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**Building a Life Sciences Cluster:
*A Case for Hamilton***

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Date Published: January 2014

FOREWORD

The City of Hamilton's current Economic Development Plan, ratified by Hamilton City Council in 2010, proposes specific goals for the creation of a life sciences industry cluster by 2015. Since this plan was adopted, the rationale and urgency for creating a life sciences cluster in our region has increased dramatically.

Hamilton's health service and research sector is now the city's largest employer. The magnitude of health and life science research being conducted here has doubled in recent years, and is receiving global recognition and awards. We have built incredible health infrastructure that is attracting specialized knowledge and human capacity that is the envy of cities worldwide. Furthermore, the stakeholders involved in every aspect of this flourishing sector are aware of what's at stake, and are willing to work together to enhance their shared capacity for commercial innovation.

The assets and momentum Hamilton has cultivated in its life sciences sector present us with a once-in-a-generation opportunity to develop new, sustainable economic and social wealth in our community. The Hamilton Chamber of Commerce and its member organizations want to leverage this momentum and our city's wealth in health to the greatest possible extent. We want to bridge the gap between research and commercialization in this sector. We want to attract new global venture capital and entrepreneurial talent to Hamilton to compete at an international level. We want made-in-Hamilton health discoveries and life science innovations to drive exports out of this region. We want to ensure that this vibrant and significant part of the Hamilton economy grows for generations to come.

This report is the culmination of more than a year of work conducted by the Hamilton Chamber of Commerce, our dedicated committee volunteers and key stakeholders. It compiles their collective expertise and research with input from industry partners about the state of growth in Hamilton's life sciences sector. More importantly, it explains the key determinants of successful industry clusters around the globe, thus illuminating our path going forward.

The essential next step identified in this report is the commission of a cluster working group comprised of leaders from the public and private sector (academia, health care, government, business and banking), who will catalyze the next phase of development of Hamilton's life sciences cluster. We're happy to say that all parties are enthusiastic in moving forward and will convene in early 2014.

While hard work remains, the areas that need our attention and further development are not at all insurmountable, cost-prohibitive, nor duplicative of past or current efforts. Therefore, we believe that success in creating a vibrant life sciences cluster in Hamilton is achievable, if key leaders remain committed to act.

I want to thank the Chamber's Life Sciences Subcommittee members, as well as the other contributors involved in the development of this paper, specifically Hamilton Economic Development, Innovation Factory and McMaster Innovation Park.



Keanin Loomis
President & CEO, Hamilton Chamber of Commerce

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EXECUTIVE SUMMARY

Given the magnitude of life sciences activity in this city and the fact that life sciences is expected to remain a global growth industry, it is safe to assume that the future economic prosperity of Hamilton will be determined in large part by the steps we take now to leverage the significant health assets we have cultivated in this region. Hamilton possesses Ontario's second-largest hospital network and a formidable health research infrastructure. Its health institutions have created specialized knowledge and developed talent that is not easily found elsewhere in the world. In fact, Hamilton has assets in this sector that take decades to nurture. In this sense, the city has an abundance of the most elusive, valued and essential preconditions for a vibrant life sciences industry cluster.

Still, there has been insufficient progress towards the realization of cluster-based commercial co-operation focused on Hamilton's health assets. Though the life sciences sector generates significant economic activity in this community, this has yet to materialize into a proportionate level of economic development.

There is no systematic union of businesses and institutions working to capitalize on Hamilton's wealth in health. And with other regions around the world aggressively developing life sciences cluster strategies, countless opportunities to derive commercial value out of world-class research and technical expertise evaporate annually, and each passing year represents a slip in global competitiveness.

In 2013, the Hamilton Chamber of Commerce's Innovation and Technology Committee took a leadership position on this issue and formed a subcommittee to investigate the preconditions driving successful industry clusters elsewhere around the world. The subcommittee, comprising representatives of key private and public sector stakeholders, took stock of Hamilton's life sciences assets and examined 35 case studies in an attempt to better understand the essential features behind these successful industry clusters. Five case studies are highlighted herein.

SUMMARY OF FINDINGS

The subcommittee identified five features that are essential for a cluster to form and thrive. These are:

- 1 Knowledge and talent;**
- 2 An industrial base;**
- 3 Infrastructure and funding;**
- 4 The support and alignment of stakeholders; and,**
- 5 A driving force.**

Of these five essential features, Hamilton has an abundance of knowledge and research in the life sciences sector. We also have a burgeoning industry base, with approximately 300 private companies operating in life sciences. Hamilton also possesses a community of stakeholders who broadly agree that an innovation oriented life sciences cluster is an economic imperative for the city's continued prosperity.

However, the analysis that follows in this report also points to some deficiencies. Hamilton needs to increase the amount of dedicated infrastructure designed to nurture the formation of this industry cluster, such as life sciences incubation space. We have insufficient venture capital flowing to the region, and there are too few programs working to promote and exploit Hamilton's life sciences assets, or to create a culture of commercialization within the life sciences sector itself. Arguably, we also lack significant business expertise required to commercialize and support business ventures. Most importantly, there is no driving force or chief advocate leading the charge for the establishment of a life sciences industry cluster in Hamilton.

RECOMMENDATIONS

This report looks at Hamilton's assets and deficiencies in greater detail. By comparing Hamilton to the elements of successful clusters, the subcommittee is able to make the following recommendations:

- Champions must emerge. Key industry stakeholders in both the private and public sector must create a unified vision, convene to identify specific goals and act as a champion group that leads the development of a local cluster mentality.
- We must create a physical life sciences incubation space, which is critical for anchoring a regional cluster.
- Associated with the incubation space, an arm's-length organization, focused on commercialization and innovation in life sciences, must be established to open up global channels and equip the creators of intellectual property with the knowledge, tools and connections they need to achieve commercial success.
- A marketing and branding strategy for Hamilton's life sciences cluster must be created. Enhanced public awareness of research will create community support, commercialization interest, the attention of venture capital and the pressure to innovate.
- Pursue investments from the provincial and federal governments to support the creation of the cluster and to help bridge the gap to commercialization.

Fortunately, none of these recommendations are impossible to implement; they are not duplicative or cost prohibitive, nor are they going to take decades to nurture and develop. Many essential pieces, in fact, are already coming together. Progress, though never "easy", is possible if key leaders are determined to act.

If there is an appetite from industry stakeholders to drive forward, the Hamilton Chamber of Commerce and the stakeholders that contributed to this report pledge to champion this initiative and be the galvanizing force needed to help build a life sciences cluster in the Hamilton region.

PREFACE

In May 2012, business and community leaders convened at the 5th Annual Hamilton Economic Summit, presented by the Hamilton Chamber of Commerce. Together, participants identified five sectors that are essential to the Hamilton region's future economic and social prosperity. They are: education, advanced manufacturing, creative industries, transportation and life sciences.

Since then, the Hamilton Chamber of Commerce and its members have dedicated significant resources and expended considerable effort to build momentum and to support growth in each of these sectors. In particular, given Hamilton's abundance of intellectual and institutional health assets, the life sciences sector drew considerable interest from a broad range of stakeholders as being ripe for future economic development.

The stakeholders formed a subcommittee of the Chamber's Innovation and Technology Committee to investigate further.

SUBCOMMITTEE VISION

- 1 To position health as a wealth creator by exporting new innovation and unique delivery models, and exploiting new platforms for commercialization in order to catalyze new funding concepts for health and life sciences.**
- 2 To promote Hamilton as a centre of excellence and emphasize our positive global reputation to attract international businesses, talent and investments in Hamilton.**

The subcommittee then endeavoured to understand what is required for Hamilton to meet this vision. This pursuit started with an examination of past progress achieved in advancing life sciences as an economic development agenda item.

The concept of life science cluster formation has been on the radar of stakeholders in the city of Hamilton for at least a decade. Most notably, the Economic Development Department of the City of Hamilton prioritized the life sciences sector as an area of importance in its 2010-2015 Economic Development Strategy. Within this development strategy, the city and stakeholders identified a number of short- and long-term priorities for the development of Hamilton's life sciences cluster by 2015.

Some progress has been made, but much more needs to be done

LIFE SCIENCES REMAIN CRITICAL FOR HAMILTON'S FUTURE ECONOMIC PROSPERITY

Life sciences continue to be a growth industry domestically and globally. Despite governmental fiscal realities, leading analysts project an optimistic period of growth for the sector over the coming decades due to new discoveries and shifting demographics. Additionally, patent expirations have increased the pressure for industry leaders to develop new sources of income.

For these reasons, the industry is projected to grow in North America, pursuing mergers and acquisitions that will help populate product pipelines, while concurrently investing in research for new products and services to address ever-changing health care demands.

Statistics Canada's 2012 Canadian Business Patterns survey estimated that close to 300 businesses are currently operating in the life sciences sector in the Hamilton region. Their commercial activities are diverse and comprise (but are not limited to) the fields of biotechnology, agriculture, pharmaceuticals, biomedical technologies, life systems technologies, kinesiology, nutraceuticals, cosmeceuticals, food processing, environmental, biomedical devices, health informatics and administration, and organizations and institutions that devote the majority of their efforts to the various stages of research, development, technology transfer and commercialization. Furthermore, our analysis of the aforementioned Stats Can data over the last three years has also shown an approximate 12% increase in the number of established businesses in the life sciences sector in Hamilton.

As recognized in the City of Hamilton 2010-2015 Economic Development Plan, these businesses engage the intellectual capital of Hamilton's academically-focused health research institutions and centres. In fact, a majority of the start-up life science companies (70%) are created from science developed at universities. Hamilton has world-class life institutions working in this field. McMaster University, Hamilton Health Sciences and St. Joseph's Healthcare Hamilton have won global and national accolades and recognition for research performance. Mohawk College has also prioritized service innovation in the health sector through its Apps for Health initiative and the recent creation of the Mohawk eHealth Development and Innovation Centre (MEDIC). Significant economic development can be derived from these local assets, in part through businesses needing to be in close proximity to Hamilton's physical and intellectual life science resources, but most importantly when outside capital flows into the city to fund the commercialization of intellectual property and when subsequent domestic and international export sales materialize.

There is a strong, and necessary, relationship to be nurtured between Hamilton's life science research institutions and the local and global businesses that are capable of commercializing their discoveries. Research hospitals and health-focused academic institutions produce scientific and technical knowledge, but they also help life sciences businesses as they navigate the pathway towards commercialization.

Commercializing life sciences requires many steps, including a proof of concept, validation and the selection of exploration candidates for possible incubation by virtue of “prospecting” and technological “due diligence,” as well as clinical trials. Incubation partnerships with academic institutions are created to give businesses access to the extensive network of scientific or technological expertise, as well as intellectual property advice, and support for navigating the convoluted channels of government funding. Most importantly, academic institutions have existing access to commercial partners who are more likely to support a new business if it’s affiliated with a college, university or hospital.

Stakeholders, including the Government of Ontario, City of Hamilton and McMaster University have attempted to systematically promote and encourage this commercial relationship. Governments and academic institutions are allocating public funds to initiatives that are designed to identify the commercial potential of new research, develop an entrepreneurial culture among researchers, and create opportunities and support to help life sciences businesses grow.

Profile: Golden Horseshoe Biosciences Network

The recent example is the Golden Horseshoe Biosciences Network (GHBN), which was incorporated as a not-for-profit in 2005, with representation from the City of Hamilton, Halton Region, the Region of Niagara, McMaster University and its affiliated research hospitals, as well as various companies in the biotechnology sector. This network strived to promote the Golden Horseshoe region of Ontario as a globally competitive bioscience cluster for the development and commercialization of innovative products, and as a world class provider of services in the areas of biotechnology, biopharmaceuticals, health and medicine, bio-manufacturing and bioengineering technologies. The City of Hamilton, together with McMaster University, played an integral role in the creation of GHBN.

Among its accomplishments over four years of operation, GHBN managed to help provide one-on-one support to numerous startups and commercialization projects, provided tools to clarify provincial and federal funding envelopes that were accessible in the sector, and developed a business plan for an 80,000 square foot incubator space at McMaster Innovation Park (MIP).

MIP is now in the development process for the 80,000 square foot Emerging Technology Centre, which is focused on new technologies coming from McMaster University and the Hamilton area. The current plan includes 20,000 square feet of space committed as a bio-tech incubator, with laboratories and central services. A further 20,000 square feet of open acceleration space is also being discussed to house the growth in new entrepreneurial firms coming from McMaster University, Mohawk College, and to the Hamilton area over the last two years.

In 2010, the GHBN’s primary funding from the Government of Ontario was reallocated to capitalize the formation of Regional Innovation Centers across the province, including one in Hamilton. While the resulting organization, Innovation Factory, has a mandate to continue nurturing the Hamilton region’s commercial entities in the life sciences sector, the organization is sector-agnostic and works to catalyze commercial activity emanating from intellectual property developed in a broad range of sectors. It is not strategically focused on any specific economic development goals using Hamilton’s health assets.

Despite the investments in GHBN and Innovation Factory, the pace and form of collaboration towards the commercial innovation of life sciences knowledge developed in the Hamilton region lags behind provincial, national and international counterparts. There is still no recognizable, dynamic business network or support system working to derive and promote commercial activity from the significant assets found in Hamilton's life sciences sector. The question arises: what has been missing from previous networks, and remains missing from current investments, that is inhibiting the formation of a verifiable cluster?

The second half of this paper examines the essential features for the development of life sciences industry cluster in more detail. Furthermore, based on this analysis, the authors have proposed a response to the question posed above. There are some specific elements missing from previous and current attempts to derive and promote commercial activity from Hamilton's life sciences assets.

ELEMENTS OF A SUCCESSFUL LIFE SCIENCE CLUSTER



ELEMENTS OF A SUCCESSFUL LIFE SCIENCE CLUSTER

The development of economic clusters is nothing new and has been pursued in hundreds of cities in dozens of countries around the world. In Canada, several clusters have developed over the past two decades in a number of industries. In Ontario, one of the most notable clusters is in the Kitchener/Waterloo region, which focuses on technology-based companies.

In the life sciences sector, seven clusters were identified in a 2003 report, and included Toronto, Montreal, Vancouver, London, Ottawa, Halifax, and Saskatoon (CPRST, 2003). Le out from that report, or potentially included in Toronto, is Mississauga, a region that has garnered the name of "Pill Hill" due to the large concentration of multinational pharmaceutical companies found in the municipality.

Clusters emerge from regions that have achieved critical mass in a particular area of expertise and are often anchored by strong research universities, industrial laboratories and/or entrepreneurial companies with human capital to match (CPRST, 2003). Within these organizations, overlapping interests and shared benefits are realized. Initially, this is oen accomplished through focused efforts among stakeholders, and an integration agent is required to foster and develop collaborative opportunities between these organizations (CBC, 2013). This agent is required until capacity is established whereby these partnerships and synergies take place naturally.

Through its research, this subcommittee has identified five primary determinants that contribute towards the successful development and sustainability of life sciences clusters.

"Clusters are agglomerations of interconnected companies and associated institutions. Firms in a cluster produce similar or related goods or services and are supported by a range of dedicated institutions located in spatial proximity, such as business associations or training and technical assistance providers. Vibrant clusters are home to innovation-oriented firms that reap the benefits of an integrated support system and dynamic business networks."

- United Nations: Industrial Development Organization, 2013

1. KNOWLEDGE AND TALENT

Knowledge is developed by institutions (universities, colleges and labs) that are designed to support the curiosity of, and seek answers to, fundamental scientific questions. However, knowledge also arises as a trickle-down effect from these institutions (i.e. knowledge discovery can lead to commercial opportunities and build tertiary knowledge about patents, legal issues and finance). Significant health care delivery capacities also allow this specialized knowledge to be transferred into the advancement of medical practice (i.e. from bench to bedside).

Talent is nurtured by institutions that promote and support the training and development of human knowledge, skills, and capabilities. Talent is required to conduct research within both public and private institutions. It is also the unique extension of focused and rigorously-regulated professional accreditation regimes (i.e. specialized medical skills).

2. INDUSTRIAL BASE

.Clusters must be supported by an industrial base that is comprised of established businesses that both directly and indirectly support cluster development. Direct support comes from existing private sector companies in the given sector (e.g. in the case of life sciences: pharma, medical device, diagnostics, etc.), which provide knowledge on how to commercialize products and services, as well as the “do’s and don’ts” associated with the path to commercialization, thus accelerating growth. Indirect support includes businesses that are capable of providing other essential commercialization supports, such as capital, business expertise, services, networks and credibility. Building an industrial base is certainly a challenge within the life sciences sector given the comprehensive regulatory requirements and financial risk associated with certain subsectors.

3. INFRASTRUCTURE & FUNDING

Infrastructure encompasses the public and private sector institutions where research takes place (e.g. laboratories) and in the health care delivery systems where research becomes validated at the bedside or in clinical trials. Funding can refer to either direct capital investment (e.g. government grants and loans programs) or by creating favorable environments for discovery and commercialization to take place (e.g. tax incentives). Venture capital (e.g. private equity, angel investment) is required to support infrastructure development and research along the pathway to commercialization.

4. SUPPORTIVE ECOSYSTEM/ALIGNMENT OF STAKEHOLDERS

Clusters require an ecosystem or network of individuals and organizations who are willing to support the development of ideas and products by leveraging their existing resources and connections. Such an ecosystem can be achieved through formal engagement opportunities, or through serendipitous interaction, which takes place once capacity has been established. Opportunities for innovators and the business community to connect must exist not only for commercial purposes, but also to build awareness around specific initiatives – this creates momentum for a movement. It is very important that all key stakeholders are aligned in all cluster-development efforts and are, in fact, actively collaborative.

5. DRIVING FORCE

The driving force is a chief advocate or group of advocates willing to lead the charge for a sustained period of time until the cluster is established and sustainable. This group aims to create a new status quo and acts both as the leader and as the ‘glue’ that holds the initiative together



PROGRESS ON THESE DETERMINANTS IN HAMILTON

Using the above-mentioned determinants, we are able to create a report card for current progress towards creating a life sciences cluster in Hamilton region.

1. KNOWLEDGE & TALENT

Grade: Excellent

- We have strong knowledge infrastructure with internationally-ranked life sciences research institutions at HHS, St. Joseph's and McMaster University.
- Hamilton Health Sciences, St. Joseph's and Bay Area Health Trust have formidable clinical trial activity and lab infrastructure.
- Mohawk College has made significant investments in developing technologists dedicated to addressing the service side of health care delivery.
- There are over 20,000 jobs directly and indirectly related to life and health sciences in Hamilton: Hamilton Health Sciences: 10,000, St. Joseph's Health Care: 5,000, McMaster: 7,000, Mohawk: 1,000.
- Hamilton Health Sciences is one of the three largest hospital systems in all of Canada, and the second largest hospital network in Ontario.

2. INDUSTRIAL BASE

Grade: Fair

- We have a limited number individuals and/or organizations with expertise in commercialization at a number of institutions in Hamilton (e.g.: McMaster Industry Liaison Office, Innovation Factory, Bay Area Health Trust).
- We have business development managers who can partner with innovators and foster incubation (e.g.: McMaster Industry Liaison Office, Innovation Factory, Bay Area Health Trust)
- There are 298 Hamilton-area businesses operating in the life sciences sector (Appendix C is a directory of these businesses). The sector has also shown positive growth over the last few years.
- Relative to other Canadian cities, we have little representation from large multinational companies in the life sciences industry at this time.

3. INFRASTRUCTURE & FUNDING

Grade: Fair/Poor

- We have excellent facilities and equipment at publically-funded institutions, with potential real estate available at McMaster Innovation Park for future expansion.
- We need to identify opportunities to introduce incentives that encourage commercialization and new businesses in life sciences to develop.
- We need programs designed to instigate a culture of commercialization within the existing research community.
- We need the formation of a dedicated life science incubation space.
- We need to grow channels to venture capital that supports commercialization at McMaster, Mohawk and throughout the local health care system.
- We need government funding programs designed to support innovation and collaboration between industry partners (Public Private Partnerships).

4. SUPPORTIVE ECOSYSTEM/ALIGNMENT OF STAKEHOLDERS

Grade: Good

- There is significant operational alignment between Hamilton Health Sciences and St. Joseph's, and the recognition that significant gains can be achieved by continued partnerships.
- We have a municipal economic development agency that has focused on life sciences and works well with the industry.
- We have increasing awareness among the private sector and the Hamilton Chamber of Commerce of the commercial potential of the significant research and health delivery capacity in this community.
- We have a strong community consensus on the need for increased collaboration towards developing a life sciences cluster in Hamilton. (Appendix B shows the full list of stake holders interviewed for the purpose of this paper.)
- We need our existing institutions to fully embrace principles of innovation at all levels of their organization; this will result in dynamic, redesigned systems where innovative ideas flourish, become implemented, and, where applicable, are developed as new commercial entities.

5. DRIVING FORCE

Grade: Fair/Poor

- Initiative in Hamilton's life sciences sector is still too diffuse, and the progress made is too insignificant to keep pace with other regional clusters.
- We need an arms-length institution, invested in by all stakeholders, that drives continued cluster formation and has the bench strength necessary to meet the unique challenges of commercialization and innovation within the life sciences industry.

WHERE DO WE GO FROM HERE?

HAMILTON IS A CITY CURRENTLY WORKING THROUGH A STAGE OF ECONOMIC REJUVENATION

We are starting to realize the benefits of:

- Economic incentives instituted by our municipal government;
- Significant financial investment in post-secondary education institutions;
- Shifting visions of how these same institutions should involve themselves in the community;
- Greater recognition of Hamilton's quality of life offerings and authenticity;
- A private sector that is seeing increased levels of activity in both its mature industries (i.e. advanced manufacturing, goods movement) as well as new markets and industries (e.g. agribusiness, life sciences, creative industries).

In addition to these economic benefits, a city of Hamilton's scale and population benefits from the ability to be nimble, and make significant changes occur faster than our larger municipal counterparts, such as Montreal and Toronto. More specifically, we have fewer stakeholders to align and should theoretically be able to do so faster.

The success of a cluster has to do with the level of integration among stakeholders, because, by definition, it must successfully leverage all of the existing assets within a region. All of the health and academic institutions, businesses, community organizations and levels of government that are directly affected by the cluster must be involved and drive this initiative. If not, the likelihood of success falls drastically, as interests will not always align and eventually the costs of pursuing this initiative by secondary stakeholders will outweigh the benefits that can be accrued from its full realization.

PRIMARY RECOMMENDATIONS

Hamilton remains an excellent place to continue the development of a life sciences cluster. Building on the work already completed by this subcommittee, and the considerable business development efforts by the City of Hamilton Economic Development Department, **our primary recommendation is for a working group of organizational leaders**, drawn from the primary stakeholders in both the private and public sector, be commissioned to continue the discussion, identify specific goals, and act as a champion group that can work with the City to motivate industry stakeholders to collaborate and grow together.

(Appendix D) in the full report is a supplementary document proposed by the Innovation Factory that reviews this idea and suggests a potential path forward for the formation of this group.)

This group will re-engage all stakeholders, and begin to develop a cluster mentality of collaboration while also working to market the region's assets as a cluster. A similar exercise was conducted successfully by the Toronto Board of Trade in spring 2013; a steering committee was formulated consisting of key players in academia, health care, government, banking and the private sector. Through an ideation conference they have currently identified a number of priorities to be tackled by working groups.

Take steps to create a marketing and branding strategy for Hamilton's life sciences cluster, to celebrate the existing accomplishments of commercialization initiatives, as well as the economic and social potential to be derived from existing health research being conducted in the region. Enhanced public awareness of depth and potential of this research will help create commercialization interest, attract the attention of venture capital and apply pressure to innovate.

Create a physical incubation space. McMaster Innovation Park is on the verge of developing an Emerging Technologies Centre. The City of Hamilton committed approximately \$5 million to the initial development of MIP, earmarking the money for a life sciences incubator space. While Hamilton currently has several state-of-the-art labs and spaces where commercialization activities are happening, it lacks a central location to act as an instigator for commercialization activities and greater collaboration amongst stakeholders. Incubation centres are critical for anchoring regional clusters.

Mere incubation, however, is not enough. An arm's-length organization, focused on commercialization and innovation in life sciences, must be established to open global channels and equip the creators of intellectual property with the knowledge, tools and connections they need to achieve commercial success. Models around the world abound, with some of the most successful ones close to home – e.g. Toronto's MaRS. Hamilton might not require a new organization, since Innovation Factory is modelled after MaRS and Waterloo Region's Communitel would, however, need to enhance its life sciences commercialization capacity and expertise.

The nature of research commercialization in the life sciences sector is such that private venture capital across the world has preferred to get involved at a later stage in the project, are a proof-of-concept and clinical tests have been successfully completed. Thus, we must pursue investments from the provincial and federal governments to bridge the gap to commercialization. Through a variety of programs, both levels of government have been instrumental in kick-starting innovation centres in Hamilton and other Canadian cities. A recent example is the formation of an eHealth Incubator at Mohawk College (MEDIC) through the Canada Foundation for Innovation. The City of Hamilton needs incentives of this nature to spur commercialization activities from university and health care research units, as well as support for small- and medium-sized enterprises that have been founded in recent years.

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ACKNOWLEDGMENTS

The Hamilton Chamber of Commerce would like to thank and acknowledge all those involved in the development of this paper.

The life sciences subcommittee membership included:

Edward, Valerie	Ballagh & Edward LLP
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APPENDIX A

Models for Growth and Cluster Formation

This Workgroup was tasked with reviewing theoretical and case study models that have been used for other cities and suggest a path forward for Hamilton.

In our literature review we looked at a variety of structural models, namely fully private, public private and publicly funded incubators that have served as a hub for clusters. A limited number of case studies from the chamber's extensive research are featured to highlight the impact of certain variables of a successful cluster.

Public Private: Munich, Germany

In Munich, Martinsreid in the south-western suburbs marks the center of biotechnology research and incubation in Germany. One of the world's largest pharmaceuticals Aventis opened its Centre for Applied Genomic Research there and the Biotechnology Innovation Centre (IZB) funded by the German government is located nearby with 9000m² of laboratory and office space. The cluster is centered by the organization responsible for managing development of biotechnology, BioM. The area has become a biomedical research campus with 8000 researchers working in biology, medicine, chemistry and pharmacy located there. BioM AG is a one-stop shop with seed financing, administration of BioRegio awards and enterprise support under one roof. Seed financing is a partnership fund from the Bavarian State government, industry and banks up to 600,000 (euros) per company. BioM's investments are tripled by finance from tbg (public investment fund) and Bayern Kapital, a special Bavarian financing initiative. The fund has over e200 million for supporting biotechnology activities. Bay BG, and BV Bank-Corange-ING Barings Bank have special public/private co-funding pools, and a further eight (from 16) Munich venture capitalists in the private market sector invest in biotechnology. DBFs increased from 36 to 120 between 1996 and 2001 (Kaiser, 15). BioM is a network organization, reliant on science, finance and industry expertise for its support committees. It also runs young entrepreneur initiatives, including development of business ideas into business plans and financial engineering plans. Business plan competitions are also run in biotechnology.

Importance of a strong knowledge base & organizational support: San Diego, USA.

The San Diego region is one of the largest life sciences clusters in the United States, anchored by prominent non-profit medical research institutions and R&D-oriented private companies such as The Scripps Research Institute, Sanford-Burnham Medical Research Institute, Synthetic Genomics, Pacira Pharmaceuticals and Althea Technologies. What is also remarkable about this cluster is the relatively short amount of time it's institutions grew since their inception.

The presence of CONNECT and later BIOCUM was critical during the formative period of the region's high technology clusters in the 1980s and early 1990s, because the region lacked a critical mass of entrepreneurial talent and business support services. The local business community formed CONNECT in 1985 as a way to accelerate and support the burgeoning Life Sciences industry, it was hosted within UC San Diego to avoid appearance of bias. CONNECT's Biotechnology Corporate Partnership Forums were instrumental for attracting interest in San Diego's emerging biotech industry from outside the region. In later years, the Springboard Program began a process of coaching and mentoring entrepreneurs that continues to this day. The organization now has a \$3 million annual budget and over 17 staff members. It holds over 330 events each year that attract approximately 15,000 attendees and claims responsibility for forming over 3,000 companies and more than \$3 Billion of investment.

APPENDIX A

Publicly funded: Montreal, Canada

Quebec Biotechnology Innovation Centre (QBIC), inaugurated in May 1996. It was created to promote the launch and development of biotech companies specializing in health, environment, agro-food and forestry industries in the greater Montreal region. The region has a large biomedical cluster with leading companies and a strong research base with four universities in Montreal, an established biopharmaceuticals industry with well over 145 companies and 14,500 jobs and 50 biological research institutes including the Canadian National Research Council Biotechnology Research Institute, an important federal biotechnology research centre. QBIC is located in the Laval Science and High Technology Park, Montreal. The Park was created in 1989 as the result of a strategic alliance between the INRS–Institut Armand-Frappier (a research centre of Quebec University), the City of Laval and Laval Technopole. The Laval Science and High Technology Park is the focus of “Biotech City,” a \$100 million initiative launched in June 2001 to develop a business and science centre supported by the Quebec government, Investissement Quebec, the Institut National de la Recherche Scientifique (INRS), the Laval Technopole and the City of Laval. Some 30 businesses, biotechnology and biopharmaceutical companies, research centres and IT firms exist in Biotech City. Like Oxford BioTechNet, it is a not-for profit organization with two funding partners: first, the INRS–Armand–Frappier Institute of Immunology and Virology at the University of Quebec, and second, Laval Technopole, which is the Economic Development Agency of Laval City. QBIC relies on the support of the Canadian and Quebec governments for around 45% of operating finance with the remainder self-financed through mainly rent (c. 80%) and other services such as the hire of scientific equipment to outside companies. Private sector sponsors such as the Royal Bank of Canada—the main commercial bank in Canada— have also invested. QBIC has a wide range of incubation periods, from 3–6 months to 3–4 years with many companies staying the full 4 years. The Centre considers between 15 and 20 proposals for start ups per year with around 3 accepted.

Start-ups at the pre-incubation stage can apply to QBIC’s seed-corn fund which is a rotating interest-free unsecured loan up to a maximum of 75% of projected costs repayable in full when companies secure second round funding. The remaining 25% of finance must be raised by entrepreneurs, with regional funds or institutional venture funds the main sources. A business mentoring service is available to help reduce start-up costs and equip companies with appropriate human and financial resources. The mentoring structure relies on the bioincubator manager who acts as a first-line advisor to the heads of resident companies. Further mentoring expertise is provided by a network comprising consultants covering the seven major fields of bioincubation competence and acting as an advisory committee.

QBIC occupies 27,000 sq.. of space including 20 wet laboratories and 19 offices, its 2003 enrolment was 6 resident companies, with 13 graduate companies having moved on to other premises. Start-up companies have access to facilities such as laboratories, offices, specialised storage areas and basic furniture. Tenant companies also have access to a host of sophisticated scientific instruments on a time-sharing basis for no extra cost.

A key attraction of QBIC to clients is the wide array of equipment available so clients have to buy less equipment themselves, leaving funds to pay for research staff. The graduation policy at QBIC entails writing a business plan 12 months prior to graduation, raising a final round of financing, and setting a time limit on occupation at QBIC. Part of the graduation policy stipulates that companies are not allowed to grow to more than 25% of the total incubator space. A large majority of companies (90%) graduating from QBIC have been successful in raising capital are incubation with the average amount raised around \$120 million.

APPENDIX A

The two prior examples have demonstrated that the Life Sciences cluster possesses a unique set of attributes and challenges to development. There is an immense amount of specialization and collaboration required due to the overlap between the various subsections that make up the field of Life Sciences within any project. Therefore in almost all cases they tend to be clustered around Universities or Hospitals, utilizing their existing capital facilities to lower costs during the crucial initial phase of testing and building a business case, until a point where they can prove the success of their high risk clinical trials or product. This latter point is important since it distinguishes the sector from other sectors where investors are more willing to front the up front costs. The other take away was also centered on the importance and prevalence of public funding to kick start incubators and support clusters. The government sponsored Capital funding and research awards were instrumental in creating a healthy ecosystem for researchers leading to outside Venture Capital at a later stage upon the completion of certain stages of research.

Pittsburgh: Importance of a regional public - private organization

Pittsburgh's anchor institutions account for more than \$11 billion in local salaries, or 22% of the total salaries in the region. They've also spun off hundreds of companies in the past 15 years, driving Pittsburgh's technology boom. Firms in the life science sector have been doing especially well. These companies wanted to be close to Pittsburgh's universities and hospitals in order to leverage local intellectual capital, resource availability and collaboration. But once these companies began to grow, several either relocated or were acquired by firms outside of the region. The movement of companies just before a critical stage of job and revenue growth was hurting the local economy.

In 2002, in an attempt to make these companies feel more entrenched in the local life science ecosystem, the Commonwealth of Pennsylvania, University of Pittsburgh, Carnegie Mellon University, the University of Pittsburgh Medical Center and Pittsburgh's regional foundation community pooled resources and established the Pittsburgh Life Sciences Greenhouse (PLSG). PLSG Offers a variety of resources to organizations in the sector. They offer Early Stage and Regional Economic Development loans executive training program, facilitating industry collaborations, a full-service life science incubator, location services, and workforce development programming. The pool of industrial expertise housed at PLSG allows companies to commercialize faster and more efficiently.

In terms of results, since 2002 PLSG boasts 178 investments totaling \$19 million in 76 companies, leveraging \$840 million in additional capital. The regional cluster has also attracted an additional 13 Life Science companies to the region. More importantly, with help from various partners and a \$2.4 million grant from the U.S. Department of Labor, the anchors comprising the PLSG have also trained more than 6,000 people for jobs in the life sciences cluster since 2005.

APPENDIX A

Philadelphia: The role of Government Incentives

Philadelphia's large concentration of academic institutions, geographical proximity to New York and strategic incentives have allowed it to host a significant cluster of over 1,200 Life Science companies. The University City as it's also called, plays host to The Science Center, one of the largest urban research parks in the United States. With 100 colleges and universities and 25 medical schools, Philadelphia's institutions have fed the region's 432,000 jobs and \$20.2 billion in earnings within the biotechnology and healthcare sectors, accounting for 26.5 percent of the regional workforce and nearly 15.0 percent of Philadelphia's economic activity, respectively.

The Science Center is strategically located proximate to several major universities and research institutions including The Children's Hospital of Philadelphia, Drexel University, the University of Pennsylvania, University of the Sciences in Philadelphia and The Wistar Institute. Serving as an incubator for many of the region's growing companies and research efforts, University City's Science Center specifically has led to more than 40,000 jobs in the region and \$64.5 million for the city and state in tax revenue.

The government sponsored Capital funding and research awards were instrumental in creating a healthy ecosystem for researchers leading to outside Venture Capital at a later stage upon the completion of certain stages of research. Arguably, the state of Pennsylvania is the most influential force in providing a wide variety of incentives and leadership. For example through the Keystone Innovation Zones, tax credits of up to \$100,000 were offered to companies based on revenue growth, as well as a variety of direct grants and loans and tax exemptions.

Furthermore, Ben Franklin Technology Partners provides risk capital and commercialization products to early stage companies, supporting the development of centers of excellence in the region. According to a report in 2013, apart from creating over 16,000 jobs and over \$6.6 Billion impact on the local economy, there was a 3.6-to-1 return on investment to the state on its \$13.7 million investment in Ben Franklin between 2007-2011. Lastly, through the Collegiate Consortium for Workforce and Economic Development assists life science businesses with customized workforce training, retention, and skill development program For example, the Philadelphia Naval yard closed down in 1995, the city immediately obtained over 1,000 acres of land and began working to transform it into a vibrant mixed use commercial zone. The area was successfully transformed into a hub of Life Sciences and technology activity with over 120 new companies and several global pharma firms moving their headquarters into the city and the Naval yard.

APPENDIX B: PUBLIC SECTOR STAKEHOLDERS

Explanation of contents:

Appendix B contains a listing of work compiled by the Life Sciences Subcommittee of the Hamilton Chamber of Commerce and Workforce Planning Hamilton. Please note that this is not meant to be an exhaustive list of sector stakeholders.

List of Tables:

Page 24: Academic Leadership

Page 25: Healthcare Leadership

Page 26, 27, 28 & 29: Research Leadership

Page 30: Other leadership

Academic Leadership

Organization	Department	Description	Contact	Website
Mohawk College	Health Sciences	Training Nurses, Cardiovascular Technologists, Diagnostic Cardiac Sonographers, Medical Radiation Sciences Technologists, Medical Laboratory Technologists, Medical Laboratory Assistants/Technicians, Occupational Therapist Assistants & Physiotherapist Assistants, Personal Support Workers, Pharmacy Technicians & other health professionals.	Paul Armstrong, Dean Donna Rawlin, Associate Dean Lori Koziol, Associate Dean James Humphreys, Associate Dean	www.mohawkcollege.ca/healthsciences-programs.html
Mohawk College	Engineering Technology		Tony Thoma, Dean Bill Brimley, Associate Dean Tom Low, Associate Dean	www.mohawkcollege.ca/engineering-technology-programs.html
McMaster University	Faculty of Health Sciences	Our Faculty thrives on a team approach to health care that represents a true partnership between the community and the University. Within McMaster's health care group is a broad spectrum of staff, faculty, students, alumni and community supporters, as well as our strong academic hospitals Hamilton Health Sciences and St. Joseph's Healthcare Hamilton. The Faculty of Health Sciences is a major contributor in maintaining McMaster's position as one of Canada's top research-intensive universities., with \$133 million in research funding being overseen by health sciences investigators. The Faculty is committed to moving forward with discoveries that will improve medical knowledge and treatments for the people of Hamilton, Canada and beyond. In partnership with hospitals, government bodies and private enterprise, we continually pursue medical breakthroughs in our laboratories and incorporate them into the practice of health care professionals. Training programs exist for physicians, nurses, physiotherapists, occupational therapists, physician assistants, midwives and researchers.	John G. Kelton, Dean and Vice President Susan Denburg, Associate Vice-President (Academic) Stephen Collins, Associate Dean (Research) Alan Neville, Associate Dean (Education) William Orovan, Associate Dean (Clinical Services) Andrea Baumann, Associate Vice-President (Global Health) Catherine Tompkins, Associate Dean and Director, Nursing Patty Solomon, Associate Dean and Director, Rehabilitation Science Catherine Hayward, Associate Dean (Graduate Studies) Susan Emigh (Director Public Relations)	fhs.mcmaster.ca/main/index.html
McMaster University	Faculty of Engineering		Ishwar Puri, Dean Kenneth Coley, Associate Dean (Academic) Peter Mascher, Associate Dean (Research and External Relations) Maria White, Assistant Dean (Studies)	www.eng.mcmaster.ca
McMaster University	Faculty of Sciences	A research-intensive Faculty, Science is McMaster's largest, with over 6500 undergraduate and graduate students. McMaster is consistently ranked as one of the top research universities in Canada and one of the country's most innovative.	John G. Kelton, Dean and Vice President Susan Denburg, Associate Vice-President (Academic) Stephen Collins, Associate Dean (Research) Alan Neville, Associate Dean (Education) William Orovan, Associate Dean (Clinical Services) Andrea Baumann, Associate Vice-President (Global Health) Catherine Tompkins, Associate Dean & Director, Nursing Patty Solomon, Associate Dean & Director, Rehabilitation Science Catherine Hayward, Associate Dean (Graduate Studies) Susan Emigh (Director Public Relations)	fhs.mcmaster.ca/main/index.html
Leadership				
Mohawk College		TBA	President	
McMaster University		Dr. Patrick Deane	President	

Healthcare Leadership

Organization	Campus	Description	Contact	Website
Hamilton Health Sciences	Hamilton General Hospital	Founded in 1848 as the first hospital in Hamilton, Hamilton General Hospital has grown to become a leading healthcare provider, not only for the downtown community of Hamilton, but for the entire South Central Ontario region. With state-of-the-art facilities, the General is recognized as a regional centre of excellence in cardiovascular care, neurosciences, trauma and burn treatment.	Teresa Smith, President	www.hhsc.ca/body.cfm?ID=228
Hamilton Health Sciences	Chedoke Hospital	Hamilton Health Sciences' Chedoke site houses non-acute care programs in a campus setting on Hamilton's west mountain. A leading Prosthetics and Orthotics Department and several McMaster Children's Hospital (MCH) outpatient services are located at Chedoke.		www.hhsc.ca/body.cfm?ID=226
Hamilton Health Sciences	Juravinski Hospital	Through the years, the Juravinski Hospital has become an integral part of the mountain community as the region's centre of excellence for cancer and orthopedic care and a full service general hospital.	Dr. Ralph Meyer, President	www.hhsc.ca/body.cfm?ID=229
Hamilton Health Sciences	Juravinski Cancer Center		Dr. Ralph Meyer, President	www.jcc.hhsc.ca/
Hamilton Health Sciences	McMaster Children's Hospital	MCH is home to 154 acute care beds, 40 subspecialty clinics, a Children's Treatment Centre and one of the largest and most impressive Neonatal Intensive Care Units in Canada. Founded in 1988, MCH has rapidly become a leader in pediatric evidence-based care, collaborative research and innovative leading-edge education.	Dr. Peter Fitzgerald, President	www.mcmasterchildrenshospital.ca
Hamilton Health Sciences	McMaster University Medical Centre	McMaster University Medical Centre plays a major role in the provision of healthcare services for Hamilton and the surrounding region of central-west Ontario. MUMC is home to Adult Day Clinics (Medical and Surgical), McMaster Children's Hospital and the Women's Reproductive Health and Newborn Care program.		www.hhsc.ca/body.cfm?ID=232
Hamilton Health Sciences	St. Peter's Hospital	A complex continuing care hospital on Maplewood Avenue in downtown Hamilton, St. Peter's provides inpatient, outpatient, and community-based programs and services that focus on four pillars of excellence: Dementia, Aging, Palliative Care and Rehabilitation.	Rebecca Repa, President	www.hhsc.ca/body.cfm?ID=1575
Hamilton Health Sciences	Urgent Care Centre	The Main Street West Urgent Care Centre (UCC) opened on April 4, 2011, providing another level of care to the community. The UCC serves as an alternative between the doctor's office and an emergency department (ED) as an option when someone is not sick enough to visit an ED but can't wait for an appointment with their doctor.		www.hamiltonhealthsciences.ca/body.cfm?ID=2109
St. Joseph's Healthcare Hamilton	St. Joseph's Home Care	St. Joseph's Home Care, a not for profit charity, is dedicated to providing quality home care, community nursing and personal support services to our clients at competitive prices.		www.stjosephshomecare.ca/
St. Joseph's Healthcare Hamilton	St. Joseph's Villa's	St. Joseph's Villa, located in Dundas, Ontario, is recognized as one of the province's largest and most innovative long term care homes with 378 beds.	Shawn Gadsby, President	www.sjv.on.ca/
St. Joseph's Healthcare Hamilton	Charlton campus	St. Joseph's Healthcare's Charlton Campus is a 600-plus bed acute care facility located at 50 Charlton Avenue East in Hamilton, Ontario.	Dr. David Higgins, President	www.stjoes.ca/default.asp?action=article&ID=84
St. Joseph's Healthcare Hamilton	West 5th campus	St. Joseph's Healthcare Hamilton's West 5th Campus is home to the regional specialized Mental Health Services for Central South. We are a specialized tertiary care centre dedicated to the service of individuals suffering with a severe mental illness, their families and their community.	Dr. David Higgins, President	www.stjoes.ca/default.asp?action=article&ID=191
St. Joseph's Healthcare Hamilton	King campus	We are a hospital-sponsored outpatient facility supporting the service needs of the residents of Stoney Creek, East Hamilton, and the broader Hamilton-Wentworth Region. Our King Campus brings health care into the community with a variety of services and programs from eye care and cataract surgery to pain management.	Dr. David Higgins, President	http://www.stjoes.ca/default.asp?action=article&ID=192

Leadership

Hamilton Health Sciences	Mr. Rob MacIsaac	President & CEO
St. Joseph's Healthcare Hamilton	Dr. Kevin Smith	President & CEO

Research Leadership

Organization(s)	Center/Institute	Description	Director	Area(s) of Expertise / Key Word(s)	Website	Alt Contact	Notes
McMaster University	Center for Health Economics and Policy Analysis (CHEPA)	Interdisciplinary environment in the fields of health economics and health policy analysis.	Dr. Michel Grignon	Health Policy, Health Economics	www.chepa.org/		
McMaster University	Allergy, Genes & Environment Network (AllerGen)	National network of researchers conducting discovery, development, and knowledge translation/mobilization in the field of allergy, asthma and anaphylaxis.	Dr. Judah Denburg (Scientific Director/CEO)	Immunology, Respiratory	www.allergen-nce.ca/	Diana Royce, Managing Director/COO	Not For Profit Centre of Excellence
McMaster University	Centre for Gene Therapeutics McMaster Immunology Research Centre (MIRC) Centre for Functional Genomics	Expertise in the delivery of genes as therapeutic agents and/or vaccines in the treatment of human and animal disease; focus on respiratory, oncology, and infectious diseases - e.g. TB, influenza. GMP facilities for virus production and other services available.	Dr. Johnathon Bramson	Immunology, Bioinformatics, Respiratory, Therapeutics, Vaccines, Virus, GMP Lab	www.mirc.master.ca/		
McMaster University	Institute for Infectious Disease Research (IIDR)	Understanding the mechanisms of antibiotic resistance to treat infectious disease. High throughput synthesis and screening facilities for early stage drug discovery.	Dr. Gerry Wright	Infectious Disease, Bioinformatics, High Throughput Screening	www.iidr.master.ca/index.html		
McMaster University	Biointerfaces Institute	Ability to rationally and rapidly develop new biomaterials with surfaces engineered to have the appropriate interactions with the intended biological environment for applications in medical diagnostics, biosensors, and ophthalmic materials.	Dr. John Brennan	Medical Diagnostics, Biosensors, Biomaterials	www.biointerfaces.mcmaster.ca		
McMaster University	Center for Probe Development and Commercialization (CPDC)	Focus on all areas related to the development of molecular imaging probes and chemical compounds that provide a non-invasive means to diagnose disease at its earliest stage.	Dr. John Valliant	Imaging, Diagnostics	www.imagingprobes.ca	Diana Royce, Managing Director/COO	Not For Profit Centre of Excellence
McMaster University	Farncombe Family Digestive Health Research Institute	Focused on developing new strategies for diagnosis, treatment and prevention of intestinal diseases and other diseases that may be caused and/or profoundly influenced by digestive health and nutrition. other services available.	Dr. Stephen Collins	Digestive Disease, Immunology	http://farncombe.mcmaster.ca/index.html		
McMaster University	McMaster Institute for Applied Radiation Sciences (McIARS)	Core Facilities include: McMaster Nuclear Reactor, McMaster Accelerator Laboratory and licensed laboratories for handling high levels of radioactive materials. Medical research includes: imaging and analysis of bone & joint structure using MRI and quantitative CT, as well as use of optical techniques (optical imaging, photodynamic therapy, and optical spectroscopy) to diagnose, treat, and monitor response of cancer in patients and preclinical animal models.	Dr. David Chettle	Medical Imaging, Diagnostics, Oncology	www.science.mcmaster.ca/mciars/		
McMaster University	McMaster Stem Cell and Cancer Research Institute	Explores the underlying cellular and molecular origins that initiate human cancer by employing human stem cells as a model system. This centre has research expertise in epigenetics, signalling pathways, neural cancer stem cells, human leukemia and pluripotent stem cells; as well as shared facilities for high content screening and analysis.	Dr. Mick Bhatia	Oncology, Stem Cell	www.sccri.mcmaster.ca/index.html		

Research Leadership

Organization(s)	Center/Institute	Description	Director	Area(s) of Expertise / Key Word(s)	Website	Alt Contact	Notes
McMaster University	Medical Imaging Informatics Research Centre at McMaster (MIIRC@M)	Brings together radiologists and engineers in order to bridge the gap between clinical studies and computer sciences and to solve specific issues in Medical Imaging. The Centre focuses on seamless integration of medical images in the daily world of healthcare professionals with appropriate delivery of relevant content and decision support and educate the new world of imaging/EHR professionals.	Dr. David Koff	Medical Imaging, eHealth, Informatics	www.miircam.ca		
McMaster University	R. Samuel McLaughlin Centre for Gerontological Health Research	Research is conducted in four specific areas: health promotion and disease prevention; the aging brain; aging, mobility and participation; and pharmacology and therapeutics.	Dr. John Brennan	Gerontology, Neuroscience, Mobility	www.research.mcmaster.ca/research-chairs-and-institutes/sammmc		
McMaster University	Centre for Longitudinal Study of Aging (CLSA)	CLSA is a large, national, long-term study that will follow approximately 50,000 men and women between the ages of 45 and 85 for at least 20 years. The study will collect information on the changing biological, medical, psychological, social, lifestyle and economic aspects of people's lives. These factors will be studied in order to understand how, individually and in combination, they have an impact in both maintaining health and in the development of disease and disability as people age.	Dr. Parminder Raina	Gerontology, Bioinformatics	www.clsa-elcv.ca/		
McMaster University	Surgical Outcomes Research Centre (SOURCE)	SOURCE, housed within the Department of Surgery at McMaster, is a world leader in the area of Evidence-based Surgery (EBS). They have developed an ongoing series of instructional articles and workshops that teach clinicians how to interpret and apply evidence to clinical scenarios by use of various examples from the field of surgery.	Dr. Achilles Thoma	Surgery, Best Practices	www.fhs.mcmaster.ca/source/about_us.html		
McMaster University, Hamilton Health Sciences	Michael G. DeGroote Institute for Pain Research and Care	The institute explores the causes of a number of different types of pain, develops new strategies for its prevention, diagnosis and management and develops innovative care for patients. A special emphasis will be on thalamic pain.	Dr. Akbar Panju	Neurological, Pain	www.fhs.mcmaster.ca/paininstitute/index.html		
Hamilton Health Sciences, McMaster University	Escarpment Cancer Research Institute (ECRI)	The ECRI brings together cancer research groups from McMaster University, Hamilton Health Sciences, and the Juravinski Cancer Centre, with promise to embrace and grow the opportunities for synergies in cancer research.	Dr. Mark Levine	Oncology, Clinical Trials			
McMaster University, Hamilton Health Sciences	Offord Centre for Child Studies	Our research is dedicated to improving the life quality and life opportunities of the one in five Canadian children and youth who suffer from serious social and emotional problems.	Dr. Harriet MacMillan (acting)	Mental Health, Child Development, Autism	www.offordcentre.com		
Hamilton Health Sciences, McMaster University	Population Health Research Institute (PHRI)	To conduct trans-disciplinary research to improve major health outcomes in common and neglected conditions affecting Canadians and populations across the world.	Dr. Salim Yusuf	Clinical Trials, Digestive Disease, Cardiovascular Disease, Infectious Disease, Neurological Disorders, Endocrine Disorders	www.phri.ca		

Research Leadership

Organization(s)	Center/Institute	Description	Director	Area(s) of Expertise / Key Word(s)	Website	Alt Contact	Notes
Hamilton Health Sciences, McMaster University	Thrombosis and Atherosclerosis Research Institute (TaARI)	To reduce death and disability from thrombotic diseases by conducting research into the pathogenesis, prevention, diagnosis and treatment of thrombosis and vascular disease.	Dr. Jeff Weitz	Vascular Disease, Medical Devices, Clinical Trials	www.taari.ca		
St. Joseph's Healthcare Hamilton, McMaster University	Centre for Surgical Innovation and Innovation (CSii)	Develop and commercialize a new class of robotic platforms for image targeted and less invasive surgical and medical interventions.	Dr. Mehran Anvari (Scientific Director)	Surgical Robotics	www.csii.ca	Liane Stefurak (Executive Director)	Not for Profit Centre of Excellence
St. Joseph's Healthcare Hamilton, McMaster University	Biostatistics Unit	Provides statistical support tailored to the needs of researchers at various stages of the research process: planning, implementation, analysis and reporting.	Dr. Lehana Thabane	Biostatistics	www.stjoes.ca/default.asp?action=article&ID=1978;http://www.thecem.net/biostat_intra.php		
Hamilton Health Sciences, McMaster University	Centre for Minimal Access Surgery (CMAS)	A state-of-the-art multi-disciplinary technological education and research centre, designed to increase the awareness, as well as support the research and development, of the specialized techniques of minimal access surgery and surgical innovation.	Dr. Mehran Anvari	Surgery	www.cmas.ca		
Hamilton Health Sciences, McMaster University	Firestone Institute for Respiratory Health (FIRH)	Closely integrated clinical, research and educational activities focusing on respiratory health, disease and care. Research is wideranging including basic and clinical investigations with the expectation of improving patient care.	Dr. Paul O'Byrne	Respiratory, Immunology	www.fhs.mcmaster.ca/firh		
St. Joseph's Healthcare Hamilton, McMaster University	Imaging Research Centre (IRC)	Service provider for research use - 3T MR, PET/CT Dr. Medical Imaging, Diagnostics	Michael D. Noseworthy	Medical Imaging, Diagnostics	www.ece.mcmaster.ca/~mikenose/web/HOME.html		
St. Joseph's Healthcare Hamilton, McMaster University	Hamilton Centre for Kidney Research (HCKR)	Mandate to combine expertise in clinical and basic research to reduce the risk of kidney disease and its complications.	Dr. Richard C. Austin	Nephrology	www.hamiltonkidneyresearch.ca		
St. Joseph's Healthcare Hamilton, McMaster University	Programs for Assessment of Technology in Health (PATH)	Mission to improve population health by conducting and promoting evidence-based evaluations of the effectiveness and efficiency of new & existing health care technologies. PATH's educational and research activities are separated into 5 primary programs: the FieldEvaluation and Economic Assessment Program (FEEAP); the HealthTechnology Assessment Program (HTAP); the Trial and EconomicModelling Methodology Program (TEMMP); the St. Joseph's Healthcare Hamilton (SJHH) Health Technology Assessment Appraisal & Review Program (SHARP); and the Health Technology Assessment Educational Learning Program (HELP).	Mr. Ron Goeree	Health Economics, Health Policy, Technology Assessment	www.path-hta.ca/Home.aspx; www.thecem.net/path.php		
St. Joseph's Healthcare Hamilton	Clinical Research Network (CR Net)	Formed to bring clinical research team members from many research areas together for the purpose of research education through presentations, networking ect.		Clinical Trials	www.stjoes.ca/default.asp?action=article&ID=1143		

Research Leadership

Organization(s)	Center/Institute	Description	Director	Area(s) of Expertise / Key Word(s)	Website	Alt Contact	Notes
Mohawk College	Mohawk Applied Research Centre (MARC)	MARC plays a vital role in the college and the community. We foster a culture of collaboration, learning, & innovation - essential skills for identifying and solving relevant problems. Includes the MARC Health Informatics Electronic Health Record (MARC-HI EHR) project.	Ted Scott (Dean, Applied Research & Chief Innovation Officer)	eHealth, Informatics	www.mohawkcollege.ca/about/research/marc.html		
Mohawk College	iDeaWORKS	iDeaWORKS is a project centre based on partnerships between Mohawk students and start-ups, small businesses and non-profit organizations. Together, we work on the design, development, testing and commercialization of new products and technologies. Home of Mohawk eHealth Development and Innovation Centre (MEDIC).	Ted Scott (Dean, Applied Research & Chief Innovation Officer)	eHealth, Informatics	www.mohawkcollege.ca/iDeaWORKS		

Leadership

McMaster University	Dr. Mohamed Elbestawi Vice-President,	Research & International Affairs
McMaster University	Dr. Fiona McNeill Associate Vice-President,	Research
McMaster University	Mr. Nick Marketos Assistant Vice-President,	Research Partnerships
McMaster University	Dr. Peter Mascher Acting Associate Vice-President,	International Affairs & Associate Dean (Research and External Relations), Faculty of Engineering
McMaster University	Dr. Stephen Collins Associate Dean (Research),	Faculty of Health Sciences
McMaster University	Dr. Gianni Parise Associate Dean Research and External Relations,	Faculty of Science
McMaster University	Mr. Greg Weiler	Director, Health Research Services
Hamilton Health Sciences	Dr. Salim Yusuf	Vice President of Research
Hamilton Health Sciences	Dr. Heather Arthur	Chief Scientific Officer
Hamilton Health Sciences	Mr. Frank Naus	Director of Research
St. Joseph's Healthcare Hamilton	Dr. Mark Crowther	Vice President Research
St. Joseph's Healthcare Hamilton	Ms. Dori Kazimer	Director, Research Administration
Mohawk College	Mr. Ted Scott	Dean, Applied Research

Other Leadership

Organization	Description	Contact	Website
McMaster Industry Liaison Office (MILO)	The McMaster Industry Liaison Office (MILO) supports the research endeavors of McMaster University and its affiliated hospitals, Hamilton Health Sciences and St. Joseph's HamiltonHealthcare by facilitating collaborative research with industry partners and disseminating research results through commercialization. MILO is a unit of the Research and International Affairs Office at McMaster University.	Elsie Quaite-Randall (Executive Director)	www.milo.mcmaster.ca/
Innovation Factory (iF)	Located in Hamilton, Ontario and networked across North America, Innovation Factory is a not-for-profit Regional Innovation Centre (RIC) funded by the Ontario Network of Excellence (ONE). We believe in a New Hamilton, a city that's becoming recognized as a global centre of innovation. We believe it's not the business you're in that's innovative, it's the way you do business. As the spirit and skills of innovation permeate our traditional and advanced industries alike, Hamilton will become unstoppable.	Ron Neumann (Executive Director)	www.innovationfactory.ca/
Canadian Society of Medical Laboratory Science (CSMLS)	The Canadian Society for Medical Laboratory Science (CSMLS) is the national certifying body for medical laboratory technologists and medical laboratory assistants, and the national professional society for Canada's medical laboratory professionals. We are a not-for-profit organization that is funded entirely by membership dues and revenues from goods and services. We do not receive operational funding from governments or other organizations.	Christine Nielsen (Chief Executive Officer)	www.csmls.org/
Golden Horseshoe Manufacturing Network (GHMN)	The Golden Horseshoe has a long, proud history in manufacturing and the Golden Horseshoe Manufacturing Network (GHMN) has been formed to ensure the future of manufacturing. Formed through a partnership between McMaster University, City of Hamilton, and the Regions of Halton and Niagara.	Gillian Sheldon George Wright Anne-Marie Harte Nick Markettos Elaine Holding	www.ghmn.org/
CanmetENERGY	CanmetENERGY is the Canadian leader in clean energy research and technology development. With over 450 scientists, engineers and technicians and more than 100 years of experience, we are Canada's knowledge centre for scientific expertise on clean energy technologies.	Dr. Jennifer Jackman (Director General)	www.canmetenergy.nrcan.gc.ca/home

Life Sciences in Hamilton

Appendix C: Private Sector Company Directory

Prepared by Workforce Planning Hamilton for the Life
Sciences Sub-Committee of the Hamilton Chamber of Commerce

April 2013 (Updated November 2013)

OVERVIEW

This directory has been prepared by Workforce Planning Hamilton to provide insight into the current research and commercialization expertise of Hamilton's private sector life science businesses. The labour market profile, *Growing the Potential of Life Sciences in Hamilton*, was released by WPH in March 2013 which details the current workforce challenges and opportunities for Hamilton's life sciences cluster.

Identifying Life Science Companies

Life Sciences Businesses in Hamilton by Employee Size Range (Canadian Business Patterns June 2012)

OWNER OPERATED	1-4	5-9	10-19	20-49	50-99	100-199	200-499	500+	TOTAL
132	66	42	22	23	10	3	0	0	298

June 2012 Canadian Business Patterns data estimates there could be upward of 298 businesses (both public and private) operating within the cluster¹. Of these businesses, 132 indicated they were owner-operated, while the remaining 166 had employees. However, a search of the City of Hamilton Economic Development contacts, YLM directory, BIOTECanada directory (canadianlifesciences.com), Industry Canada and the 2002 Hamilton Biotechnology Profile yielded a result of 31 separate private sector businesses that are currently operating in Hamilton.

On page 33, WPH and the Chamber also conducted a longitudinal analysis for growth between 2011 and 2013. The data analysis demonstrates a 12% growth in Life Sciences sector for "employer businesses" (those that report at least one employee on a payroll) and an even more significant increase of approximately 100 businesses in the "indeterminate" category, which are registered business that do not maintain a steady payroll or employ contract workers while reporting an income of at least \$30,000 per annum.

The information presented here was gathered either directly from the business or the company's public website. If any information is incorrect or outdated, please let us know. Not included are any direct contacts WPH made with these businesses.

¹ Estimated at the 4 digit NAICS level. Life science industries go as detailed as 6 digits; therefore, some of the 298 businesses would not be life sciences.

Appendix C

Number of Employers -Life Sciences

	2011		2012													2013	
	Total (A)	Indeterminate (B)	Total (A)	Indeterminate (B)	Subtotal (A-B)	1-4	5-9	10-19	20-49	50-99	100-199	200-499	500+	Total (A)	Indeterminate (B)		
Column1																	
Agricultural Biotechnology	176	84	191	94	14	32	22	17	14	4	3	0	0	301	182		
Industrial Biotechnology	12	2	12	1	10	5	3	1	0	1	0	0	0	12	1		
Medical Devices	11	6	9	5	5	0	3	0	1	1	0	0	0	7	4		
Medical Equipment and Supplies	38	7	38	6	31	12	10	3	3	2	2	0	0	28	5		
Pharmaceuticals and Related Man	6	3	4	2	3	1	0	1	1	0	1	0	0	6	3		
Research Services	45	25	44	24	20	10	5	2	3	0	0	0	0	45	22		
	288	127	298	132	161	60	43	24	22	8	4	0	0	399	217		
Column1																	
Agricultural Biotechnology			191	94	1-4	5-9	10-19	20-49	50-99	100-199	200-499	500+					
Industrial Biotechnology			12	1	11	6	2	1	1	1	0	0					
Medical Devices			9	5	4	0	2	0	1	1	0	0					
Medical Equipment and Suppli			38	6	32	15	9	2	3	3	0	0					
Pharmaceuticals and Related M			4	2	2	1	0	0	1	0	0	0					
Research Services			44	24	20	10	6	2	2	0	0	0					
			298	132	166	66	42	22	23	10	3	0					
Column1																	
Agricultural Biotechnology			301	182	1-4	5-9	10-19	20-49	50-99	100-199	200-499	500+					
Industrial Biotechnology			12	1	11	7	1	1	0	2	0	0					
Medical Devices			7	4	3	0	2	1	0	0	0	0					
Medical Equipment and Suppli			28	5	23	9	7	2	3	2	0	0					
Pharmaceuticals and Related M			6	3	3	1	0	1	1	0	0	0					
Research Services			45	22	23	8	7	6	1	1	0	0					
			399	217	182	67	48	29	24	9	4	1					

Activation Laboratories Ltd

www.actlabs.com



Expertise: Development and Research Laboratory

Activation Laboratories Ltd. (Actlabs) was founded in 1987 by Dr. Eric Hoffman. The laboratory grew to provide contract analytical services to a variety of market segments. The Life Sciences Division was established in 2003 and has evolved to offer a full suite of developmental, CMC and research laboratory services for the Life Sciences market. Clients include Pharmaceutical, Biotech, NHP, Medical device and Cosmetic companies world-wide.

The ISO 17025 accredited and Health Canada licensed GMP laboratories have also been inspected by FDA several times. Actlabs prides itself on being Technology Pioneers and were awarded an Innovation award by the Federal Government in 2009. Drawing from their expertise in the fields of pharmaceutical analytics, biotechnology analytics and agriculture testing, their Life Sciences group offers scientific expertise across many platforms. Their core vision is to concentrate on development and delivery of novel analytical assays, bioassays and pioneering technologies in conjunction with our academic and industry partners, while meeting regulatory compliance. With over 300 employees in our headquarters in Ancaster and over 1000 world-wide, Activation Laboratories continues to deliver excellence in all markets served.

Adiga Life Sciences Inc

www.adiga.ca



Expertise: Development and Commercialization of Medical Science and Technology Research

Based out of the McMaster Innovation Park, Adiga Life Sciences is a joint venture formed by McMaster University and UK-based Circassia Ltd. Adiga was originally formed in 2008 to act as a vehicle for the growing scientific collaboration between Circassia and McMaster in the field of allergy research. The Directors of Adiga further recognize that there is a real opportunity for companies able to identify and commercialize promising early stage medical technology projects. Adiga therefore has a wider mission to provide the management guidance and funding required to demonstrate proof of concept for projects of interest in a way that will resonate with potential industrial partners. Adiga also attracts revenue by offering management services for medial development projects being conducted in Canada.

Adjuvant Informatics Corporation

www.medtel.on.ca/index.php/adjuvantinformatics



Adjuvant Informatics
CORPORATION
A Clinical Anesthesia Informatics Company

Expertise: Anesthesia Software Products

Adjuvant Informatics was founded by an anesthesiologist and a software engineer with the goal of producing high quality software products that are optimized for all the needs of an anesthesia department. Adjuvant is a Canadian company with worldwide installations of its clinical applications. Their primary mission – “Improving Patient Outcomes Through Knowledge” – is achieved by improving clinical efficiency with digital systems, facilitating quality assurance, reducing costs, enabling benchmarking of facilities, and improving patient safety.

Affinity Biologicals Inc

www.affintiybiologicals.com



Affinity Biologicals™ INC.

Expertise: Primary Manufacturing of Products used in Thrombosis and Hemostasis Research and Medical Diagnostics

Affinity Biologicals Inc. (Affinity) was founded in 1987 by the principals Hugh and Patricia Hoogendoorn. With a strong background in hemostasis research and a focus on reagent development, Affinity has become a primary manufacturer of more than 250 reagents and kits used in hemostasis and thrombosis research and diagnostics. Their product line includes: coagulation related antibodies, matched-pair antibody sets for ELISA, depleted/deficient plasmas, protease inhibitor deficient plasmas, the VisuLize™ line of complete ELISA kits and the VisuCon™ & VisuCal™ coagulation controls and calibration plasmas. All Affinity Biologicals products are manufactured in their Ancaster, ON facility, products are sold direct in North America and worldwide through a network of branded and private-label distributors. **does not want to be in a public directory*

Apollonia Health Inc

www.apolloniahealth.com



Innovation Factory

Expertise: Oral Healthcare Biotechnology

Apollonia Health researches and develops innovative oral hygiene products that can safely and selectively eliminate cavity causing bacteria. Our company manufactures revolutionary oral healthcare products made only with naturally occurring ingredients. Because of this, our products can be used safely by children. Apollonia Health will release its first products to oral healthcare practitioners in Canada in the summer of 2013.

Bay Area Research Logistics

www.barl.ca



Expertise: Clinical Trial Logistics

Bay Area Research Logistics (BARL) is a global, clinical trial logistics organization focused on helping the global healthcare industry to successfully develop new medications and treatments. BARL evolved initially as a clinical trial logistical partner for some of Canada's leading researchers at Hamilton Health Sciences (HHS). While continuing to partner strongly with HHS, growth since inception in 2007 in capacity and expertise has allowed BARL to deliver quality, specialized services to many additional research institutions, pharmaceutical organizations and investigator initiated trials, on a global basis.

Cellometrics Inc

www.cellometrics.com

CELLOMETRICS INC

Expertise: Commercialization of Medical Product

Cellometrics was formed in 2007 to commercialize an established test method and novel kit initially developed and applied at the Firestone Institute for Respiratory Health at St Joseph's Healthcare Hamilton. In conjunction with McMaster University. The company's core product, the Accufilter® test kit, standardizes and simplifies the processing of sputum for examination. The Cellometrics team has extensive experience in applying quantitative measurements to accurately diagnose and treat common diseases of the airways of the lungs. The company is focused on the most comprehensive, specific and clinically applicable measurement of the airway inflammation component of these diseases- quantitative sputum inflammatory cell counts.

Genesis Health Light

www.genesishealthlight.com



Expertise: Research and Development- Medical Devices

The Genesis Pain Relief Light™ is an effective Health Canada licensed and FDA approved medical device that alleviates pain and stimulates healing at the cell level by concentrating broad spectrum light through an innovative water based filter.

Hamilton Medical Research Group

www.hmrg.org

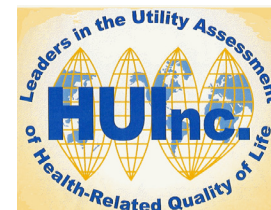


Expertise: Drug Development and Commercialization

HMRG delivers a unique partnership in drug development and commercialization through working with our partners in development and introduction of safe and effective medicines that improve lives of Canadians. Our expert network of scientists and medical professionals, demonstrates our clinical expertise, to provide an in-depth understanding and execution of clinical research for Canadian and International results. We leverage this network for expert opinion and expert support to deliver marketing and medical objectives for new and existing products.

Health Utilities Inc

www.healthutilities.com



Expertise: Research and Development

Health Utilities Inc specializes in preference-based (utility) measures of health-related quality of life for use in describing treatment processes and outcomes in clinical studies, economic evaluations of health care programs and the measurement and monitoring of population health. HUInc provides support services for the Health Utilities Index measurement systems.

Hemostasis Reference Laboratory Inc

www.hemostasislab.com



Expertise: Laboratory Testing Services

The Hemostasis Reference Laboratory (HRL) is a Canadian Laboratory with over 20 years of experience in providing quality coagulation testing services to customers internationally. HRL is located in the Research Centre within the Juravinski Hospital in Hamilton, Ontario, a centre of excellence for the diagnosis and treatment of thrombosis. HRL offers a complete range of testing for clinical trials, sample analysis, research projects, product evaluation, value assignments, instrument validation, and more servicing pharmaceutical companies, diagnostic manufacturers, veterinarians, and researchers.

INO

www.icebiotech.com

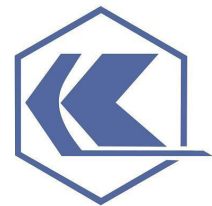


Expertise: Design and Development- Optics and Photonics

Headquartered in Quebec, INO is a technological design and development firm for optic and photonic solutions for SMEs and large corporations. INO offers a complete range of integrated services in the fields of optics/photonics to clients of all descriptions in every field of industrial activity.

Lukang America Pharmaceuticals Ltd

www.lukangamerica.com



Expertise: Antibiotic Production

Established in 2001, Lukang America Ltd is a corporation which supplies the services on modification of the industrial production strains via the genetic engineering, impurity isolation and identification and direction on the GMP.

Marchese Health Care

www.marchesehealthcare.ca



Expertise: Pharmacy and Medical Supplies

Marchese Health Care takes pride in delivering quality products and services with a strong commitment to client-centred care. In addition to their dispensing pharmacy, they reach out to patients receiving care in their homes with infusion therapy services, a wide range of medical supplies and specialized medication programs. Their head office is located in Hamilton, and they have offices and distribution centres in both Kitchener and Mississauga.

Microstar Biotech Inc

www.msbiotech.com

MICROSTAR BIOTECH INC.

Expertise: Research and Development of Frost Protectant for Fruit and Vegetables

Founded in 1999, they conduct research, develop and market frost protectant for fruit and vegetable growing.

Niagara Pharmaceuticals

www.niagarapharmaceuticals.com



Expertise: Health and Safety Products

Products include anti-fog lens cleaner, anti-static solution, coated lens cleaner, lens cleaning tissue, eye/skin neutral wash, eye patches, light shields, eye wash irrigation, ear drops, ear plugs, swim nose clips, antiseptics, disinfectants, eyewear accessories.

OptumInsight

www.optuminsight.com



Expertise: Consultants in Pharmaceuticals, Medical Devices, and Biotechnology Products

Formerly CanReg, OptumInsight is a leading consulting firm that specializes in providing the pharmaceutical, and medical device industry with assistance in gaining regulatory approval and market access. More than 100 in-house consultants and staff support our pharmaceutical, biotechnology and medical device clients around the world. Our senior consultants have more than 30 years experience dealing with FDA, Health Canada, and European regulatory agencies.

Rotsaert Dental Laboratory Services Inc

www.rotsaertdental.com



Expertise: Dental Laboratory

Established in 1963, Rotsaert Dental Laboratory Services provides prosthesis and services to the restorative dental practice. They provide a full complement of restorative prostheses, including crown and bridge, implants, dentures and cast partials.

Sensible Life Products
www.benefect.com



Expertise: Botanical Disinfectant

Sensible Life Products is a leader in next-generation botanical antimicrobial technology. Their active ingredient is a highly specialized thyme oil that has been specially grown and blended, which they have been advancing for almost ten years.

Stryker Canada
www.stryker.ca



Expertise: Medical Devices

Stryker Canada was incorporated in 1990, and is a leader in the worldwide orthopaedic market and is one of the world's largest medical device companies. Stryker delivers results through a wide range of capabilities including joint replacements, trauma, spine and micro implants systems, orthobiologics, powered surgical instruments, surgical navigation systems, endoscopic products as well as patient handling and emergency medical equipment.

Face the World Cosmedics
(Formerly Take Control Cosmedix)
www.takecontrolcosmedix.com



Expertise: Camouflage Therapy and Prosthetic Reconstruction

Formerly Take Control Cosmedix, Face the World Cosmedics is a leading camouflage therapy and prosthetic reconstruction company. Since 2000, it has worked with the medical community to treat individuals with severe skin conditions and develop new ways to treat unusual cases. Recently, a new camouflage therapy clinic was opened in the Hamilton Hospitals Assessment Centre. The company is the only one working with Chedoke McMaster Hospital and has been approved for treatment plans from insurance companies to help in the rehabilitation of their patients.

Titan Medical Inc
www.titanmedicalinc.com



Expertise: Research and Development Facility- Robotic Surgery

Headquartered in Toronto, Titan Medical has a research and development facility in Ancaster. Titan Medical is focused on the design, development and commercialization of new robotic surgical technologies. The Company is advancing the development of a robust product portfolio with the objective to meet current needs in surgical procedures which would benefit all stakeholders, including patients, surgeons, and hospitals. The Company currently has under development platforms for singlesite and multi-port surgical procedures that are under-served by robotic and non-robotic minimally invasive techniques.

VitaSound Audio Inc
www.vitasound.com



Expertise: Audio-Enhancement Technology Company

VitaSound Audio Inc is an audio-enhancement technology company which develops and brings to market advanced audio solutions that enhance the quality of life for the boomer generation. Utilizing leading-edge brain science, their patented Neuro-Compensator is a 'best-in-class' technology, which significantly improves the listening experience by improving the clarity, crispness and naturalness of sound.

APPENDIX D

Supplementary proposal to the LSSC Report by Innovation Factory Recommendations to Phase 2 Group

Goals & Outcomes of Group

- Identify common problems that can be solved with joint ventures that minimize resources required from each, and maximize benefits for all parties involved. Identify Hamilton's comparative advantages in Life Sciences, so that we can help them focus around developing commercially viable solutions to existing problems, as well as existing strengths. (eg. We can't be everything to everyone, so who are we going to be?; Need a clear identity/brand)Needs to be a flexible organization that has the ability to respond to the demands and needs of our regional industry and capitalize on the opportunities that exist and will show up in the future.

How it will work

- Garner support from primary stakeholders to meet regularly and pursue the development of building a life sciences cluster in Hamilton
- An executive must be established to:
 - a. Identify shared challenges; availing opportunities for collaborative solutions
 - b. Identify comparative advantages in the region
 - c. Outline specific goals within short, medium, and long-term periods to develop cluster
- Re-engage secondary stakeholders to develop action-based subgroups

Proposed Participants (10-15)

Senior Leadership from the following institutions:
Hamilton Health Sciences (CEO)
St. Joseph's Health Care (CEO)
McMaster University (President)
Mohawk College (President)
Municipal Government (EcDev)
Intermediary Agencies (iF, MILO, Chamber)
Private Sector Partners (2-3)
Bay Area Health Trust
McMaster Innovation Park
Hamilton Niagara Haldimand Brant LHIN