

Innovation and Knowledge Flows in the Financial Services and ICT Sectors of the Toronto Region

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Introduction

This report presents the key findings of a recently completed study of innovation processes within the financial services sector of the Toronto region. It examines the flows of knowledge and technology between the information and communications technology sector (ICT) and financial services sector within the GTA, and how these flows contribute to the innovation process.

The study was conducted as part of a five year project on the nature of innovation, as well as the role of talent and creativity in sixteen city regions across Canada undertaken by members of the Innovation Systems Research Network (ISRN). Key goals of the broader ISRN project were to understand the role of networks within the city region, as well as the labour market dynamics, and the specialized organizations that stimulate innovation by promoting the circulation of knowledge between firms and across industry sectors in the regional economy. The ISRN Project also examined the relative importance of local versus non-local sources of innovative ideas and technology for innovation within the city-region.¹

This current study of the innovation linkages between the financial services sector and the ICT sector in the Toronto region asks the same questions as the ISRN national study. The primary aim of this research is to provide the Ontario Ministry of Research and Innovation (MRI), the Toronto Region Research Alliance (TRRA), the City of Toronto, and the Toronto Financial Services Alliance, (TFSA) with strategic insight into the nature of the innovation process in these two sectors. It seeks to identify areas of existing innovative strengths among firms within each sector, and the opportunities to further enhance the linkages between firms in and across the sectors. A secondary objective is to explore issues related to talent attraction and retention, in particular with respect to the interface between ICT and financial services. This study is unique in that it explicitly sets out to explore the interactions of two different sectors – ICT and Financial Services; each of which has been identified as a key cluster in the Greater Toronto region.

Research Questions

In light of these broad objectives, four specific research issues were identified for the present study: (1) the nature of innovation within financial services; (2) the contribution of information and communication technologies to innovation in this sector; (3) the extent of linkages between the financial services and ICT sectors in the GTA; and (4) the relative importance of the co-location of the two sectors within the GTA for innovation in financial services.

The first question was *how is innovation viewed within the financial services sector, and based on this understanding, how innovative are Canadian financial services firms?* We sought to determine what innovation means in the context of the financial services industry and discuss the scope of internal and external firm factors that affect innovation within the financial services industry. The second question was *how does the financial services sector use information technology to make its firms more innovative and competitive?* The study examined the significance of information and communication

¹ An overview of the key findings from the ISRN study can be found in David A. Wolfe, *21st Century Cities in Canada: The Geography of Innovation*. Ottawa: The Conference Board of Canada, 2009. More information about the broader ISRN study can be found online at: www.utoronto.ca/isrn.

technologies to the innovation agenda of financial services firms in the Toronto region, and the spectrum of ICT products and services that are in high demand by the financial services industry. The third question was *what is the nature of the relationship between the financial services and the ICT sectors?* We investigated the nature of knowledge flows within and between the two sectors which entailed focusing on the development of innovative ideas and the outsourcing of expertise, the potential for partnerships and collaborations within and between the ICT and financial services sectors, as well as the complexities of the financial services-ICT vendor relationship and the ICT-financial services client relationship. The fourth question was *what are the advantages of the co-location of financial services and ICT firms in the Toronto region?* To this end, the study reviews the potential advantages to be gained by firms in both sectors from their location in the Toronto region, and more specifically, the extent to which co-location has had an impact on the development of innovation networks as well as talent attraction and retention in the Toronto region.

The study began with the hypothesis that the combined strength of the financial service and ICT sectors, including the presence of public and private sector research centres, creates distinct advantages for the Toronto region, and that these are underexploited due to a lack of awareness and underdevelopment of key linkages. The findings presented in this report are based on 60 key actor interviews across the two sectors. All quotes in the report are taken from those interviews.

The Financial Services and ICT Sectors in the Toronto Region

Financial services and information and communications technology represent two of the largest and most dynamic sectors in the GTA. As such, they are among the largest employers in the regional economy and are central in the development the economic strategies of the various levels of government in the region. The following section provides an overview of the key features of the two sectors.

Financial Services in the Toronto Region

In 2011, the Toronto region ranked in the top 10 group of financial centres globally. According to the *Global Financial Centres Index*² released in September 2011, Toronto placed 10th overall and ranks in the top ten for six key industry segments: Asset Management, Banking, Government and Regulation, Insurance, Professional Services and Wealth Management/Private Banking. A second report, *Cities of Opportunity*,³ published in May 2011 by PwC and the Partnership for New York City

² The Global Financial Centres Index (GFCI) was first produced by the Z/Yen Group in March 2007 following another research project into city competitiveness undertaken in 2005. The aim of the GFCI is to examine the major financial centres globally in terms of competitiveness. For more information on the March 2011 publication: <http://www.zyen.com/PDF/GFCI%2010.pdf>.

³ The Cities of Opportunity study analyzes and ranks how 26 global centers of finance, business and culture perform across 10 key indicators. In the 4th edition, New York leads the report, but is followed closely in the top five by Toronto, San Francisco, Stockholm and Sydney—cities more notable for quality of life and balance than global business dominance. See *Cities of Opportunity, 2011*, 4th edition, p. 14 and 20, 23, 47. <http://www.pwc.com/us/en/cities-of-opportunity/2011/pdfdownload.jhtml>.

ranked Toronto second in the world after New York City as a financial capital. In this study, Toronto scored particularly high in two key categories: Intellectual Capital and Innovation, and Health, Safety and Security.

These rankings reflect the fact that Toronto is home to the vast majority of Canada's largest financial services companies. According to the TFSA, the major financial institutions based in the Toronto region include: 10 Domestic Banks, 18 Foreign Bank Subsidiaries and 21 Branches of Foreign Banks; 129 Securities Firms, 60 Life Insurers including two of the largest 10 global life insurers; and 130 Property and Casualty (P&C) Insurance companies, including three of the four largest P & C insurers in Canada. It is also the headquarters for the majority of the \$700 billion investment management industry and is a major pension management hub with three of Toronto's public pension plans ranking among the top 60 in the world. Toronto is also a growing host of financial services technology providers, including CIBC Mellon, State Street, RBC Dexia, Citco, UBS, Northern Trust, Goldman Sachs, and Bank of America Merrill Lynch Technology Centre.

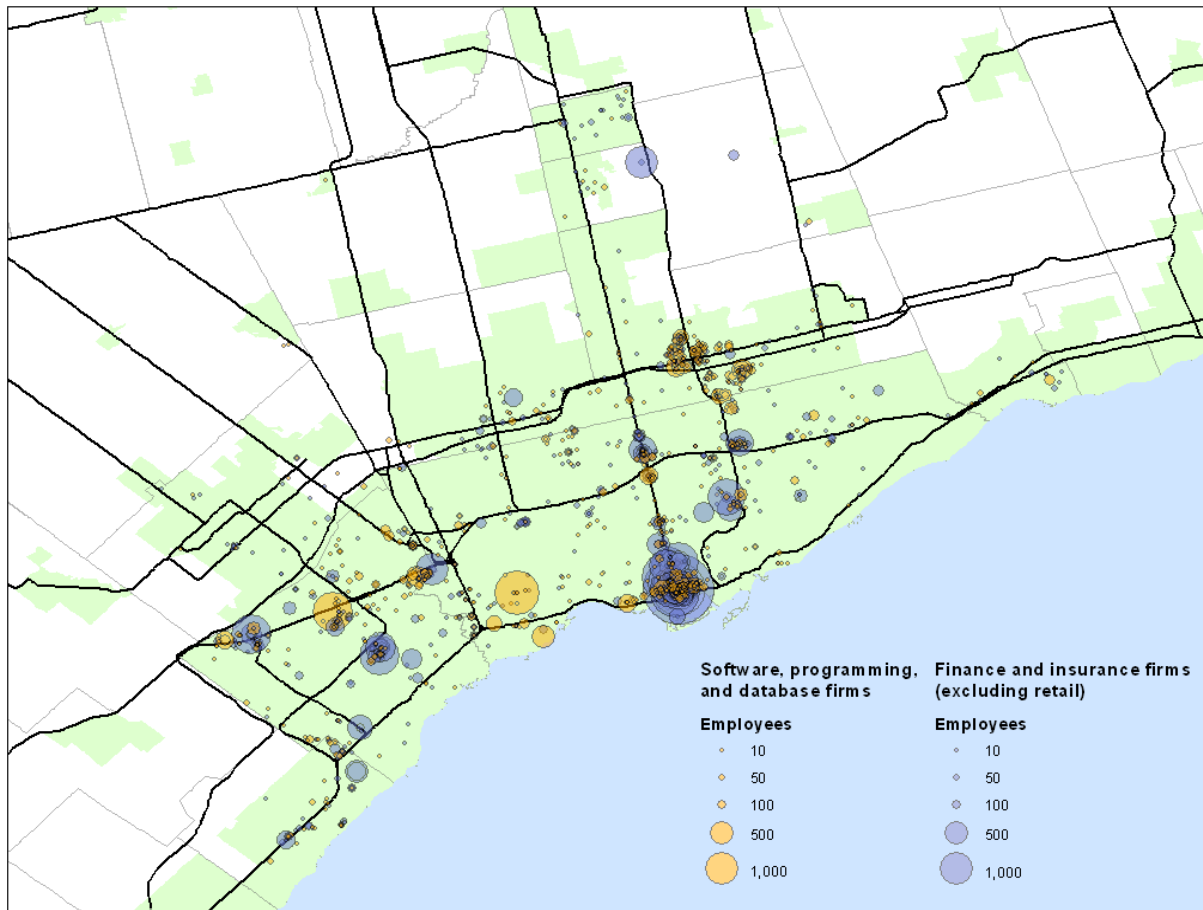
Most of the firms in the financial services industry are included in Section 52 – Finance and Insurance of the North American Industry Classification Scheme (NAICS). This includes depository institutions such as banks and credit unions; non-depository institutions such as credit card issuers and consumer lending; securities and commodity brokers, and exchanges; insurance carriers, agencies and brokerage; pension funds and other funds and investment vehicles. According to the latest data available from the Toronto Financial Services Alliance, there are 232,200 people employed in the sector. Overall Toronto has the 3rd largest concentration of financial services employment in North America, after New York and Chicago.

Using data from the Local Indicators for Economic Analysis Database, developed by researchers at PROGRIS at the University of Toronto, we are able to map the precise location of the financial services firms in the Toronto region. While the sector clearly has its strongest concentration in the Central Business District (CBD) in downtown Toronto, the extent to which the financial services firms are distributed throughout the region is striking.⁴

⁴ This is due to a variety of factors, including the integrated financial services firms to locate some of their key functions in parts of the region with lower rents than are paid in the CBD. Real estate costs are also lower outside the CBD, but a number of respondents pointed to the importance of having head office in the CBD. In addition, a growing security concern over security issues is also leading to a dispersal of some of the key infrastructure sites outside of the CBD. A number of those interviewed said that growing concerns about security is one reason to explain the location of data centres outside of the city.

Figure 1

Location of Financial Services and ICT Firms in the Toronto Region



Notes: Finance: NAICS = 5231; 5232; 5239; 5241; 5242; 5251; 5259 (excluding retail: 5231; 5232; 5233)
 ICT: NAICS = 5112; 5182; 5415

The ICT Sector in the Toronto Region

The Information and Communications Technology (ICT) sector is another major component of Toronto’s economy. The sector employs 161,000 people in the City of Toronto, in 11,500 firms. Unlike the financial services sectors, however, where the firms tend to be large, the vast majority of firms in this sector have fewer than 50 employees (City of Toronto 2010).

The financial services industry is one of the largest consumers of information and communication technologies and services, and these tech products and services are transforming the region’s financial services sector, enabling financial services firms to meet the needs of consumers; to more efficiently identify risks and opportunities; to reach a wider market, and to enhance competitiveness (Toronto Economic Development 2001). According to data compiled by the Canadian Bankers Association, the largest banks alone collectively spent \$55.8 billion on

technology between 1996 and 2009 with the bulk of this spending concentrated in the Toronto region. The ICT industry in the Toronto region earns 16 per cent of its sales from financial and business services.

Over the past several decades, Canada's larger financial institutions have consolidated their suppliers and vendors, with a focus on global corporations earning upwards of a billion dollars in revenue annually. Examples of global firms who sell to the financial services industry in the Toronto region include SAP, Oracle, IBM, HP, Cisco, CGI, and Microsoft. There are also smaller Toronto-based ICT vendor firms who provide niche solutions to the financial services sector, but they are often faced with reluctance on the part of the financial services firms to adopt new innovations or as yet unproven ICT solutions. Toronto-based ICT firms will frequently first seek entry into the U.S. marketplace to demonstrate the viability and market acceptance of their products. With its substantially larger market and numerous independent financial companies, the U.S. appears to offer a greater opportunity to supply technology infrastructure and software solutions. Once a firm has secured an initial client, they have a better opportunity to demonstrate the value that their product or service may hold for firms in the Toronto market.

One strategy for entering the sector successfully adopted by some of the smaller Toronto-based vendors is through working with systems integrators and consulting firms whose banking and capital market clients are undergoing large projects requiring multiple inputs from a variety of specialized service providers. Systems integrators with a local presence such as Deloitte, Accenture, FIS, and Adastral help technology start-ups to penetrate the market. Global system integrators and suppliers have the connections and necessary capital, not only to meet demand, but to earn the confidence of this customer base, and to cover potential liabilities. A partnership of this nature, in turn, can increase the brand recognition of the niche solution firm, and benefit the major ICT vendors and global solutions providers who may be too large to offer a niche service directly to their Canadian clients. One example is the partnership between Broadridge, a large technical infrastructure and multi-service provider, and a Markham-based document management firm, DOXIM, who partner to offer specialized services to Toronto's investment management sector.

Regardless of the method of entry, for both large and small ICT firms to be successful in the local vertical, any new business venture must be cognizant of the needs of the client in financial services; be sensitive to the regulatory environment, and, most importantly, address a topical and common industry problem through a customizable solution.

Innovation in Financial Services

Canada's Science, Technology and Innovation Council (STIC) defines innovation as "the process by which individuals, companies and organizations develop, master and use new products, designs, processes and business methods. These can be new to them, if not to their sector, their nation or the world" (2011 vi). According to the OECD, it includes the introduction of new or significantly improved products, processes and methods that impact an organization, industry and/or an entire ecosystem of networks and in turn drives development and prosperity. Innovation is a highly interactive and multidisciplinary process, requiring and facilitating institutional interdependencies, locally and globally (OECD 2010).

Analyses of the innovation process identify several different types of innovation. The recently revised Oslo Manual of the OECD differentiates between four different types that are now included in national innovation surveys: product innovation involves the introduction of a good or service that is entirely new or has significantly improved characteristics or uses; process innovation refers to the adoption of a new or significantly improved method of production or method of delivering a service; organizational innovations include a new method of organizing the firm's business practices, the organization of its workplace, or its relations with other firms or outside organizations; and finally marketing innovations include new developments in the design or packaging of the firm's products, the channels for distributing products to the marketplace, their promotion and their pricing. All four types of innovation involve a degree of novelty, whether the innovation being introduced is the first in the world or merely new to the firm itself (OECD 2005).

Students of innovation also adopt a simple two-fold classification scheme that distinguishes between incremental (or minor) innovations and radical or (major) innovations. Incremental innovations happen as a regular part of economic activity throughout the various branches of industry. This type of change frequently emerges out of the interaction of engineers and production designers involved in the manufacture of a product or the provision of a service, or may arise from suggestions made by the end users of the firms' products. Incremental innovations may result in significant improvements in the quality or market appeal of specific products, but their net economic effects are limited to the existing mix of products, services or processes. The second order of change consists of radical innovations which result from the introduction of new and unique products and processes. The development of a radical innovation may result in the opening of new markets for the original product or may contribute to radically altering the cost and competitive structure of an industry through the introduction of radical process innovations. Radical innovations may lead to a significant degree of structural change in the economy arising from the emergence of entirely new branches of industry. They may also cause significant structural dislocation because of the new types of capital equipment or the new type of skills required to supply the product or service (Freeman 1994).

Drawing on these distinctions, the project set out to develop a better understanding of precisely what innovation means to those working within the financial services sector and if, and in what ways, linkages with the ICT sector feed into that process. The interviews made it clear that these two sectors are deeply entwined. While innovation is generally understood in both sectors to be about creating value and increasing productivity, a great deal of the discussion continues to be framed by older models where the focus was primarily on product innovations of a radical nature. As the report makes clear, this potentially deflects attention from a broader understanding of what constitutes innovation in the financial services sector specifically, and in the service sector more generally.

A recent report from the OECD on *The New Nature of Innovation* (2009) suggests that innovation is driven by co-creating value with customers and tapping knowledge about users; intensifying global knowledge sourcing and building collaborative networks; identifying global challenges as new business opportunities and capitalizing on these opportunities by developing sustainable solutions;

and, addressing public services challenges. This shift in perspective on innovation has informed our efforts at addressing the question of *how does the financial services sector define innovation, and based on this definition, how innovative are Canadian financial services firms?* Technology in general and information and communications technology in particular plays a key role in the innovation process within the financial services sector. It is important to recognize, however, that technology is more an enabler than the driver of innovation in the sector, and that the co-creation of value involves not only an emphasis on the client or customer, but a process of collaboration and mutual engagement. This shift in perspective helps to frame new ways of thinking about innovation.

Scholarly Research on Financial Innovation

This section reviews some of the key insights on financial innovation provided by that literature. Because of the important theoretical, practical, and policy issues raised by financial innovation, the scholarly literature on innovation in financial services is quite substantial.⁵ The literature deals with a rich array of both new innovations in financial products, as well as service innovations. To provide some context for this discussion, Table 1 provides a number of familiar examples of innovation in banking to illustrate both the nature of activity in a major area of the sector that is under discussion and to underscore the social nature of innovation.

Table 1 A Selection of Key Innovations in Banking

| <i>CATEGORY</i> | <i>INNOVATION</i> | <i>ADOPTION DATE (EST)</i> |
|------------------------------------------|-----------------------------------|--------------------------------|
| <i>New products and services</i> | <i>Credit cards</i> | <i>1969</i> |
| | <i>Money market mutual funds</i> | <i>1970s</i> |
| | <i>Mortgage-backed securities</i> | <i>1980s</i> |
| | <i>Debit cards</i> | <i>1987</i> |
| | <i>ETFs</i> | <i>1993</i> |
| | <i>Weather derivatives</i> | <i>2000s</i> |
| | <i>Processes</i> | <i>Risk management systems</i> |
| <i>Discount brokerage services</i> | | <i>1980s</i> |
| <i>Telephone banking</i> | | <i>1983</i> |
| <i>Customer needs-based segmentation</i> | | <i>2000s</i> |

⁵ For example, useful overviews of financial innovation are provided by Allen (2010), Allen and Gale (1994), Anderloni, Llewellyn and Schmidt (2009), Fasnacht (2009), Freedman (2006), Philippas and Siriopoulos (2011), Goetzmann and Rouwenhorst (2005), and Tufano (2003).

| | | |
|----------------------------------------------|-----------------------------------------------|--------------|
| | <i>Mobile banking</i> | <i>2010s</i> |
| <i>Common to both processes and services</i> | <i>ATMs</i> | <i>1967</i> |
| | <i>Electronic fund transfer</i> | <i>1985</i> |
| | <i>Internet banking</i> | <i>1997</i> |
| <i>Miscellaneous types of innovation</i> | <i>Lockbox system</i> | <i>1980s</i> |
| | <i>Loyalty schemes</i> | <i>1990s</i> |
| | <i>Cash register free sales, e.g., Square</i> | <i>2010s</i> |
| | <i>Digital wallet</i> | <i>2011</i> |

(Based on Fasnacht, 2009, pp. 47-48)

Six stylized facts emerge from the extensive scholarly accounts of financial innovation. First, as history demonstrates, innovation in financial services is practically as old as financial services themselves. Financial innovations such as interest, transaction dispute resolution, paper money, bonds, shares, pawn broking, futures and options trading, risk analysis, and inflation indexing predate the industrial revolution—in some cases by millennia.

Second, although there is abundant scholarly and policy literature on financial innovation, a notable weakness of this literature is the relative paucity of empirical research on innovation in financial services (Frame and White 2004; Tufano 2003). The principal areas of empirical research concern payment instruments and systems, securities, internet-based financial services, credit scoring, and organizational innovation in financial institutions (Frame and White 2004). Therefore it is difficult to discuss the key questions about innovation in financial services that must be posed in an analysis of innovation in any industry: what are the categories or types of financial innovation? Under what circumstances and in which firms do financial innovations originate? What business purposes does financial innovation serve? Which factors affect the diffusion of financial innovations throughout industry? How is the financial innovation system structured, and what are its dynamics? What are the private returns to financial innovators and what are the larger economic and social consequences of financial innovation? The answers to these questions are uneven in the literature with respect to financial innovation in general and largely unavailable with respect to innovation in the Canadian financial services industry.

Third, with the growing predominance of financial capitalism since the 1970s, innovation has become ubiquitous in the financial services industry, and it has accelerated over the past four decades. Tufano (2003) reports the introduction of more than 1800 different types of securities in the United States in the twenty years following 1980. Many of these were nearly indistinguishable

one from another, representing one institution's attempts to differentiate its products from those of its competitors through what were understood to be incremental improvements. Tufano states:

Perhaps a few [of the innovations] were truly novel. Nevertheless, the length of the list represents a 'normal' pattern of financial innovation, where a security is created, but then modified (and improved) slightly by each successive bank that offers it to its clients.

It is a challenge to produce comprehensive catalogues, typologies, or metrics of financial innovation. However, it is possible although not entirely straightforward—to use the conventional innovation categories of product, service, process, and organizational innovation to characterize various financial innovations, and introduce implicit or explicit scales regarding the relative significance of the innovation (firm-first, world-first, etc.). Or, in another approach, innovations may be classified in functional terms. A useful taxonomy of functions of financial systems involves the following:

(1) moving funds across time and space; (2) the pooling of funds; (3) managing risk; (4) extracting information to support decision-making; (5) addressing moral hazard and asymmetric information problems; and (6) facilitating the purchase of goods and services through a payment system (as listed by Tufano 2003).

Fourth, research indicates that financial innovation is motivated by diverse factors (Tufano 2003). Financial product innovation is induced by unmet needs or preferences of particular customers. It is also motivated by considerations of information asymmetry, agency, and moral hazard, by the opportunity to minimize transaction costs, as a response to taxes and regulations, and as a response to various risks, such as weather or currency volatility.

Fifth, ICTs have become the essential enabling technologies of financial innovation, providing abundant opportunities for product and process innovation, achievement of economies of scale and scope, and data-intensive decision making. We return to this point below.

Sixth, financial innovation has earned an ambiguous reputation because of the widely held view that too much innovation leads to excessive risk-taking, especially on the product innovation side, as exemplified in the explosive expansion of trading in derivatives that was at the centre of the 2008 financial crisis:

[S]everal eminent mainstream economists have attacked financial innovation and flatly recommended less innovation. For example, Jagdish Bhagwati of Columbia University argued that financial innovation was unlike non-financial innovation because it generated more upheaval: 'with financial innovation, the downside can be lethal - it is "destructive creation" (Financial Times, 16 October 2008). [I]n December 2008 the Nobel prize-winner Robert Solow recommended "a regulatory system aimed at insulating the real economy from financial innovation insofar as that is possible" and accepted "that may require limits on the freedom of action of commercial banks" (Financial Times, 16 December 2008) (Engelen et al. 2010).

At the same time, it is often held that further, or better, financial innovation is essential in order to solve the world's most pressing problems, including poverty or climate change.

Innovation in Financial Services and the ICT Sector in the Toronto Region

Most financial service institutions, in the Toronto region, do not define themselves primarily in terms of innovation, but instead think in terms of reliability, security, profitability, and service quality. These are the features of financial services that create customer and business value, and many of our interlocutors emphasized that innovations are introduced in support of these objectives, not as ends in themselves. Thus many large financial institutions cultivate a broad definition of innovation that encompasses process, product, service, and organizational innovation, emphasizing external and internal value creation, primarily through *incremental* innovation. The image of technology as risky or superficial gadgetry is downplayed. One respondent from a Canadian bank stated:

I would think of innovation in a very broad sense. For me it would be any change in process, organization or use of technology that delivers some direct or indirect benefit to the business. That could cover anything from a simple process improvement activity that goes on, to actually introducing something quite fundamentally different that overturns a business model and introduces a whole new line of products and services. Unfortunately, it's hard to define where process and practice improvement ends and innovation begins. I think we've come to the conclusion that it's a false logic to try to make that distinction because innovation comes from the continuity of those activities. And the combination of several small process improvements may, in fact, be quite innovative, simply because you have the practice in place that lets you see that you can combine them together to do something new.

Notably, there were a few cases where individuals in the Canadian financial services industry possessed a comprehensive overview and a well-articulated sense of the dynamics of innovation in the sector. This capability is mostly found in professional services companies that offer consulting services to the financial services industry. An expert observer described innovation in the Canadian insurance industry by characterizing innovation in terms of type, degree, temporality, and environment.

On the life insurance side, innovation has come in waves. The creation of the minimum withdrawal annuity product has been fairly impactful. The movement in the life industry toward more morbidity based products and morbidity being around sickness versus death, and focused around quality of life products, so for example the criticalness of quality life product.

There hasn't been a lot of innovation from a product perspective on the life insurance side, primarily because of the regulatory environment that we're in in Canada. So you don't see a lot of variable annuity stuff; there is some but not a lot and you still see a lot of life companies selling traditional life products, like whole life, unlimited pay and that kind of stuff, some universal life but not overly complex diverse life.

On the [property and casualty] side, the innovation has come more on the property side than on the auto side and the reason why is on the auto side they're pretty much dictated by the government, by provincial regulators as to what they can and cannot offer and it's uniform, so they will say, you can offer these products, you can offer accident benefits with these options and they're dictated to and so what you find is all insurers have the same product, almost identical and so the only way they can compete is by price. So what innovation is happening for P&C companies is in the way that they price.

I think on the P&C side you're going to see a lot of back office transformation, because they're replacing their old systems, you're going to find greater degree of automation, greater degree of straight through processing, the introduction of self-service capabilities to the general public.

The broader perspective on innovation revealed in interviews with interviewees in financial services contrasts with the view prevalent in the IT supplier industry. Firms whose principal products are software-based solutions define innovation in terms of functional and qualitative improvements in their software products.

[Our company defines innovation] strictly from the perspective of technology. Our organization delivers software solutions to the financial services industry and so the vast majority of innovation we do is technical innovation regarding new product development and solutions are deployed and delivered through software. So we write and develop software.

The Canadian financial services sector is regarded as a more prudent (and therefore a slower) innovator than the financial services sector in the U.S. and other countries. According to conventional wisdom, the most important financial innovations in recent decades in Canada were the rollout of a national ATM system, the establishment of specialized back-office processing facilities and the creation of the debit system Interac (both of which required collaboration among Canadian financial institutions), and the effective management of risk which significantly lessened the exposure of most Canadian financial institutions in the recent financial crisis. Examples of financial innovation as currently practiced by Canadian financial institutions include: customization of financial products and services for purposes of market differentiation, development of new ways of interacting with customers through social media, enhancement of the customer experience in retail banking with attractive banking environments, development of payment methods for smart phones, ongoing business process improvements to decrease costs, and business model innovation with respect to online services.

The national branch banking system of the major Canadian financial services firms also creates a number of distinct features according to one interviewee at a major multinational IT provider who deals exclusively with the financial services vertical in Canada. However, these features are not fully appreciated by many of their competitors in the U.S. or the major IT providers. Managing the national branch banking system (as opposed to the more decentralized system in the U.S.) confers a number of significant technological and innovative advantages on the Canadian financial institutions, constituting a major competitive advantage for the sector. However, this may create both an opportunity and something of a challenge for the multinational IT providers who design hardware and software for a radically different industry and market south of the border.

Well, it creates a bit of a challenge in the fact that most of the people that are creating the innovation corporately don't understand how capable the Canadian financial institutions are in deploying a fully mobile national branch infrastructure. That really is a benefit for Canadian financial institutions because they can deliver their same brand of capability across 1600 branches across the country. That's pretty unique.

Overall, based on the conceptualization of financial innovation that the interviewees offered, the financial industry in the Toronto region is innovative, although more imitative or adaptive than leading edge. However, there are a number of factors that have a significant impact on the

promotion of innovation within the sector. The following two sections examine the scope of internal and external factors that impact the innovation capacity of financial services firms.

Internal Firm Factors

All of the larger financial institutions in the Toronto region have established internal processes, mechanisms, or groups to promote and facilitate innovation. But notably absent is a discussion about the ‘culture’ of innovation, which appears only in the case of one large financial institution that is regarded as being strongly identified with innovation by industry observers.

We have a broad definition of innovation. Innovation doesn't have to be new to the world, it's not new to the industry, it's not new to Canada, it's just new to us. The reason we have a very broad definition is because of the kind of culture of innovation we want in the organization which is one that is actually relevant to everybody. So if you take it to be it's only people who can work on that next new shiny bright object, then it actually isn't relevant to 99.9% of our employee base. By taking innovation to be just doing your job better, or smarter, or faster, cheaper...finding even if it's incremental improvement, and saying, yes that is good as an innovation because you have done it differently not new, but better—that's the kind of mindset we want people to take on.

In addition to possessing internal information technology capabilities, financial service organizations have implemented, or are considering, a number of innovation-enhancing initiatives: for example, improvement of internal communication through the development of an internal YouTube site, a private internet/an Intranet, an internal library, internal white papers and an internal social media platform; diffusion of potential innovative solutions to internal clients and stakeholders by establishing pilot projects virtual tours for internal customers and a technology demonstration facility; encouraging learning about innovation through the development of an internal business school, internal mentoring programs, and internal workshops; ensuring that employees know how to find experts internally, and enabling ad hoc teams from different departments to collaborate on projects; and, overall facilitation of the sharing of information and ideas.

One of the key issues driving innovation in the financial services sector is the increasing competition among the major integrated institutions for what is perceived to be a domestic market that is growing more slowly. As the industry moves into this new phase, a critical factor in the future competitiveness of the integrated financial institutions will be their ability to grow their market share, as opposed to just growing with the market. For most of the major institutions, the overall quality of the customer experience is seen as critical for their success. According to a major integrated multinational information technology service provider in the financial services vertical:

I think we have to be much more innovative in the way we treat a customer. . . . maybe it's almost going to come up with a new mouse trap in financial services. It's a pretty basic industry. But the innovation is going to occur in how the customer gets their experience. Can they [the financial institution] truly view you as a one customer and when you go to the teller, they actually know who you are and they can see all your different business elements. You know, you start a conversation in the call centre, you move into the branch, you are on your mobile phone, it looks like a common experience. And that's

where we fit into that equation is first to figure out what that experience is, and second is then to figure out, well how do I make the changes necessary to what goes on behind the surface to enable that.

External Government and Regulatory Factors

Regulatory measures have a profound influence on innovation in the financial services industry. The overall financial market is protected by legal and regulatory measures that subject the financial services business to certain constraints within the specified profile of risk.

The three core policy objectives of financial regulatory frameworks are to mitigate systemic risk, to ensure proper market conduct, and to ensure adequate protection for borrowers, investors, and other users of financial services (Lumpkin, 2009). The challenge for regulators is to find “an appropriate balance between preserving safety and soundness of the system and allowing financial institutions and markets to perform their intended functions”. In the investment world, regulations affect operations and ways of trading, “so certainly any changes in regulation could require us to be doing compliance monitoring”. As one respondent stated, financial products must be designed with regulatory compliance in mind:

Most of our innovation lies solely with what the government allows, so we design our products based on guidelines that the government gives us. They give us an overarching guideline saying that you can do this and we’ll try to figure out a way to maximize market share profitability within those guidelines.

The Canadian financial service industry’s relative stability after the recent financial crisis is attributed to regulatory prudence, although industry insiders believe that the prudence actually reflected a lag in regulatory practice.

We are all patting ourselves on the regulatory back because, you know, our regulation never caught up. We didn’t indulge in the excesses that led to the 2008 crash because we were so far bloody behind in terms of our regulation parameters. The problem in the U.S. arguably was that there was a bad regulatory framework to begin with, but also enforcement was not consistent. We have bad regulation, but it’s enforced very strictly, and it’s very opaque.

Some regulations stimulate innovation. The requirement that checks have a signature led to the development of imaging technology as a means to record every transaction. On the other hand, some regulations are regarded as stimulating wasteful innovation. One interviewee noted:

A recent example was the HST which we saw, in its application, as detrimental to our clients and it was an industry issue. Unfortunately, adapting our systems to the HST meant a reallocation of technology resources to addressing HST specific needs, as opposed to more innovative or creative endeavours.

Regulatory and compliance requirements absorb a lot of attention and energy on the part of the financial institutions.

It’s painful. More and more of the effort in IT is focused to deliver on compliance and regulation issues, so that eats up our innovation budget and that is driving the cost of all the banks up. If they

want to continue to launch new products and renovate their infrastructure, [compliance] is becoming a burden.

Small software providers are at a relative disadvantage because software products must be made compliant with complex regulations in each national market. It is “a bit of a nightmare for smaller firms”. One respondent said:

... to anyone from the outside, it might make them sad looking at the number of regulatory things we have to put up with... Just keeping up with the regulation is a huge barrier to entry for any banking software company. Part of the innovation is just keeping up [with the regulatory framework].

New product development requires such stringent compliance that large financial institutions are frequently unable to work with small suppliers.

If you are bringing in a new piece of technology that is going to be used by customers, that means you are going to have to go through an information security audit, a privacy audit, a regulatory compliance audit...you are going to have to let us know whether you satisfy the twelve billion page regulatory requirements that come out of the Securities and Exchange Commission in the States, and on and on and on. So by the time you had even gotten to the point of filling out what would be our, for example, procurement process, the 200 excel spreadsheets for the RFI, let alone the RFP, you basically killed off every small company because they simply don't have the manpower to do that. And they don't have the background and reputations to answer the questions.

A growing presence in the U.S. market is also affecting Canadian financial institutions in two important ways. First, business processes can be patented in the U.S., and many U.S. financial institutions and information technology firms have taken this route to protect their intellectual property (IP).

It is getting more and more important. Right now, IP is a big deal because there are a lot of companies, especially in the States, that are trolling. And financial institutions are big, big targets. To protect ourselves we need to be patenting a lot more than we are doing. We've got a few patents, but it's not enough. And now we see big, big banks like Bank of America, Wells Fargo, they are all putting up patents to protect themselves. So we are into the game. We have a centralized body that helps us. So any project they do, they say, okay, is it patentable or not patentable. It's a defensive mechanism.

The second regulatory implication of involvement in U.S. markets concerns the location of data. Privacy legislation in Canada prevents Canadian financial services firms from placing data where Canadian privacy laws do not apply.

Right now a lot of storage, Cloud [computing] that we'd like to get into, some of the services on line or Cloud applications that we would like to explore, to dip our poles into, we cannot because of privacy regulations, because we or our data needs to reside in Canada, we cannot put it down in the States because of their Patriot Act.

In summary, financial innovation in the Toronto region is heavily influenced by the extent to which financial services firms have introduced and embraced internal processes, mechanisms and practices that facilitate efficient in-house communication and knowledge flows. Financial innovation is also affected by factors that are external to firms, particularly competition for retail

customers and government legislation and regulatory measures. Additionally, as already mentioned, ICT plays a major role in leveraging financial innovation in the GTA. The next section discusses the impact of ICT, focusing on its significance to the financial services sector and the type of ICT products and services these firms employ.

The Impact of ICTs on Financial Service Innovation

Data processing and telecommunications are at the heart of the financial services industry. It would be impossible to offer contemporary financial services without the extensive operational and strategic support of information and communications technology, “the major enabler for upstream information and transaction processing and downstream interfacing with clients and multi-channelling” (van Ark, Broersma and den Hertog 2003). ICT is “a core competency for financial institutions, where the use of technology to deliver services is the business” (Olvet 2007). This section of the report explains the significance of information and communications technology to financial innovation and discusses the demand for ICT products within the financial services sector of the Toronto region.

Implementing ICTs in Financial Services

The three principal pathways for the incorporation of information and communications technology in the financial services sector are:

- Banks (usually the players in the top tier of the “innovation continuum”) have in-house groups who “sense out” new technologies and opportunities and present them to internal management and their major SI providers. They may not be as fast as Professional Advisors.
- Major technology vendors make direct contact with banks to advise on new product ideas and technology innovations
- Professional advisors and consultancies sell their expertise on technology integration to banks. They often bring opportunities to the attention of banks, who rely on their expertise to ensure that “the technologies and innovation that [they] apply [to their processes] work in a robust, secure, and heavily regulated private business”.

However, from the point of view of the integrated service providers, the ideal situation occurs where all three pathways coincide.

... as a services provider to the banks, the special point is where you can get the two occurring at the same time. Because if you come forward with an idea and the business problem isn't real to them at that point in time, it doesn't go anywhere. And if they come forward with a problem and you haven't thought about it too much nor have anything unique to say, probably competitively you are not in a good spot. So you need to have the things occurring at the same time. And I would say the banks are at a point right now where they have to actually go at some of these things in different ways than they have historically.

The role of information and communications technologies in enabling innovation in the financial services sector is expected to gain even more traction as the deployment of mobile platforms and services, and social media is extended. In addition, the development of two new technologies is growing in appeal for financial services firms: cloud computing, and data analytics. The appeal of the latter is due to the increasing salience of data- and mathematics-intensive computation in finance due to competitive and regulatory forces.

Cloud computing “is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Nelson 2009). The five key characteristics of cloud computing are: on-demand self-service, standardized network access via diverse client platforms, dynamic pooling of resources, rapid scale elasticity, and measured (metered) service (Nelson 2009). Cloud services encompass software as a service, the cloud platform as a service, and the cloud infrastructure as a service. The advantages of cloud computing include lowered maintenance and processing costs, increased flexibility, reusability of information, increased integration of best-in-class components, and improved data integration and analytics (Pryor 2011). One Toronto-based cloud services provider lists the following services to financial institutions: automation and actuarial analysis, commodity pricing, converts pricing, counterparty credit risk, credit derivatives pricing, currency exchange, derivatives pricing, enterprise market risk, fraud detection, foreign exchange derivatives pricing, hedging, insurance claims processing, mortgage loan analytics, operational risk, portfolio optimization, and risk analysis. Insofar as cloud computing systems permit very flexible and scalable combinations of solutions from many solutions providers, they represent a form of organized open innovation.⁶

Use of computational mathematics for portfolio management and asset allocation is becoming a “technological arms race”.

Although today’s risk managers enjoy computational tools with unprecedented power at low costs, they must also navigate an ever-expanding investment universe as new emerging markets enter the investment mainstream and new types of securities are created. As a result, investors are confronting the challenges of comprehensively modeling portfolios and markets in the face of dramatic increases in the scope, detail and timeliness of financial data. Accommodating all of these inputs demands ever increasing computational power, which in turn leads to the further proliferation of data, markets and security types. While computational capacity grows in line with Moore’s Law, the billions of possible scenarios in the investment universe may expand at an even faster rate (Donahue and Hooker, 2011).

Integration of capital markets through networked trading exacerbates the complexity of asset management and portfolio optimization. The more portfolios are globally distributed, the more diverse the asset classes are and the larger and more complex the models required to measure risk and return. All participants in financial markets are adopting advanced technologies and so “asset owners and managers have little choice but to continue investing in IT systems and raw

⁶ The concept of open innovation is formulated in the work of Henry Chesborough (2003).

computational power for building intelligent, networked models that seek to map risk and dynamically evolve both in service to alpha acquisition and to enhance risk management” (Ibid.).

Said one interviewee:

One other huge trend which is extremely important in a lot of regular trade groupings is highly enhanced integrated risk management, especially for the institutional brokers. A lot of that is driven from regulatory reform and it takes really heavy lifting horsepower to be able to pull that off. The mathematics behind that is not for the faint of heart.

The shift to electronic trading has considerably changed market behaviour, and not just through substantial increase in trading volume. Regulators, in order to create transparency, are requiring that trades take place on electronic platforms. However this also brings an explosion of algorithmic trading, creating concerns about market stability.

Demand for ICT Products

High-tech products and services are transforming the region’s financial services sector, enabling financial services firms to meet the needs of consumers; to more efficiently identify risks and opportunities; reach a wider market, and enhance competitiveness (Toronto Economic Development 2001).

Several financial service firms purchase products that improve and simplify contact with their clients. To date there is a notable demand for ICT applications associated with enhancing customer facing interaction, wherein customers interact with financial services employees, their web site, and/or systems. Additionally, there is a notable demand for technology that ensures that the customer of the financial services firm will receive the same quality of experience regardless of how he/she chooses to interact with the bank, i.e. via phone, teller, ATM, web or mobile. Customer relationship management (CRM) applications are people-centred products financial services firms purchase and employ to create detailed client profiles encompassing the customers’ contracts, communications, accounts, buying histories and preferences. This information helps the firm identify its best customers, customize communication with them, manage marketing campaigns, reduce customer response time, implement customer loyalty programs that engage the right citizens at the right time and serve wider geographical regions (Government of Canada n.d.). A variety of CRM systems exist, including online solutions, off-the-shelf software and custom-tailored programming.

Demand for ICT products that improve the organizational integration of financial services institutions is also intensifying; these applications are particularly important to larger financial services organizations seeking to improve in-house cooperation and internal communication.

There are many factors that influence the demand for ICT products in the financial services sector. Firstly, relative to the United States, demand for these products is mitigated given that Canadian customers are more conservative than their American counterparts. Many Canadian firms only invest in a new ICT product once the adoption of that technology has demonstrably contributed to an improvement to the sector. In the words of one executive responsible for managing IT at a

Canadian financial services institution, “We class ourselves as state of the market so we are not looking for leading edge, because leading edge can be very expensive. . . . our guiding principles are to be able to make sure that what we are taking on in terms of the technology is proven.”

The purchasing activity of large financial institutions influences major fluctuations in demand, which may or may not correlate to market trends. In some cases, technology roll outs and their time frames are guided more by the financial services customer’s business plans rather than by the market. Respondents in several ICT firms pointed to a recent upswing in the level of demand for their products. Despite a great deal of purchasing activity on the part of the major domestic financial institutions within the past few years, some firms predict that 2011 will be “a soft year” due to the tapering off of an artificial boom in substantive spending by industry and consumers.

In the eyes of some informed observers, the role of information and communications technologies in enabling innovation in financial services firms is rapidly approaching a major inflection point. Much of the application of ICTs has focused on providing an enhanced experience for the customer as the end user or in adopting specialized packages to upgrade specific business processes, such as customer relations or human resources management. Despite the massive investments in ICTs over the past decade, many of the underlying systems that are in place rely on the same ‘green screens’ that first came into use in the 1960s. From the perspective of the service providers, this underlying infrastructure is reaching a critical turning point that will require a major overhaul.

The industry has constraints on what it can do because their technology does date back to the ‘60’s. The kernel...what’s right at the heart of it. Your bank statement is still produced by the same technology your parents’ bank statements were produced on. That’s the reality. We have been talking about core renovation and improvement of the underlying technology of the banks and insurers for many years. There is going to be a point in time where you are going to hit across an inflection point where it just becomes too expensive to keep doing what we’ve done before. And I think we are starting to get to that point. Mobile banking is actually one of those things which is like the straw that is sort of tipping the balance a little bit. Because, again, you are going to have to build a brand new channel top to bottom to go back to your ability to do some of these things.

The following section explores the relationship between the financial services sector and the ICT firms located in the region, and discusses the extent to which well-defined knowledge flows have been established within and between firms, as well as the degree to which this has contributed to the region’s ability to develop networks and productive, ongoing working relations.

Knowledge Flows in the Financial Services-ICT Nexus

An exploration into the dynamics of the financial services-ICT nexus can reveal a great deal about the nature of the innovation process within these two sectors, the areas of existing innovative strengths and weaknesses among firms within each sector, and the opportunities to further enhance the linkages between firms in and across the sectors. Well-established knowledge flows are a key feature of this nexus; these knowledge flows influence how, when, where and why innovative ideas are formed as well as how and why expertise is transferred between firms and across the two industries. Through a more detailed examination of the financial services-ICT nexus, we develop a better understanding of the spectrum of successes and challenges that exist in the

financial services-ICT vendor relationship and the ICT-financial services client relationship; each of which in turn affect the capacity for innovation in the Toronto region.

Knowledge Flows: Ideas and Expertise

Innovative ideas that infuse the financial services-ICT nexus originate from multiple sources within and across both sectors. Most notably, internal R&D is nearly a universal feature in the ICT sector; this R&D feeds into the introduction of both new products, but more frequently, it leads to evolutionary or incremental improvements to existing products. The majority of the ICT firms interviewed are inclined to base product innovations on existing IP that came from R&D developed at the onset of their business. Only a small number of respondents in ICT firms stated that they were exploring opportunities for radical innovation. For one financial software developer, proprietary R&D is presently being undertaken through the redevelopment of their core software platform. Although this firm is a mature player in the ICT vertical, its actions are motivated by fear. As the representative of the firm stated:

Fear. Fear that we're not taking advantage of current technologies as well as we could be... and even if the radical development project that we're on never sees the light of day, there're still benefits derived from performance research.

Yet another ICT firm that provides global financial solutions spends hundreds of millions of dollars per year on R&D. While this firm owns a considerable market share, it is motivated to "stay ahead of the curve." According to a representative, the firm's size and scope allows it to "take a much broader look to be far more innovative on a bigger scale". Each of the organization's major centres around the world specialize in a different aspect of their IT-based financial applications, and host independent research and development labs.

Some other firms get their ideas from mandates that are given to them to create new solutions with existing technology. In the case of one small software provider, personal networks, connections and leads help with R&D and give the firm direction on "what [the] enterprise is converging to...and where the customers are." For many large IT vendors and providers, customer focus groups are a major source of innovative ideas. In this sense, many firms' R&D efforts are customer-centric.

Financial services and ICT firms take advantage of several sources of knowledge that drive the development of innovative ideas. Some of these firms partner with universities and research labs. Firms in both sectors also look to foreign markets as sources of ideas for sector innovation. In contrast, a number of firms pay attention to ideas generated within the organization. Several of the financial services firms interviewed credited their own employees with introducing some of the innovative ideas that are later developed. An interviewee at a national insurance company maintained:

[t]he generation of new ideas comes from a culture of being prepared to listen to what otherwise are out of the norm ideas from our own people. Most of them have them; there's a huge wealth of ideas in every company...

Financial data services and large investment banks remain consistent sources of information and research data for capital market firms. Additionally, business, market and technology intelligence agencies like Gartner and Forrester are among the most cited business intelligence agencies that financial services firms use.

Knowledge flows within the financial services-ICT nexus also involve the outsourcing of expertise and capabilities. In particular, there are a number of functions the financial services sector outsources to ICT firms. Many of the respondents noted that hosting is outsourced; a very popular server host mentioned was Toronto-based Q9 networks. The outsourcing of off the shelf ICT services and equipment is used extensively by firms with small IT departments; some financial services firms simply do not have the resources to justify internalizing such processes. In the Toronto region outsourcing services are provided to some of the national financial institutions by leading international ICT vendors and other large U.S.-based financial institutions. Additionally, financial services firms outsource when they do not have the necessary IT skills in-house and/or it is less expensive than making an internal hire. For instance, an interviewee noted that one of the major national banks outsources coding if the talent in another country like India is more affordable than the talent in Canada.

Knowledge Flows: Collaboration/Partnerships

Cooperation and collaboration are understood to be important attributes of an innovative industry, supporting and encouraging knowledge flows between firms within the financial services-ICT nexus. Within the financial services industry, firms are inclined to seek out organized forums to exchange information, address common problems, and to help identify and gauge market reaction to trends. For example, interaction between financial services firms, industry associations, and government bodies on the federal and provincial levels occurs most frequently in relation to compliance and regulatory issues. The most valuable benefits financial firms gain from involvement with local industry or trade associations are the formation of mutually satisfactory industry standards and a stronger position from which to campaign for policy and regulatory change.

The Toronto region is home to several forums for networking and professional development. One unique gathering, hosted by the Toronto offices of Deloitte Canada, is a monthly meeting of the Chief Innovation Officers (CIOs) of Canada's five largest banks. The purpose of the forum is to learn about the innovative activities of the individual firms. Through discussing IT-related issues, the CIOs are better able to strategize about future adoption of information and communications technologies and to allocate specialized R&D or test projects among the different firms as a cooperative means of saving time and resources on new innovations. According to one banking sector executive, however, such activities are viewed to be less about partnering and more about "information sharing".

While firms seem open to cooperation on those issues and concerns that have a comparable effect across the industry, the majority of financial services sub-sectors continue to have an insular business culture in which the drive to maintain competitive and operational advantages limits the opportunities to collaborate. Thus, collaborations among like firms in the financial services vertical take place only if the joint initiative provides no competitive advantage to an individual firm and if

there are scale efficiencies to be had by combining resources. Historically, joint ventures among organizations of varying scope and size do not necessarily meet their anticipated goals and outcomes. However, under non-competitive conditions, participants in collaborations or formal joint ventures can effectively seize an opportunity to enhance capabilities and produce value.

Four major examples of horizontal collaboration among Toronto-based financial institutions are the Interac Association, Symcor Inc., Moneris Solutions, and the Alpha Group.

The Interac Association: The Interac Association's shared network of electronic financial services that links ABMs and financial institutions throughout Canada has become a success story of both industry collaboration and banking convenience. Launched in 1984 as a cooperative venture between Royal Bank of Canada, Canadian Imperial Bank of Commerce, Bank of Nova Scotia, Toronto Dominion Bank and the Fédération des caisses Desjardins du Québec, Interac was devised as way to link Automated Banking Machines (ABM) across Canada. Since 1996, Interac Association has been a not-for-profit organization with a vast membership of Canadian financial institutions, businesses and service providers. Interac Association does not manage the transfer of funds but facilitates the exchange of information among its members through its shared cash dispensing (SCD) service at ABMs and its national debit service, Interac direct payment (IDP), which had its Canada-wide rollout in 1994. SCD and IDP transactions are processed by financial institutions instantaneously through the Interac Inter-Member Network. This electronic exchange network allows Canadian consumers access to cash withdrawals at ABMs across the country and to use banking debit cards for point-of-sale payments at merchants. Since 2000, Interac has become the most frequently used method of payment among Canadians (Interac Association 2007).

Symcor: Initially formed by TD Bank Financial Group, RBC Financial Group and BMO Financial Group in the early 1990s, Symcor serves as the combined paper transaction processing and accounts payable operations for many of Canada's financial institutions, retail and telecommunications companies. Driven by its specialized business function, Symcor's innovative and efficient payment processing methods have provided synergies, cost savings, and increased productivity in a specific business function that was not considered to be a point of competitive leverage on the part of its founding institutions.

Moneris: In 2000, credit and debit card transaction processing firm Moneris Solutions was founded as a joint venture between RBC Royal Bank and BMO Bank of Montreal. Moneris' centralized operations process annually, upwards of three billion credit and debit card transactions made through such payment methods as VISA, MasterCard, American Express, and the Interac direct payment network.

The Alpha Group: Established in 2007 by nine Canadian financial institutions and specialized securities firms, Alpha Group is a collaborative equity trading system founded by BMO Nesbitt Burns Inc., Canaccord Capital Inc., CIBC World Markets Inc., Canada Pension Plan Investment Board, Desjardins Securities Inc., National Bank Financial Inc., RBC Dominion Securities Inc., Scotia Capital Inc., and TD Securities Inc. Through its pooled resources and shared technology, Alpha Group provides management, connectivity and data services at significant cost savings to its founding partners and clients in the capital markets. It acts as a 'lit' market, taking orders from different

brokerage firms, other investment members of IIROC (the Investment Industry Regulatory Organization of Canada). The orders are both active and passive—the passive orders have a fixed price with a fixed number of shares, and the active ones are orders to fill a buy or a sell for a number of shares at market value.

As illustrations of formal cooperation among some of Canada’s major financial intuitions, Interac, Symcor, Moneris, and the Alpha Group all represent positive examples of the Toronto financial service sector’s ability to exploit its potential for synergistic endeavours in process innovation. The challenge is to further expand that potential by extending such ventures to global financial markets as well.

Looking to firm-level partnerships among ICT firms, we note that formal co-ventures are not widespread, but that several key ICT solution providers within the local vertical have participated in horizontal collaboration with potential direct competitors. For software solutions providers, the decision to collaborate with like firms is not motivated by cost savings, but by their drive to meet the needs of their clients. Partnering is firstly a way for them to improve their product by seeking specialized inputs from other software solution and IT platform developers. While firms acknowledge the resulting cost benefits of collaborative activities, as the VP of a software solution provider states, they are primarily motivated to partner because doing so “creates a bigger and better overall solution” for their financial services client. ICT firms who have formed such collaborative relationships have reaped the benefits of access to new expertise and a wider client base.

Overall, evidence of cross-sector partnerships between ICT and financial services firms seems limited within the local sectors. Similarly, instances of collaborative partnership with firms in unrelated (or outside) industries were not apparent among the survey of local firms. Firms instead maintain strong vendor-client relations when a business partnership is formed regardless of which party proposes the venture.⁷ While the planning and strategy role most often falls upon the financial services firm, more symmetrical relationships among client and service firms could allow for greater knowledge spill-overs and synergies among firms increasing the level of innovation in Toronto’s financial services industry.

Financial Services-ICT Vendor Relations

Given that information and communications technologies play such an important role in stimulating financial services innovation and influencing the nature of the innovation process, financial services firms are careful when selecting the ICT vendors with whom they establish a working relationship. Many financial services firms employ an aggressive set of criteria for selecting ICT vendors. The capacity of the ICT vendor to fill these criteria and meet the expectations of their financial services client has a significant impact on the nature of the financial services-ICT vendor relationship.

⁷ For the ICT firms the advantage of a centralized banking system in which there is a limited number of large financial institutions, means that it easy to roll out a solution across the country, or the corporation.

One striking observation was that many of the financial services firms interviewed make extensive use of the services of multinational vendors over domestic vendors; a number of these international vendors are American, Indian and South African. Given the substantial size of the financial services sector in the Toronto region, many of the larger vendors maintain substantial operations in the Region, and some also have major research facilities located here, qualifying them as ‘indigenous’, if not ‘domestic’ firms.⁸ A handful of financial services firms explained that their selection of vendors was premised mainly on the capacity of the vendor to provide the best ICT solution to meet the needs of the firm at the most competitive rate for service. In virtually all cases, however, the financial services firms indicated that it was important for the ICT vendors to have a strong physical presence in the Toronto region in order to service their needs. Despite the predominance of the multinational ICT vendors as suppliers to the local financial services industry, the study also found numerous instances of small domestic niche firms, providing more specialized software and services to meet the particular needs of financial services firms. In many instances, these local firms first had to establish their credibility in the larger market south of the border before they began to acquire local clients in the Toronto region.

A productive financial services-ICT vendor relationship features vendors who can demonstrate added value, i.e. readily provide their financial services client with a solution to a given problem. Additionally, an effective financial services-ICT vendor relationship is contingent on the vendor’s understanding of the financial services environment and the will to invest in developing that knowledge. The ICT vendors stay in constant contact with the financial services firms, partly to keep the firms informed of the products and services they have available, but also, in the words of one executive responsible for IT management at a financial services firm:

... they recognize that they need to have a model of understanding of what we are doing. They have to be around on a regular basis and build relationships with us or they don’t have a chance when a purchase decision is going to be made.

An interviewee with a national insurance company based in Toronto discussed the importance of selecting an industry-savvy vendor, stating:

This particular company had knowledge of the insurance industry, and this made it very easy to explain what it was we were looking for. There was an immediate exchange of ideas around them giving back to us, ideas of how they could strengthen the app. There really were no questions that that’s who we were going to deal with right from the very get go.

Alternatively, a large financial services firm specializing in diversified wealth management and investment solutions referred to the difficulty of working with a Telco due to a lack of a deep domain understanding of that firm’s industry:

I would say in general the Telco is not able to understand your business because they have so many accounts and many types of what I would call tier clients. We are not what I would call part of the top tier clients so the type of service could be completely different from one Telco to the other.

⁸ The distinction between domestic and indigenous firms was introduced in the first report of the Ontario Premier’s Council, *Competing in the New Global Economy*, Vol. 1. Toronto: Queen’s Printer for Ontario, 1988.

While financial services firms go to great lengths to select the vendor that best suits their needs, there are a number of factors that can strain the financial services-ICT vendor relationship. Some financial sector firms complain about the absence of ‘thought leadership’ on the part of the vendor. For instance, some of the large financial institutions have outsourced their infrastructure management to leading ICT vendors. One institution was frustrated at having to monitor and direct the vendor on how to use their products more efficiently. This relationship between the financial services firm and the vendor is further complicated by the vendor’s disinclination to bring added value to the services provided. Other financial services also criticised some of the larger vendors for their unwillingness to customize a product to suit the changing needs of their clients.

Poaching between vendors can also have a negative effect on an already established financial services-ICT vendor relationship. Some vendors have employees who are very knowledgeable of the product that is offered to the financial services firm. However, that talent might be ‘picked off’ by another vendor. The poached employee would have developed an ongoing line of communication and collaboration with the financial services client, so his/her departure might have major ramifications for the financial services client, including a potential disruption in services or an unwelcomed, unanticipated change in the quality of service.

The relationship between the financial services client and the ICT vendor may also deteriorate if, in the process of finding a solution to the client’s problem, that vendor partners with another vendor that is not as familiar with the financial services firm’s needs and/or the industry.

ICT-Financial Services Client Relations

Successful ICT firms in the region’s financial services sector have enhanced their efforts at becoming world-class service providers by understanding and satisfying the needs of their clients (Deloitte 2009). However, there are a number of factors that influence the development of the ICT-financial services client relationship, and in turn, impact the nature of the innovation process.

Effective communication between ICT firms and their financial services clients is paramount for cultivating a productive working relationship. However, communication barriers are encountered for a variety of reasons. One mid-sized software and services provider to the mortgage lending industry suggested that communication with their financial services clients is compromised when the client’s internal IT and business sides are not communicating properly and hold different and/or conflicting goals and expectations. This was highlighted as one of the biggest communication challenges for banks in particular. Many ICT firms providing financial software or ECM document solutions must also navigate the complex web of miscommunication between the front office decision-makers in a large financial services institution and the back office operations side of the organization. This disconnect between the internal agents of the bank has serious consequences for ICT firms’ capacity to understand the needs and goals of the client and to design and deliver the optimal technological solution.

The ICT-financial services client relationship is also complicated when the ICT vendor is challenged with the task of finding the appropriate decision-makers. When ICT firms work with financial service organizations, the main point of contact between the two is often the financial service firm’s

CTO or CIO. However, problems arise when the financial services contact is less focused on the business case and more concerned with ‘the bigger picture’. Consequently, ICT products and services designed to address specialized aspects of the business may not get the attention they deserve. In such cases, the ICT vendor must use strategy and finesse to capture the attention of the most appropriate contact at the financial services firm.

The ICT vendors have great difficulty establishing a relationship with a financial services client if on one hand, they attempt to sell ICT projects and activities that add little value to their potential client, or on the other hand, the financial services firm cannot readily identify the value of employing the ICT service provider. Financial services firms recognize that investing in ICT initiatives that do not align with their business strategy is tantamount to throwing money away on problems that do not have the highest business priority. Hence, successful ICT vendors must identify potential clients that are most amenable to deploying their ICT solutions, select ICT projects and activities that align with the needs of that client’s business and effectively communicate the added value of the ICT product and services. A successful ICT-financial services client relationship may also be strained if the delivery of a solution takes longer than expected.

Overall, effective communication is the lynchpin to maintaining strong ICT-financial services client relationships. It is important for the ICT vendor to speak the same language as their clients and maintain ongoing communication. As noted above, maintaining a strong physical presence in the Toronto region is critical to meeting the needs of financial services firms. Several ICT firms have developed strategies for mitigating miscommunication with their clients and most ICT firms are committed to interacting with their financial services clients every day. One mid-sized software provider in Toronto provides help to financial services clients 24/7 through a support desk and a call centre. Additionally, maintenance contracts are developed to guarantee financial services clients’ access to the ICT firm whenever help is needed. This ICT firm also sends teams of employees to work with the financial services client for several days particularly in the early stages of product design, implementation and testing to ensure effective product integration and customization. Alternatively, another mid-sized ICT firm that provides enterprise-class retail wealth management solutions for Canada’s financial services industry attempts to overcome potential problems in attaining a mutual vision with their financial services clients by conferring with an internal board of advisers composed of representatives of major financial services firms.

A Special Challenge: The Disconnect between Local Niche ICT Vendors’ Solutions and Retail Financial Services Firms Innovation Agendas

In the Toronto region’s retail financial services industry, innovative firms try to maintain competitiveness, create market differentiation and strengthen customer loyalty through improved services, new product offerings, and reduced costs. Competitiveness in the financial services industry is determined by many factors, but customer retention is a top priority of financial services firms. Financial services firms strongly believe that innovation and value added services enhance customer loyalty. In the current competitive environment, customer retention and attracting the unbanked (new immigrants, etc.) is paramount; therefore, visible customer-facing innovation is a key driver of the sector’s innovation agenda.

The key innovation agenda drivers are, for the most part, being supported by internal service and product development teams, transnational ICT service providers, and, in the case of Canada's national retail banks, in-house innovation research centres. Toronto is rarely the primary revenue generating market for the more specialized and niche service offerings of local ICT firms, but merely one among several client hubs. In this respect, specialized providers are similar to the larger multinational ICT vendors.

There are two forms of visible innovation that a firm can generate: product innovation and service innovation. In banking, insurance, and the capital markets product innovation comes from offering new account options and value-added products. Financial sector service innovation comes from offering clients more options for communication and delivery channels that provide greater access and ease of use. While our study has uncovered evidence of vendor-led process innovation in back-office systems, few local ICT firms are focussed on developing product and service innovations or helping financial services firms to increase market performance like the global technology vendors with which they compete at the local level. A disconnect still exists between the innovation agenda of local financial services firms and the business solutions being offered by Toronto-based ICT vendors, and the network is unlikely to be fully self-aware of the range and diversity of firms providing services to financial services.

To some extent, innovation within the Region's financial services-ICT vertical takes the form of what NESTA (2007) has referred to as 'hidden innovation'. At the heart of hidden innovation is the novel application of existing technologies to business processes. Often such innovations are tailored to specific business practices or functions and focused on creating efficiencies rather than bring new top-line propositions to a firm. In the Toronto region's financial services sector, there are a wide variety of ICT players, but the predominant offering to retail banking and insurance clients are innovative solutions for back-office processes. Such hidden innovations include internal management systems, data and analytics software, enterprise content management solutions and digitization technologies, and outsourced capabilities such as IT talent and project management services.

Co-location of Financial Services and ICT Firms

Advancements in digital technology make it possible for people to connect and conduct business with anyone in the world. In turn, it would appear as though the Internet and other innovative telecommunication products and services make location irrelevant. However, as noted at several points, the study underlines the extent to which location still matters for the relations between these two key sectors. Financial services and information and communications technology firms derive a number of distinct advantages from the co-location in the Toronto region. They gain a competitive edge in productivity, knowledge flows and economies of scale arising from a critical mass of ICT and financial services firms located in close proximity. The following section discusses the range of benefits afforded to financial services and ICT firms located in the Toronto region and the impact of co-location on the development of innovation networks as well as the attraction and retention of talent in the Region.

Location Benefits of the Toronto Region

Since the mid-1970s, Toronto has established its position as the dominant financial centre in Canada, and is currently home to approximately 70 per cent of all banking activity, as well as three of Canada's largest insurance firms, and the majority of wealth management and capital markets activity on both the retail and wholesale side. The primary benefit cited by virtually all of the respondents in the financial services sector for being located here is that Toronto is the business hub of Canada and the site of the largest concentration of financial services firms in the country. Among the related aspects of these benefits are the diversity of corporations located in the Toronto region, the concentration of the head offices of many of the larger Canadian corporations, and the presence of a wide variety of industry verticals.

A number of respondents suggested that all of the key players in the financial services vertical were concentrated in the downtown business core largely within walking distance of each other. A respondent at one of the large integrated financial institutions pointed out the office window and said that virtually all of the major clients and many of the key service firms they deal with were located in the office building right across the street. Another interviewee said that in winter people like to be able to go to meetings without worrying about putting on their overcoats, because they can simply follow the PATH, the underground walkway that connects the major office complexes in the central business district.

Another benefit to co-location is that it aids in lobbying both the provincial and federal levels of government. One interviewee from a national insurance company discussed the advantages of being closely located to policy makers and regulators. They were sure that the company could function just as well anywhere else, but pointed out that 60 per cent of the company's total business is in done in Ontario and thus the proximity of Queen's Park is somewhat advantageous.

Proximity to the financial services sector is a clear advantage for the firms in the ICT sector who provide hardware, software and services to their financial services clients. This point was stressed in an interview with one of the major IT providers who noted:

So being close to our customers is core. And that is an advantage to being in the [core of the] GTA... . If we sort of had a string that was probably about five or six kilometres long and we drew a circle, other than hitting the lake south of us, we'd probably hit every CEO, CFO, CIO, in the FSI in Canada, barring a couple of folks up in Montreal and a big insurance company out in Winnipeg, and arguably a few out at the west coast. But the major ones, we'd hit them all right here.

Small ICT vendors choose to headquarter their operations in Toronto because the critical risk of market acceptance in the local financial services sector is far outweighed by the value of the local talent supply and the proximity advantage that Toronto holds for reaching their key Canadian and US financial services clients. However, even after achieving entry into the vertical, many of these smaller ICT firms face a myriad of challenges that threaten their continued existence. A number of smaller ICT firms have indicated the potential of buckling under the pressure of financing the full cost of business operations, meeting the stringent security requirements set by its financial services clients, and fulfilling austere oversight conditions necessary for acquiring funding from federal and provincial government programs aimed at supporting innovation. Failing to maintain business under these conditions, some smaller companies are absorbed through consolidation. Smaller

software publishers and ICT service firms in the financial services vertical also experience some difficulty in recruiting the most valued talent, i.e. employees with a mix of market savvy and technical programming skills. These firms fear that the top talent that possesses the right combination of technological skills and knowledge of financial services are seeking employment with banks and large institutions. On the other hand, one successful ICT firm was set up as a professional service company. Their location, east of University Ave. indicated their desire to be part of the high tech community, and they were able to attract top talent who wanted a more entrepreneurial and research oriented environment than the ICT operations in the financial services sector itself could provide. Their decision to locate east of the financial services cluster in the central business district has been a strategic and successful one. Despite these challenges, there are a number of successful niche ICT firms located in the Toronto region whose success is attributed to their ability to acquire business outside of Canada.

A number of other advantages of co-location were mentioned. Interviewees pointed out that Toronto enjoys distinct cost advantages as a financial services centre, especially when compared to some of the other global financial service capitals. What makes the cost advantages work to Toronto's benefits is the fact of its proximity to New York and being located in the same time zone.

We have also benefitted in that there are lots of folks that have gone to New York that are looking to come home, and so we actually even find with the Canadian dollar doing well, with Canada doing well, there are a lot of people who want to come home to Canada...with the cycle we're in, in the economy, we have lots of folks that want to come back and come home.

In terms of its benefit to business functions and the ability to reach the most customers, "the Eastern Time zone is, just simply put, probably the best time zone in the world to be in." This sentiment was echoed a number of times, "It is close to the East coast, which in financial services is one of the bigger hubs." This is also a distinct advantage for the small, specialized IT firms located in the Toronto region. According to one provider of investment management software, although the majority of their clients are based in the U.S., "even for the U.S. business, Toronto is fairly close to everywhere."

The Toronto region is also well endowed with both a strong physical infrastructure in terms of the transportation network and a first rate airport (which merited several mentions), as well as a competitive research infrastructure in terms of the presence of world-class universities and community colleges. On the negative side, transportation within the Toronto region was also mentioned as a hindrance to attracting talent to certain locations throughout the city not accessible by public transit.

Toronto's Talent Pool

Toronto has an expansive talent pool developed and supported by world-class educational and training institutions within the Region; federal and provincial government programs; and, local, national and global industry (Toronto Financial Services Alliance n.d.). This concentration of highly qualified personnel affords the region a formidable competitive edge. A key feature that was mentioned repeatedly in interviews in both sectors was the large and diverse population base in the region, which is being replenished with a steady stream of immigration,

...there are a lot of new immigrants and the young people coming up today who are very computer literate. So there's a lot of talent here. A lot of young people. A lot of Canadians... a lot of second generation immigrants from Europe, from Russia, from Asia who are doing extremely well. They are all hard-working young people. They are going to school, they are studying, and I am very encouraged with the young people and the level of immigration [in Toronto].

Indeed, the effect of the co-location of financial services and ICT firms on labour market dynamics in the GTA is substantial. Over the years, Toronto has successfully attracted an impressive array of talent seeking employment in the financial services and ICT sectors.

Firms in the financial services and ICT sectors recruit talented professionals in a myriad of ways. Internships and co-operative education programs are effective means of attracting young, bright minds and facilitating the development of local expertise. The co-op programs in particular were singled out as being of great value. These programs provide students and recent graduates from top-tier post-secondary education institutions the opportunity to apply the skills learned in the classroom and develop a better understanding of the operations of their respective placement firm. In turn, financial services and ICT firms are supplied with a pool of potential contract or full-time hires, which for some ICT firms in particular, could mitigate the desire to move development and testing offshore. However, there is still a concern that many of the entry level positions in the sector can be handled offshore. This labour arbitrage brings immediate financial gains to the firm, but more than one interviewee was concerned about a diminishing pool of local talent from which to identify future managers. The recently established Centre of Excellence in Financial Services Education, which provides specialized information on the Toronto region's talent advantage in financial services, its specialized education programs, and the careers that are available in the financial services sector, will help to maintain the supply of highly qualified labour that the sector depends upon. The recently launched Talent Engine search tool gives students, educators, employers and government access to current information about financial services education.

In the case of ICT, some firms have also used technology associations as a source for recruitment. The Information Technology Association of Canada (ITAC), York Technology Alliance (YTA) and the Innovation Synergy Centre in Markham (ISCM) were among a number of associations mentioned that provide ICT firms with recruitment information and resources.

At some organizations, employees are encouraged to refer other persons from outside the organization to fill a job vacancy, while some employers resort to converting contract workers into full-time employees. Internal promotions and in-house development of talent are prioritized by some firms which help to reduce staff turnover rates.

Financial services and ICT sector firms may recruit management and technical staff from within the region using head hunters and/or job posting on the Internet. Firms also target executives and specialized talent from outside of the Toronto region. Some Toronto-based financial services firms in particular attract talent from other international financial services hubs like Chicago and New York. A leading investment management firm suggested that these hires are valuable because of the transferrable knowledge and skills these new employees can offer.

In both sectors, employers seeking to recruit specialized talent are known to poach from other firms. However, poaching from major clients, partners and suppliers is discouraged, particularly in capital markets.

Employers from the financial services and ICT sectors within the Toronto region must address the challenge of finding talented employees that best suit the firm's skill requirements. To this end, firms target well-educated, highly trained personnel with advanced knowledge of the respective industry. It was discovered that some ICT employers in particular, were comfortable hiring persons that were technologically skilled, but had a limited knowledge of the financial services industry and wealth management, whereas other ICT employers placed a premium on the ability of the employee to speak the financial services client's language. For instance, two medium-sized software providers emphasized the value in employing technical staff with knowledge and several years of experience in the banking sector:

One of the things we need on our product management side is deep domain expertise in financial services, and that's a bit of a unique skill set where [the employee] needs to understand the vertical market's specific domain issues.

Everybody from my team comes from a banking background. Toronto is rich with people from the banking industry if someone is looking for something different, but wants to leverage their capabilities. [A job at this firm] is perfect for someone who has been in a bank but looking for something less bureaucratic, more entrepreneurial.

While the Toronto region provides considerable pull factors for recruiting and developing talent, financial services and ICT firms in the region encounter a number of challenges in attracting and retaining staff due to rigorous competition between different firms in acquiring highly qualified personnel with specialized skills. In particular, a number of firms are unable to offer more competitive pay scales and convince potential candidates that their organization/firm is as innovative as competitor firms.

Fostering Financial Innovation in the Toronto Region during Uncertainty and Economic Crisis

In many post-industrial economies, uncertainty, risk and economic crisis have been the impetus for finding new ways to manage macro-prudential risk. National and regional governments as well as corporate actors within the financial services-ICT vertical have intensified research on managing risk in the financial sector and sought to capitalize on ICT products and services that mitigate and even prevent risk. The following section discusses how ICT products and services are being used to manage risk in the Toronto region's financial services sector during periods of heightened uncertainty and how the region fared in the recent economic downturn.

How Financial Services Firms Use ICT to Manage Risk

A very small number of ICT organizations in the Toronto region engage in financial engineering. These ICT firms combine mathematics and ICT to create derivatives, algorithms and other financial products and strategies that financial services use to manage risk. Financial risk management

instruments are critical for protecting financial services firms and their investors, as well as enhancing value in the sector. Financial services firms depend on these sophisticated products and services to acquire predictions of when risk will occur and its likely effects. However, the financial services sector in the GTA would benefit greatly from the development of systemic risk metrics. Efforts at benchmarking risk or developing baseline information on risk have been the focus of ongoing debate within academic and industrial circles for several years.

One Toronto-based ICT firm with investor clientele including a large commercial bank, credit union and a pension plan, explained how their financial services clients employ the firm's innovative tools and expertise in the hedge fund market. Given that hedge funds are generally high-risk investment instruments, the ICT firm acts as an intermediary by providing oversight, investment analytics, a new investment structure and a new legal structure. These innovative products and services not only allow the investor to have increased control over investments made, but also support the development of different types of investments. Unlike some other ICT firms specializing in risk management, this firm is less focused on being aware of the risks and more concerned with avoiding risks. To this end, the legal structures that this firm has developed provide the information needed to apply value-added risk management algorithms.

For many GTA-based ICT companies that provide risk management products and services, the economic downturn validated the important position they maintain in the financial services-ICT vertical and proved the need for their expertise. What follows is a more detailed account of the impact of the economic crisis on the Toronto's financial services sector and other ICT companies.

Toronto's Financial Services in the Recent Economic Downturn

Industry experts and insiders point to conservatism on the part of Canada's banking system and its regulatory bodies as the underlying factor behind Toronto's ability to weather the global financial crisis of the late-2000s. The recent global economic downturn was created in part by a liquidity shortfall in the U.S. banking system, the fallout from which reverberated throughout global financial markets. While industrialized nations invested huge sums of capital into their financial institutions in an effort to stabilize their domestic banking systems, Canada's financial institutions did not face the same level of volatility and subsequently, Toronto-based banks and insurance companies were able to retain capitalization, report profits, and pay shareholder dividends during this period without the need to resort to public support mechanisms.

One frequent observation by our study respondents is that traditionalism in business practice and conservative regulation essentially excluded Canadian banks from adopting the trends that caused the crisis. However, as asserted by a prominent industry analyst, "Now they are looked on as visionaries for not assuming huge amounts of risk and having survived it." According to the CIO of one of Canada's top wealth management companies, historically "the Canadian market tends to be more of an observer, watcher and follower. It is not a leader." While the Canadian market's perceived penchant for risk aversion and not pushing boundaries turned out to be one of its major strengths during the downturn and subsequent economic recovery phase, it is unclear whether or not emerging strong from this economic storm has translated into more business or created opportunities for expansion and innovation for firms in Toronto's ICT-financial services vertical.

According to our survey of the industry, the promotion of Toronto as a global financial capital and its recent success in the global economic downturn has yet to yield any tangible benefits for the vast majority of local firms. Respondents feel that, while it may have increased the visibility and reputation of the Canadian financial industry generally, specific examples of new opportunities—be they new revenue streams, partnerships, or increased innovation—are not evident. In some cases, the financial crisis itself brought new clients to certain firms because of the specificity of the solutions they provide. The VP of a Toronto-based financial software firm supports this notion:

The real story behind the financial crisis was that it was a liquidity crisis and we actually did very well because we have a liquidity solution so a couple of people 911'd us and said we need your solution yesterday, so it did us very well... But in other areas it just went flat or down, so I'd say it flat lined for us then, but we got new customers and that was good because over the long haul they will all grow.

Despite the fact that the downturn resulted from a crisis of credit and liquidity outside of Canada, firms in the Toronto region who provide ICT solutions to United States-based lenders and mortgage brokers saw an immediate drop in demand for their products. This draws attention to the fact that local markets are not independent but part of a global financial network. According to the General Manager of Toronto-based mortgage management software firm, “If it had mortgage in the words everyone ran away... even though Canada was fine. But nonetheless, a lot of the conduits dried up so a lot of people exited...we started putting projects on hold, because no one knew exactly what was going to happen.” Luckily for this and other local ICT firms serving this vertical niche, while U.S.-based mortgage brokers experienced considerable volatility during the crisis, local client firms did not show evidence of a major slowdown or change their agendas for innovation and technology adoption. It is generally felt that, though the successful re-emergence of Canada's financial system did not bring more opportunities for firm-level innovation, it did create a heightened sense on the part of Toronto's financial services firms that ICT infrastructure and efficient compliance management and back-office processing technology are more essential to corporate stability than ever before.

In the years since the peak of the crisis, little may have changed in terms of the innovative behaviour of local firms or the competitive conditions for Toronto-based firms in the global marketplace. However, reports by several organizations including the Greater Toronto Region Economic Summit, the Toronto Financial Services Alliance, and the City of Toronto outline a number of recommendations for strategically positioning Toronto as a global hub for financial services. These include building upon Toronto's reputation as centre of excellence in financial services regulation and innovation, using the promotion of Toronto as a strong financial capital as a catalyst for global expansion and reinforcing global recognition through increased involvement with international financial institutions. A recent development by the Toronto Financial Services Alliance has been the creation of the Centre of Excellence in Financial Services Education and the recently launched Talent Engine search tool. The strong focus on talent development and retention will help position Toronto as a 'skills gateway' attracting further financial services companies to the city region. Another development has been the establishment of the Global Risk Institute as a public-private partnership of financial sector companies, Canadian and Ontario governments,

educators and professional organizations. The purpose of the institute is the continuous improvement of the financial services sector through applied research into the integrative management of risks; the advancement of risk education, professional development for practitioners, executives and boards; and, the ongoing examination of the mutual interests of the financial services sector and public policy makers. The organization was incorporated on January 1, 2011 and operates from offices in the financial district of Toronto.

Conclusion

[Innovation is about] figuring out what needs to be done and then how best to continue to push the boundaries to achieve it...It's about how can you do things the best way possible in spite of constraints that might be holding you back from that today.

Innovation in the financial services-ICT vertical aims to improve service, provide new offerings and reduce costs. Our study reveals that there is a substantial degree of innovation in the sector, and these innovations are often incremental product improvements, aimed at market differentiation, and therefore easily imitated. Financial innovation also often entails process innovation in back-office systems. Security and reliability are key concerns in the introduction of innovative products and processes and the key risk parameters are those set by federal and provincial regulatory agencies.

This study underscores the importance of ICT in the financial services industry. Technology enables innovation, and along with other factors, intensifies the competitiveness of the financial services industry. The national ATM network stands out among the more innovative initiatives introduced by the financial services sector. On the other hand despite repeated references to the anticipated wave of innovation in mobile banking, there is a notable absence of momentum in this area to date. Other expanding areas of innovation with the potential to act as disruptive technologies with far-reaching implications are the growth of risk management through algorithmic trading and the growing move to cloud computing and the adoption of software as a service.

This study has also underlined the crucial importance of investments in ICTs for innovation in the financial services sector. Both on a world-wide basis and in the Toronto region, financial services are among the largest consumer of ICT hardware, software and services. The financial services-ICT nexus in the region features productive working relations facilitated by fairly well-defined knowledge flows between and within the two sectors. However, these linkages are affected by a number of challenges—including miscommunication and misalignment of financial services objectives and ICT solutions—which can have a negative effect on the innovation capacity of the ICT-financial services vertical. The study also identified an interesting paradox in this respect. Despite the effectiveness of ICTs in transcending space and sometimes even time, co-location between ICT vendors and suppliers remains critical for the success of major ICT investments and new projects, to the extent that some of the major ICT vendors even embed their own teams in the large financial services firms. In making choices among the vast array of ICT vendors and service providers, size and scale remain important for the financial service firms, which is why they often choose to deal with the large multinational system integrators and service providers.

Smaller, indigenous ICT firms located in the Toronto region are at somewhat of a competitive disadvantage as they cannot provide the size, scale and guarantees of regulatory compliance that the larger firms can deliver. Having said that, there is considerable evidence of a large number of highly successful indigenous ICT firms, mostly in software, but some server hosting and service firms as well, that have achieved a high degree of success of selling into the region's financial services sector. As noted above, these indigenous firms often get their start first in international markets before they are able to secure a local client base. Once established, the indigenous firms become a critical element of the local ICT innovation ecosystem in the Toronto region. The study suggests that there remains an untapped potential to exploit the synergies between the two sectors more effectively in order to develop new innovative products and services for the financial services firms, especially in newer fields such as risk management, as well as to leverage the home base to create more export opportunities for the local ICT firms.

The study also highlights the myriad advantages of the co-location of financial services and ICT firms. The research confirms that co-location in the Toronto region facilitates productive, informal face-to-face meetings between firms in close proximity, especially for those firms that maintain a presence with easy access to the PATH which connects the major office complexes in the central business district where the financial institutions are located. For some firms, location in the GTA also aids in the lobbying efforts of firms clustered close to the provincial government.

Most importantly, location in the Toronto region and the co-location of financial services and ICT firms has an impact on the regional labour market dynamics. Toronto has an impressive talent pool from which employers from both sectors select highly qualified personnel. We discovered that a great deal of the ICT talent is recruited from regional higher education institutions, but the pathways to employment are not always clearly demarcated. New initiatives such as the Centre of Excellence in Financial Services Education and the recently launched Talent Engine search tool will help to clarify and strengthen these pathways. At present, there appears to be no predominant institutional source of HQP in the financial services industry. Much of the technologically knowledgeable talent is apparently incubated internally and there is a fair bit of movement between the leading ICT firms, including the systems integrators and service providers and the technology departments of the financial institutions. It appears as though a fair portion of senior financial services talent is sourced internationally. Finally, the continuing importance of strong inward flows of highly skilled immigrant labour to the region was repeatedly stressed as a key factor that maintains the dynamic quality of the local labour market.

If the combined strength of the ICT and financial service sectors is to be fully leveraged, they must find ways to develop distinctive local/regional institutional arrangements and capabilities that will cultivate key linkages between the two sectors and drive the development of new ideas and solutions for enhancing the financial innovation potential of the financial services-ICT vertical in the GTA. One possible way to identify and support this potential is to undertake a high level road mapping exercise for the Toronto that could address the following issues:

- the prospects for supporting the growth of small indigenous ICT firms that provide products or services to the financial services industry;

- the scope for stimulating innovation among smaller niche ICT suppliers in the region by creating a program modelled on the federal government's Canadian Commercialization Innovation Program, which helps small suppliers overcome the barriers of entry into the government procurement system by connecting them with procurement opportunities and helping them commercialize new and innovative products;
- the implications of looming technological opportunities and challenges in mobile banking, cloud computing, algorithmic trading and portfolio management, etc.;
- the attraction and retention of local financial services-ICT talent;
- the extent to which there exists a Toronto region ICT specialization in financial services which can act as a factor of competitive differentiation for both sectors; and
- the question of how a Toronto region ICT specialization in financial services can best be developed as an export platform.

The impetus for this conversation might come from a confluence of sources including the Toronto region's ICT and financial services industries and the respective industry associations such as the Toronto Financial Services Alliance and Technicity. Conversely, the conversation might be initiated by the Toronto region's economic development community, including some of the funders of this report, along with broader representatives of the regional economic development organizations. Our hope is that this report will contribute to launching this conversation.

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