be in place within a year of the establishment of the OCHIS.

Figure 2: Relationship of the OCHIS, Innovation Brokers, and the Innovation Ecosystem



Strengthening the Health Innovation Ecosystem	
Where we are	Where we're going
Fragmented health innovation ecosystem, operating in silos.	Integrated, coordinated health innovation ecosystem developed and supported by the OCHIS, Innovation Brokers, and other key stakeholders.
Health innovation ecosystem not aligned with health system priorities and population needs.	The OCHIS works with the Innovation Brokers, ministries, health care providers, and other stakeholders to ensure the innovation ecosystem is aligned to support health system priorities and population needs.
Local health care organizations possess world-class strengths in specialized areas of research and health care delivery, but are poorly connected with local innovators and policy decision makers, resulting in missed opportunities for developing new health technologies.	Strengthen existing networks that bring together leaders in research, health care, industry, and patient/consumer groups, as well as other key stakeholders, generating more opportunities for developing commercially viable health technologies.
Many great ideas and pilot projects launched, but few successfully turned into commercial products and/or diffused across the health system more broadly.	The OCHIS and Innovation Brokers, working with stakeholders, drive adoption and diffusion of innovative technologies, processes, and services by: <ul style="list-style-type: none"> • developing, evaluating and optimizing pathways to early adoption and widespread diffusion • using procurement strategically to support innovation • fostering a culture of innovation across the health system.
No single access point for innovators, so connecting with the right people and resources can be a frustrating, time-consuming process.	Innovation Brokers provide single access point for innovators to connect with the stakeholders and institutional supports they need to move their ideas forward in a timely, efficient manner.

Recommendation 3

Invest in Made-in-Ontario Technologies

The Council is proposing a four-year, \$20-million Health Technology Innovation Evaluation Fund to support pre-market evaluations and early adoption of home-grown innovative health technologies.

Why is this needed?

Early stage evaluation, feedback, and access to resources are critical to successfully advancing innovations.¹⁴ When developing a new health technology, innovators require:

- access to early stage financing to develop a prototype or proof of concept
- feedback from health system clinicians, patients, procurement officials, and other partners to figure out if the innovation can work in practice and under what conditions it might be bought and used, or what refinements are needed to make these things happen
- evidence from evaluation projects to attract additional investment and move towards adoption.¹⁵

How will this be implemented?

The proposed fund will be segmented into a two-stage process:

1. Stage one (pre-market evaluation): Funding will be used to evaluate the product in a particular health care setting. It will flow directly to health care providers to cover costs, such as staff time, which would otherwise make it difficult to participate in such trials.
2. Stage two (early adoption): Funding will be used to further evaluate the product on a larger scale at other locations or in other parts of the health care system. This will facilitate the gathering of evidence to support wide-scale adoption.

The funding will be conditional on the proposed technologies being in line with health system priorities. The pre-market evaluation and early adoption functions served by the proposed fund is similar to a number of the accelerator organizations and funds that have been established in jurisdictions such as the United Kingdom and United States.¹⁶

Who will be involved?

The Health Technology Innovation Evaluation Fund will be managed by the OCHIS, working in conjunction with the Innovation Brokers. The OCHIS will integrate and build upon existing health technology assessment organizations that government has already invested in developing, such as the Ontario Health Technology Advisory Committee (OHTAC), the Excellence in Clinical Innovation and Technology Evaluation (EXCITE) program, and the Toronto Health Economics and Technology Evaluation (THETA) collaborative. The OCHIS will also work with partners across government and the health sector to ensure technologies that successfully complete this evaluation process have the best chance of adoption and diffusion.

Suggested timeline

The first evaluations will be underway before the end of 2015.



Future State of Pre-Market Evaluation and Early Adoption	
Where we are	Where we're going
Innovators have difficulty accessing clinicians to evaluate new technologies and receive important feedback. Clinicians have little time or incentive to devote to validating technologies.	Strategic, efficient health technology evaluations facilitate partnerships between innovators, clinicians and patients. Clinicians are incented for the time they invest in the evaluations.
Even with solid business mentorship services and clinical feedback, innovators in Ontario have few options for accessing seed capital, which is needed for critical prototype development, refinement, and commercialization.	Targeted seed financing, working in sync with focused mentorship and clinical validation, is provided to accelerate early development of new technologies to the prototype stage.



“Early stage evaluation, feedback, and access to resources are critical to successfully advancing innovations.”

Recommendation 4

Accelerate the Shift to Strategic, Value-Based Procurement

Health system stakeholders will accelerate the shift towards strategic, value-based procurement, providing innovative solutions that address health system priorities and population needs.

Why is this needed?

Procurement in health care organizations has typically focused on generating short-term savings in meeting day-to-day needs. A more strategic, value-based approach considers not only price but also other measures of value such as reduced service utilization (e.g., fewer hospital readmissions), increased quality of life, and economic benefits.¹⁷ By taking into account these wider dimensions of value, the Council believes strategic procurement can contribute to healthier populations, a more efficient health system, and the growth of Ontario's health technology sector.

How will this be implemented?

The Council recommends:

- a broad range of key stakeholders, including procurement professionals, be engaged in defining health care procurement needs and strategies on an early and ongoing basis
- stakeholders enhance the focus on addressing health system priorities and population needs using strategic procurement
- individual providers maximize the value of shared service organizations
- the health system invests in building the skills, knowledge, and competencies needed to enable strategic procurement.

There is currently an initiative underway in Ontario, led by the Ministry of Government and Consumer Services, which seeks to clarify current procurement policy requirements and diffuse leading practices in the procurement of innovation.¹⁸ The Council supports this work. If health care organizations are going to engage in the kind of strategic procurement that the Council believes is vital, it will be necessary for many of these organizations to be better incented and informed about what this means and how it can best be accomplished.

Who would be involved?

Accelerating the shift to strategic, value-based procurement would be a collaborative effort, involving key stakeholders such as:

- health care providers, including hospitals, long-term care facilities, and home care providers
- health care procurement organizations, including shared-service organizations (SSOs), group-purchasing organizations (GPOs) (for definitions, see Appendix D)
- health technology companies, from small companies to large multinationals
- patient and consumer groups in the not-for-profit sector
- the OCHIS and the Innovation Brokers, and the relevant provincial government ministries.

Suggested timeline

The shift to strategic, value-based procurement has already begun in many parts of the health care sector. These efforts will be broadened and expanded as quickly as possible.

Future State for Health System Procurement	
Where we are	Where we're going
Fragmented system with a few large joint purchasing organizations and many smaller purchasers (including single hospitals or clinics).	The health system is more integrated with fewer procurement organizations and a greater number of smaller organizations actively participating in GPOs and SSOs.
Lack of clarity on specific opportunities, needs, and priorities for procurement in the health sector.	The OCHIS and Innovation Brokers engage with key stakeholders on an early and ongoing basis to identify health technology procurement opportunities, needs, and priorities for the health system, local communities, and health care providers.
Procurement still regarded largely as an administrative service, helping organizations meet their day-to-day requirements.	OCHIS works with ministries, the health sector, and other key stakeholders to leverage procurement to solve problems and create value (e.g., improved health outcomes, enhanced access, reduced costs, new investment and job creation in Ontario).
Health system procurement provides limited opportunities for Ontario-based innovators to test new products, make sales to early adopters, and diffuse proven innovations to a broad base of customers.	The OCHIS, Innovation Brokers, and health sector stakeholders provide Ontario-based innovators with opportunities to engage in testing new products, making sales to early adopters, and diffusing innovations to a broad base of customers through clearly defined procurement processes.
Limited number of specialized staff with procurement expertise and/or clinical experience involved in health system procurement organizations.	Ministries work with health system partners to ensure that more health system organizations have access to specialized staff with procurement expertise/experience.



“The Council believes strategic procurement can better contribute to healthier populations, a more efficient health system, and the growth of Ontario’s health technology sector.”

Recommendation 5

Create Incentives and Remove Barriers to Innovation

The Council recommends the OCHIS conduct targeted, evidence-based reviews of:

- opportunities presented by emerging health technology innovations in priority areas, and also of the barriers that exist to seizing those opportunities
- provincially funded programs and organizations, determining potential areas of overlap and continued alignment with health system priorities and population needs.

Why is this needed?

New technologies may require the creation of incentives and removal of barriers to be adopted. Examples of incentives include reimbursement fees, supports for implementation (e.g., education and training), and recognizing and rewarding success. Potential barriers include existing legislation, fiscal constraints, and resistance to change.

In addition, provincially funded organizations and programs should be monitored to ensure strategic alignment with current health system priorities and population needs. For example, programs that meet the needs of certain populations at a particular time may become less effective as demographics, technologies, and best practices change.

How will this be implemented?

The reviews of incentives and barriers to innovation will address priority areas (Textbox 2), while the reviews of organizations and programs will ensure the innovation ecosystem remains aligned with current priorities and needs.

Who will be involved?

The reviews will be conducted by the OCHIS, working in conjunction with relevant provincial ministries and other stakeholders.

Suggested timeline

The first reviews will be launched within a year of the Chief Health Innovation Strategist's appointment. Thereafter, the OCHIS will conduct consultations and research on potential opportunities, establish priorities, and define a plan for future reviews as needed.

Textbox 2: ICT: A Priority Area for Review

The Council believes that information and communications technologies (ICT) should be the first priority area for the evidence-based policy reviews. This area includes:

- **virtual care** – delivering care remotely through videoconference or other virtual media
- **mobile health** – use of wireless technologies such as smartphones, tablets, or other devices to support people in managing their care, navigating health services and tracking health information.

It is critical that ICT be adopted and diffused in ways that ensure value for money, safety, and meaningful access. Ontario needs to assess how to best prepare organizations and people across the continuum of care to properly embrace virtual care and mobile health. This may require a review of regulations governing the definition, use, and reimbursement for such technologies.

Future State for Information and Communications Technologies in the Health Sector	
Where we are	Where we're going
Clinician-centred model of care, in which people receive care when and where clinicians are available.	Person-centered model of care where coordinated care teams create customized, seamless care designed to achieve individual goals and aspirations for health and wellness.
People often not actively engaged in collaborating with their health care teams.	Actively engaged patients are involved in self-monitoring their health and health outcomes through smartphone applications and wearable technologies. People can connect with health care providers to share data and seek support and advice.
Clinicians operate during specific hours, forcing people to use more expensive forms of health care such as emergency departments after hours.	Better connectedness to care through devices such as spirometers and cardiac monitors, and virtual media, which empowers people and provides more options about when, where, and how care is delivered.
People receive health care information from clinicians, pharmacists, and then are faced with having to track and transfer health information from one clinician on their team to another.	Health information and treatment plans can be viewed securely and conveniently on a smartphone or via the Internet, and be easily shared with the entire health care team.



“There are lots of health technology entrepreneurs in Ontario with innovative ideas, but with all the obstacles involved in financing an idea, working in a complex regulatory environment, finding opportunities to test and pilot ideas, getting experienced business people on board and finding the right distribution channels, it’s hard to survive, let alone thrive.”

—Jeffrey Ruby, Founder and CEO of Newtopia

Recommendation 6

Optimize the Pathways to Adoption and Diffusion of Innovation

The Council recommends there be a concerted and ongoing effort to develop, evaluate and optimize Ontario's pathways for the adoption and diffusion of innovative health technologies.

Why is this needed?

There is widespread concern in many jurisdictions about the time needed to translate research with demonstrated benefits into clinical practice, with some estimates suggesting that this process can take an average of seven-teen years.¹⁹ Ontario is no different in this respect.²⁰ Taking an appropriate amount of time translating research into practice is necessary and desirable for the purposes of ensuring patient safety, clinical efficacy, and cost-effectiveness.²¹ However, the Council believes that many delays stem from the inherent challenges involved in adopting and diffusing best practices across a large, complex health care system with many players and care contexts (e.g., population needs, organizational settings).

In its consultations and deliberations, the Council made the following observations:

- the full value of proven innovative technologies can only be realized if implemented at an appropriate scale across the health sector
- the pathways for evaluating, adopting, and diffusing innovative health technologies in Ontario currently do not provide sufficient opportunities for moving such innovations into practice at an appropriate scale
- stakeholders from across Ontario's innovation ecosystem have made numerous efforts to develop effective pathways for evaluating and diffusing innovations, but more remains to be done
- stakeholders need to systematically track and evaluate the effectiveness of existing pathways, further expand and enhance those with demonstrated success, reform those where improvements can be made, and develop new pathways to address specific gaps in adoption and diffusion (e.g., in moving innovations from hospitals into community care practice).²²

How will this be implemented?

The OCHIS, working with other stakeholders, will be responsible for the ongoing development, evaluation, and optimization of pathways for the adoption and diffusion of innovative health technologies. The Council also believes that stakeholders throughout the innovation ecosystem can do a better job of coordinating the various pathways for adoption. There are, for example, opportunities for existing health technology assessment bodies, such as OHTAC and EXCITE, to more closely coordinate their efforts with evidence-based adoption pathways like the Adopting Research to Improve Care (ARTIC) initiative.

Who will be involved?

The continual improvement of the pathways to adoption and widespread diffusion of health technology innovations will be a primary responsibility of the OCHIS, working with:

- Innovation Brokers
- government ministries
- health technology assessment organizations
- health care delivery organizations, including research and community hospitals, long-term care facilities, and home care providers
- health system procurement organizations, including SSOs and GPOs
- other stakeholders as deemed appropriate by the OCHIS.

Suggested timeline

The process will begin as soon as the OCHIS has been established.

Future State of Adoption and Diffusion of Health Technologies	
Where we are	Where we're going
Risk aversion to adopting new technologies, and concern about how innovative technologies may affect patient safety and quality of care.	A culture of innovation led by strong leadership across all levels of the health care system and supported by effective change management that will promote the adoption of beneficial health technologies.
Pathways for adoption and diffusion of innovative health technologies are not systematically evaluated, coordinated, and aligned with health system priorities and populations needs.	The OCHIS works with key stakeholders to develop, evaluate and optimize Ontario's pathways for the adoption and diffusion of innovative health technologies across the continuum of care.
Lack of incentives make adopting and diffusing innovative technologies and best practice guidelines across health care settings a challenge.	Use of incentives (e.g., reimbursement mechanisms, recognition for success) will facilitate diffusion of innovation.
Value generated by health technologies in areas such as health outcomes, cost avoidance, and jobs created is not systematically measured and evaluated.	The OCHIS develops metrics, monitors performance, and publicly reports on the results.



“There is no shortage of innovation in health care. Every part of the health sector is full of brilliant people with brilliant ideas. But for innovation to flourish, there needs to be strong leadership from government, health care administrators, clinicians and other stakeholders to create the right incentives and clear away the barriers to adoption and diffusion.”

—Miles Ayling, Director of Innovation, NHS England

Measure Success, Ensure Value for Money

Measuring success and ensuring value for money are essential components of any strategic initiative. Consequently, the OCHIS will be responsible for measuring and evaluating progress in implementing the Council's recommendations and the performance of the health innovation ecosystem. The results will be presented in a public annual report.

The OCHIS should use a combination of activity-based and value-based measures. Activity-based measures can be used to monitor progress on the implementation of the Council's recommendations. Examples may include the numbers of innovators supported, the number of pilot projects launched, and the number of health technology reviews conducted. Value generated by health technology innovation should take into account social impact, health system benefits, and economic benefits (Table 1 and Figure 3).



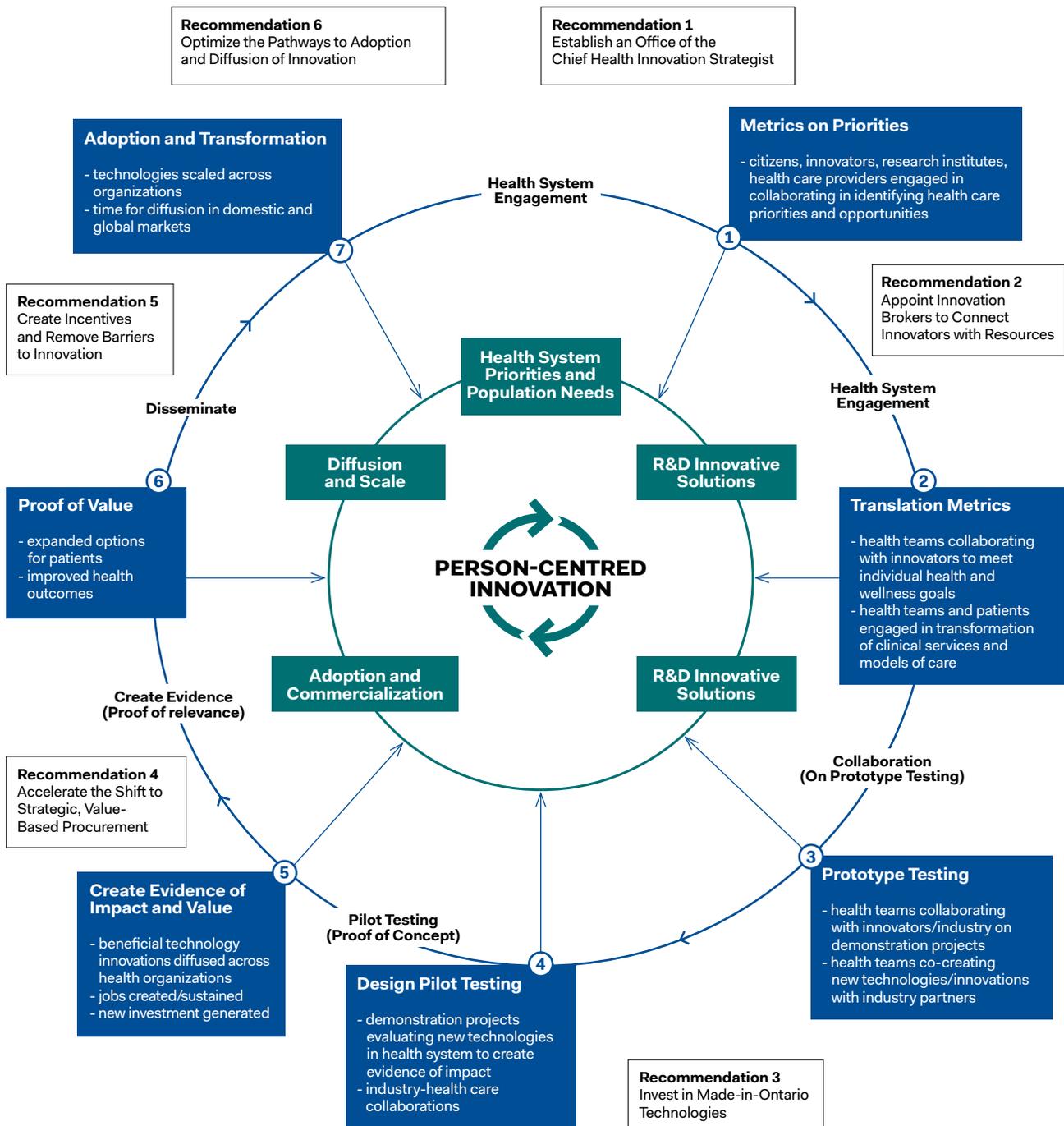
Table 1: Proposed Measures of Value[‡]

Social Impact	Health System Benefits	Economic Benefits
<p>Healthier lifestyles</p> <ul style="list-style-type: none"> - improved wellness and quality of life - people encouraged to be more active and lead healthy lifestyles <p>Healthier populations</p> <ul style="list-style-type: none"> - reduced disability adjusted life years - reduced prevalence of chronic diseases and other lifestyle-related health conditions - personalized protocols aligned with individualized health and wellness goals - improved health promotion and disease prevention - citizens engaged in health system planning and strategy using digital and on-line tools - strengthened health literacy that supports informed decision making for health and wellness - enhanced person-provider collaborations used to inform health decisions - improved levels of self-management of chronic illnesses <p>Improved health outcomes</p> <ul style="list-style-type: none"> - improved population health outcomes with informed decision making about healthy lifestyle as well as greater access to tools that help achieve those outcomes - effective chronic disease prevention promoted through universal and targeted population health interventions that address all major risk factors across the life cycle 	<p>Improved patient experience and engagement</p> <ul style="list-style-type: none"> - improved recovery times - reduced reliance on hospital care - greater engagement of community based health services - improved partnership between people and their health providers - access to care when and where needed <p>Better access to health and wellness care</p> <ul style="list-style-type: none"> - greater access to community based health care providers - easier access to care when and where it is needed - improved proximity to care including primary and community care, public health and social and behavioural care - expanded options for where and how treatment is delivered - wider options for using digital technology for a personalized approach - increased health system responsiveness and partnership to achieve wellness - timely access to evidence-informed care <p>Cost savings</p> <ul style="list-style-type: none"> - system sustainability strengthened through cost effective models of community care - health system funded and incentivized for achieving outcomes rather than services delivered <p>Productivity improvements</p> <ul style="list-style-type: none"> - mobilized digital technology to achieve integrated comprehensive models of care - interoperable data systems that facilitate connectivity among patients and providers, and strengthen quality of care 	<p>Increased economic development</p> <ul style="list-style-type: none"> - number of new companies established as indicator of sector growth - number of jobs supported or created as a result of specific initiatives - sales of new products/services brought to market by Ontario-based health technology companies - public funding budget savings generated by innovative technologies <p>Increased research and development (R&D) investment from the private sector</p> <ul style="list-style-type: none"> - new R&D funding - number of new research projects involving innovative health technologies developed by Ontario-based companies <p>Strengthened innovation ecosystem</p> <ul style="list-style-type: none"> - number of collaborative partnerships of innovations between Ontario-based companies and health organizations - number of collaborations between Ontario-based key opinion leaders in health care and Ontario-based companies in health technology

Value = Social Impact + Health System Benefits + Economic Benefits

[‡] Developed in consultation with the Ivey International Centre for Health Innovation

Figure 3: Measuring Success for a Healthier Ontario, a Sustainable Health Sector, and a Thriving Economy



Source: Ivey International Centre for Health Innovation

CONCLUSION



Health technology innovation is a catalyst

for person-centred care, a more sustainable health care system, and a growing economy. It can empower people to define their objectives for health and wellness, and to collaborate with their providers to achieve desired outcomes. It can also enable us to deliver care more efficiently, while creating opportunities for Ontario-based companies to attract investment and create jobs.

The Council does not consider that its work is done. It welcomes the opportunity to provide ongoing advice on the progress of the recommendations, reconvening with the OCHIS within one year, and continuing to work with stakeholders across Ontario to enable person-centered care powered by health technology innovation.

Implementing this report's recommendations will take leadership, collaboration, and time to achieve results. We all have a stake in making Ontario a more fertile ground for innovation. The Council regards this report as a call to action, both to the government and to the many partners and stakeholders who share its commitment to a healthier and more prosperous province.

Appendix A: Glossary of Key Terms

The following definitions have been adopted for the purposes of this report:

Person-centred care: A model of care in which people are actively engaged in defining and pursuing their objectives for health and wellness, with support from clinicians and the broader health community.²³

Health technologies: Refers to a broad range of medical devices and information technologies. For the purposes of this report, drug therapies are excluded.^d

Health technology innovators: Refers to individuals involved in the health technology innovation process, such as researchers, clinicians, and entrepreneurs, among others.

Health innovation ecosystem: Refers to the full range of stakeholders leading, participating and supporting the health innovation adoption and scalability process. This includes researchers, clinicians and health care organizations, health system procurement organizations, innovators, businesses, university research centres, investors, governments, and not-for-profit organizations, among others. The ecosystem should be outcome-driven, and incentivized to achieve both economic value and person-centric care.

Health system: Includes the full continuum of health care delivery, from health promotion to family physicians, specialist clinics, and hospitals to long-term care and home care services.

Innovation: Refers to health technologies and process changes that add value for people, the health system, and the economy, including enabling person-centred care, improving the quality and cost-effectiveness of care delivery, and enhancing Ontario's position as a leading destination for the development and commercialization of innovative health technologies.



^d There are significant policy, regulatory, and industry differences between the medical devices and information technology sectors on the one hand and the pharmaceutical sector on the other. For information on these differences, see Health Canada (2001), *How Drugs are Reviewed in Canada*; Health Canada (2013), *Safe Medical Devices in Canada*; PharmaExec (2012), *Marketing: Medical Devices vs Pharma*; MEDEC (2014), *Fundamental Differences between Medical Devices and Research-Based Pharmaceuticals*; and Eucomed (nd), *Medical Devices and Pharmaceuticals: Two Different Worlds in One Health Care Setting*.

Appendix B: Examples of Challenges for Health Technology Innovation in Ontario

Challenges for Innovators ²⁴	Challenges for the Health System ²⁵
<p>Lack of information on health system priorities and population needs: To provide optimal solutions, innovators must have knowledge of specific health system priorities and population needs that can be addressed with innovative health technologies. Often, this information is not readily available.</p>	<p>Fiscal constraints: Innovative health technologies often require significant financial investments upfront. However, similar to other jurisdictions, Ontario is under considerable pressure to contain health care spending. This limits the availability of funds for investment in new technology.</p>
<p>Lack of access to clinicians and patient feedback: Innovators require ongoing access to clinicians and patients, who offer important feedback on validation of the design and functionality of new technologies.</p>	<p>Lack of appropriate reimbursement mechanisms: If an innovative health technology does not fit under existing reimbursement arrangements, health care organizations and clinicians must absorb the costs of implementing the technology until reimbursement systems are updated.</p>
<p>Lack of early-stage capital: Innovators are dependent on risk capital to support product development and commercialization, but often have difficulty raising sufficient funds to support these efforts. This is particularly true in the early stages of research, development, and commercialization.</p>	<p>Lack of support structures for adopting innovation: The absence of optimal pathways for adoption, lack of time for health care professionals to engage in innovation, and the absence of strong leadership to facilitate change are examples of systemic barriers that can impede adoption and diffusion of health technology innovations.</p>
<p>Focus on price versus value in procurement: Procurement in healthcare delivery organizations often focuses on reducing short-term costs, instead of being strategically leveraged for enhancing value. This makes it difficult for innovators to access the Ontario market.</p>	<p>Resistance to change: Innovative health technologies may change existing scopes of practice, or displace existing positions, which can result in resistance to adoption. Other factors include the complexity involved in learning and using the health technology, potential changes in workload, and perceptions concerning the value that new technologies add to existing practice.</p>



Appendix C: Council Process for Developing Recommendations

Since November 2013, the Council has engaged in interviews, consultations, research and deliberations to develop its recommendations. Evidence was gathered through:

- an examination of promising practices in Ontario, as well as other provincial and international jurisdictions
- a review of academic publications and policy reports produced by university researchers, government agencies, industry associations, think tanks, and not-for-profit organizations
- presentations by stakeholder organizations involved in health innovation in Ontario
- interviews and consultations with SMEs and other key stakeholders in the health technology industry, in Ontario and other jurisdictions
- input provided by stakeholders, SMEs, and the public through the Council website.

The Council collected and analyzed this evidence through three subcommittees, each of which corresponded to one of the main areas of focus for this report: development, procurement, and adoption of health technologies. The subcommittees held numerous meetings over the course of the past year, while the full Council met eight times to deliberate and integrate this evidence into consensus recommendations.



Appendix D: Health System Procurement Organizations in Ontario²⁶

Health organizations in Ontario are moving towards using shared service and group purchasing organizations for procurement. These organizations offer cost savings associated with bulk buying. In addition, larger organizations are often able to integrate specialized knowledge in certain areas, such as cardiac or cancer care, thereby enhancing their ability to identify promising innovations that could improve the effectiveness and efficiency of care.

Shared Services Organizations (SSOs)

- A SSO is an entity that centralizes back-office and supply chain activities to help achieve efficiencies in operations for its members and customers
- SSO services may include sourcing, procurement, warehousing, logistics, employee benefits, accounts payable, accounts receivable, and payroll
- SSOs deliver three key benefits:
 - > cost savings
 - > operating efficiencies
 - > network enhancements (e.g., sharing of information, expertise, and resources).
- Approximately 60 per cent of Ontario's hospitals currently participate in a SSO.

Group Purchasing Organizations (GPOs)

- GPOs negotiate procurement contracts on behalf of their members.
- Members use GPOs to achieve greater price savings on medical, surgical and other supplies, and also avoid the administration cost of conducting individual contracting processes.
- GPOs also provide non-financial advantages such as specialized procurement and clinical knowledge, pooled expertise, and venues for peer-to-peer support and knowledge sharing.
- GPOs operate at the national level in Canada.

Individual Purchasing

- Health care delivery organizations also have the flexibility to test and purchase innovative solutions on their own when the opportunity arises.

Endnotes

- 1 The Health Foundation (2014). Person-Centred Care.
- 2 Ontario Ministry of Finance (2014). *2014 Ontario Budget*, Chart 2.27.
- 3 Government of Ontario (2012). *Commission on the Reform of Ontario's Public Services*; OECD (2013). *Health at a Glance 2013: OECD Indicators*; and Deloitte (2014). *2014 Global Health Care Outlook: Shared Challenges, Shared Opportunities*
- 4 In the US alone, for example, see U.S. Food and Drug Administration Device Approvals, Denials and Clearances.
- 5 Episcom (2013). *The Worldwide Medical Market Forecasts to 2018*. Based on 67 countries.
- 6 National Health Service (2011). *Innovation Health and Wealth, Accelerating Adoption and Diffusion in the NHS*; and The California Healthcare Foundation (2014). *Accelerators and Incubators*.
- 7 Based on analysis by MRI, ICT/Life Sciences Unit.
- 8 KPMG (2014). *Competitive Alternatives Cost Model*. Internal study conducted for Ministry of Research and Innovation (MRI).
- 9 MaRS Innovation (nd). *ApneaDx*.
- 10 Figure 1 (nd). *Frequently Asked Questions*; and Philippe de Montigny (2014). *How a tweet led to Toronto medical photo app Figure 1 getting backing from Union Square Ventures*, *Financial Post*
- 11 Newtopia (2014). "Newtopia announces major investment from Bloom Burton."
- 12 Adapted from J. Jenkins and S. Mansur (2011). *Bridging the Clean Energy Valleys of Death*; and OCED (2010). *Biomedicine and Health Innovation: Synthesis Report*.
- 13 NHS England (2014). *Tony Young to be the National Clinical Director for Innovation*; and Israel (2014). *Office of the Chief Scientist*.
- 14 Based on Council interviews, stakeholder consultations, and deliberations.
- 15 Based on Council interviews, stakeholder consultations, and deliberations.
- 16 For examples, see organizations and programs such as UK, *Medical Research Council* (2014). *Biomedical Catalyst Fund*; and US, *National Institute of Health* (2014). *Small Business Research Institute*.
- 17 For example, see *The Conference Board of Canada* (2011). *Innovation Procurement in Health Care. A Compelling Opportunity for Canada*. Health, Health Care and Wellness
- 18 Briefing to Council provided by Ministry of Government and Consumer Services.
- 19 Z. Morris, S. Wooding, and J. Grant (2011). "The Answer is 17 Years, What is the Question: Understanding Time Lags in Translational Research," *Journal of the Royal Society of Medicine* 104, 12, 510-20.
- 20 Council of Academic Hospitals of Ontario (2014). *Beyond Procurement: Technology Adoption Acceleration in Health Care*; and Ontario Bioscience Innovation Organization, et al. (2013). *Realizing the Promise of Healthcare Innovation in Ontario*.
- 21 Z. Morris, S. Wooding, and J. Grant (2011). "The Answer is 17 Years, What is the Question: Understanding Time Lags in Translational Research," *Journal of the Royal Society of Medicine* 104, 12, 510-20.
- 22 Based on Council interviews, consultations, and deliberations.
- 23 The Health Foundation (2014). Person-Centred Care.
- 24 This list has been based on Council research, interviews, consultations, and deliberations. Key source documents include *MedTech Working Group* (2014), *Report to the Ontario Health Innovation Council*, Appendix 3: *Survey of SMEs*; *Medical Devices Innovation Institute* (2011), *Medical Devices Challenges and Opportunities for Enhancing the Wealth and Health of Canadians*; Anne Snowden, Richard Zur, and Jeremy Shell (2011), *Transforming Canada into a Global Centre for Medical Device Innovation and Adoption*; and OSEC (2011), *The Canadian Medical Technology Sector: Opportunities for Swiss Companies*.
- 25 This list has been based on Council research, interviews, consultations and deliberations. For an overview of health system barriers to health technology innovation commonly identified across jurisdictions, see Robert et al (2010), *Adopting and Assimilating new non-pharmaceutical technologies into health care: a systematic review*; NHS (2009), *Organisational and Behavioural Barriers to Medical Technology Adoption*; NHS (2011), *Innovation Health and Wealth, Accelerating Adoption and Diffusion in the NHS*; M.P. Gagnon, et al. (2012), *Systematic Review of Factors Influencing the Adoption of Information and Communication Technologies by Healthcare Professionals*, *Journal of Medical Systems* 36, 1.
- 26 Information on participation numbers supplied by Ministry of Government and Consumer Services. For an example of the work of an SSO, see *Central Ontario Healthcare Procurement Alliance (COHPA)*. For an example of the work of a GPO, see *St. Joseph's Health System Group Purchasing Organization (sjhcs-gpo)*.

Acknowledgements

The Council sincerely thanks all of the small- and medium-sized enterprises, innovators, industry representatives, government officials, health care leaders, and other stakeholders who provided invaluable input through interviews, presentations, and consultations. For their dedication and support, the Council also would like to thank the staff of the Ontario Health Innovation Council Secretariat: Janis Tomkinson, Tim Krywulak, Jovan Matic, Stoni Astley, Didi Kaur, Shenandoah Darch, and Janette Stasinowsky. Thanks as well to officials from the three ministries who supported the Council's work, including Nancy Kennedy, Bill Mantel, Marian Macdonald, Iris Ko, Michael Hillmer, Andrea Proctor, Giles Gherson, Wendy Tilford, Helen Angus, Saäd Rafi, Vasanthi Srinivasan, and others.

In addition, the Council would like to thank Richard Dicerni, who served as Vice-Chair of the Council, before stepping down to become Alberta Deputy Minister of the Executive Council, as well as Bob Bell, who served as a Council member before stepping down to become Ontario Deputy Minister of Health and Long-Term Care. Their guidance and support were of great benefit for this report. Finally, the Council thanks Hon. Reza Moridi, Hon. Deborah Matthews, Hon. Dr. Eric Hoskins, and Hon. David Oraziotti for their vision in establishing the Council, and for providing its members with the opportunity to serve.

**ONTARIO HEALTH
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