PLANNING THE **NEXT** GGH
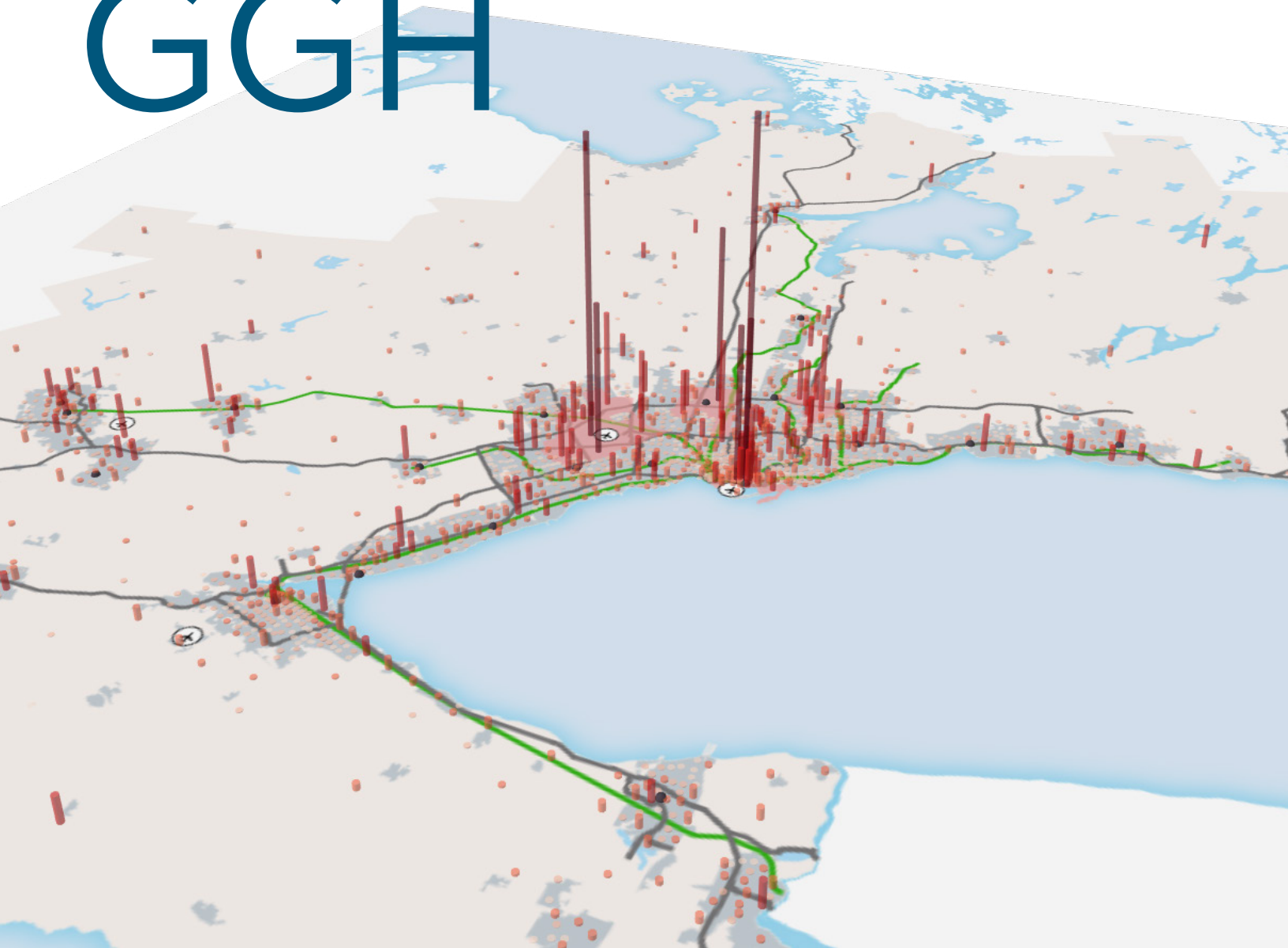
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AND THE NEPTIS FOUNDATION**
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PLANNING THE **NEXT** GGH

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PLANNING THE NEXT GGH
EXECUTIVE SUMMARY

The economic landscape of the Greater Golden Horseshoe (GGH) is in the midst of a dramatic shift. A more balanced pattern of urban and suburban employment growth has given way to the hyper-concentration of knowledge-based activities in and around downtown Toronto. This pattern is reinforced by the loss or slower growth of the economic activities that have historically been dispersed throughout the region.

Office work is being redefined, with the loss of administrative jobs resulting from computer technologies and automation, and new ways of working that mix offices, labs, tech space, startups, universities and colleges, and other uses. Disruptive technologies, like blockchain or Artificial Intelligence, have increased uncertainty, as have threats of trade disruptions.

Understanding this shift is especially important as municipalities review and modify their official plans to conform with the 2017 *Growth Plan for the Greater Golden Horseshoe*. These plans will shape growth and land use in the region for years to come, and need to ensure the right kinds of development opportunities in the right places to meet the changing requirements of business, supporting the economic vitality and resilience of the GGH.

Planning the Next GGH outlines how the GGH economy is changing, identifies the key drivers of this change, and describes the resulting economic landscape of the region. The analysis focuses only on employment in the tradeable industries (that is, "core employment") that are the economic foundation and shape the geography of the GGH, leaving aside population-related industries such as retail and personal services. The report maps the current geography of jobs in the region and patterns of change between 2006 and 2016. This work builds on the 2015 Neptis report, *Planning for Prosperity*.

The key questions addressed in this report are:
• What kinds of economic activities should we be planning for? How is the makeup of the GGH changing? What kinds of economic activities are growing, and what kinds are slow-growth or in decline?

- Where in the region should we be planning for growing activities, and within what kinds of urban environments? What areas are declining?
- What areas are most vulnerable to trade disruptions and automation?
- In the context of economic restructuring, disruption, and uncertainty, how can we make planning more effective to support key Growth Plan objectives such as the efficient use of infrastructure and integration of transit and land use planning? And how can land use planning support the economic resilience, competitiveness, and prosperity of the regional economy?

NEW ANALYTICAL APPROACHES

In order to answer these questions, new analytical approaches are needed. Conventional planning for employment has relied on linear extrapolations of past trends and analyses of economic change at a broad industry level. This approach does not capture the shift under way in a regional economy being reshaped by technological disruption, and provides little specific information on the kinds of economic activities that land use planning needs to provide for.

This report offers, first, a framework for understanding long-term structural change, the key drivers of restructuring, and the new economic geography.

Second, it introduces 12 industry "Archetypes" as an analytical tool designed specifically to better inform land use planning for employment-related uses. Archetypes are groups of tradeable industries that share both similar economic characteristics and locational preferences, helping planners make clear links between economic change on one hand and spatial patterns on the other. Archetypes differ from the concept of "clusters" as defined by Michael Porter in 1990 in *The Competitive Advantage of Nations* – a geographically proximate group of interconnected companies and institutions. Together, employment in Archetypes represents 1.46 million of the 2.38 million core employment jobs in 2016 across the GGH.

Finally, we also undertake an analysis of the geography of disruption, identifying the places and municipalities in the GGH that are most vulnerable to automation and potential trade disruptions.

The intelligence gained from such a nuanced dynamics-driven, regional-level spatial analysis can be used to create more anticipatory regional and local planning frameworks, better suited to face potential challenges, address future land needs, and create the right kinds of urban environments and planning regimes.

WHAT KINDS OF ECONOMIC ACTIVITIES SHOULD WE BE PLANNING FOR?

The transition to a knowledge economy is driven by globalization and technological change. This shift is challenging routine work, and fostering the growth of skilled, tech-related, and knowledge-intensive activities.

Booming Archetypes include Soft Tech, Finance, High Order Business Services (HOBS), Arts and Design, Higher Education, and Logistics. Declining Archetypes suffering net job losses include Other Manufacturing, Other Wholesaling, and Back Office.

WHERE SHOULD WE BE PLANNING FOR EMPLOYMENT GROWTH, AND IN WHAT KINDS OF URBAN ENVIRONMENTS? WHAT AREAS ARE DECLINING?

Hyper-concentration in and near downtown Toronto

Economic drivers have strengthened the forces of spatial clustering, and restructuring has brought about the hyper-concentration of economic activity in and around downtown Toronto. The Archetypes that show the most growth are also those that have strong tendencies to concentrate spatially. In the GGH, Finance grew by 47,000 jobs between 2006 and 2016, HOBS by 25,000, Soft Tech by 19,000, and Arts and Design by 10,000 jobs. Overall, downtown Toronto has seen the addition of 67,000 new "core" jobs and 85,600 total jobs between 2006 and 2016.

EMPLOYMENT BY ARCHETYPE, GGH 2006 AND 2016

	2006	2016	Change	% Change
Finance	228,150	275,300	47,150	20.7
High Order Business Services	98,215	123,345	25,130	25.6
Back Office	54,710	51,715	-2,995	-5.5
Arts & Design	102,645	112,665	10,020	9.8
Soft Tech	71,960	91,270	19,310	26.8
Hard Tech	72,810	51,225	-21,585	-29.6
Science-based	52,950	64,980	12,030	22.7
Higher Education	59,635	78,100	18,465	31.0
Logistics	25,170	32,635	7,465	29.7
Other Wholesaling	139,920	121,750	-18,170	-13.0
Special				
Aerospace	10,815	13,150	2,335	21.6
Telecoms	25,400	32,035	6,635	26.1
Pharma	22,960	25,175	2,215	9.6
Other Manufacturing	516,255	386,480	-129,775	-25.1
Archetypes Total	1,481,595	1,459,825	-21,770	-1.5
Archetypes Total w/o Other Manufacturing	965,340	1,073,345	108,005	11.2
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

A slowdown in job growth elsewhere in the GGH

Outside the Toronto core, we see a slowdown in job growth. Between 2006 and 2016, three of the five Suburban Knowledge-Intensive Districts (SKIDs) – the suburban areas that had previously attracted the most significant core employment growth – saw no growth or even losses: Markham, Sheridan, and Waterloo. Only the Airport and Meadowvale SKIDs grew between 2006 and 2016, with the latter expanding by almost 7,000 jobs. Overall, core employment in the SKIDs grew by a modest 8,500 jobs in the 10-year period. By contrast, in the 2001–2011 period, core employment in the SKIDs grew by 35,000 jobs, while downtown Toronto added 42,000 jobs, as described in *Planning for Prosperity*.

Employment growth in the SKIDs to 2016 included Soft Tech, Finance, Pharma, Telecoms, and Science-based Archetypes, and to a lesser extent, Hard Tech. Outside the SKIDs, Telecoms and Pharma exhibit small concentrations of employment growth. Meanwhile, Logistics has seen significant job growth across the region.

There was little to no core job growth in the Urban Growth Centres (UGCs), Major Transit Station Areas (MTSAs), and other Strategic Growth Areas designated in the Growth Plan.

Areas of job loss across the GGH

There are significant areas of core employment loss across the region, including southern Oshawa, the inner suburbs of the City of Toronto, southerly employment areas of the 905, south of the QEW, in Hamilton city centre, and in Kitchener and Cambridge. The megazones, which had seen modest growth in core jobs between 2001 and 2011, lost over 5,000 jobs between 2006 and 2016.

These changes can be attributed to declining employment in certain Archetypes: including the loss of 130,000 Other Manufacturing jobs, 22,000 Hard Tech jobs, 18,000 Other Wholesaling jobs, and 3,000 Back Office jobs in this period.

WHAT AREAS ARE MOST VULNERABLE TO AUTOMATION AND TRADE DISRUPTIONS?

Employment in the industries most vulnerable to automation represents more than 692,000 jobs. These are primarily manufacturing industries, so the geography of vulnerability reflects the distribution of these jobs in employment areas across the GGH. This includes the three megazones, Toronto's inner suburbs, and the cities of Guelph, Oshawa, Alliston, Cambridge, and Oakville.

Accommodation and food services is also an industry at high risk of automation – and the only industry in our report that represents non-core employment. Employment in this industry shows a different geography from other vulnerable industries, with a concentration in downtown Toronto, and a pattern following the geography of population elsewhere.

Employment in the industries that are most vulnerable to trade disruptions represents almost 200,000 jobs. Here too, manufacturing industries and districts figure prominently, including auto manufacturing locations, such as those in Guelph, Oakville, Alliston, Cambridge, and Oshawa.

HOW CAN WE MORE EFFECTIVELY PLAN THE NEXT GGH?

A shifting economic landscape, and growing disruption and uncertainty call for new approaches to land use planning.

Planning agencies at all levels must factor the new economic geography of the GGH into land use planning. It affects what kinds of employment-related growth municipalities can expect, where, and the kinds of urban environments needed to accommodate new employment. This is critical to successful Growth Plan implementation, as well as planning for places and major investments that depend upon anticipated employment growth. To this end, Growth Plan employment forecasts and allocations could be updated and more robust analytical approaches adopted.

Strategic, regional perspectives are needed, such as more anticipatory, forwardlooking planning approaches. Proactively planning to ensure growing Archetypes like Finance, HOBS, Soft Tech, Arts and Design, or Logistics are accommodated is key to effective planning and the continued economic success of the region.

The hyper-concentration of job growth raises critical issues about planning for a core under intense growth pressure, and an increasingly dominant single centre for the GGH. A strategic, regional economic development perspective might ask if we ought to think seriously about planning for a second regional "downtown" elsewhere, to promote economic resilience, reduce commutes, and achieve other benefits.

Hyper-concentration also has implications for Urban Growth Centres (UGCs), Major Transit Station Areas (MTSAs), and other Strategic Growth Areas outside downtown Toronto. Planning strategies could include the proactive updating of plans and renewal of employment environments to meet the needs of new economy businesses. And since the supply of places designated for dense office uses likely far outweighs demand, serious consideration should be given to prioritizing among these many nodes and corridors.

While planning in the GGH has tended to focus on growth, there is a need to address areas of transition and loss. Along with other planning strategies, close integration of planning with place-based economic development strategies would support regeneration of these areas.

Planning can play a role in addressing potential disruptions and uncertainty, promoting economic growth and resilience. More anticipatory and flexible planning approaches can ensure the evolving needs of businesses are met, and create urban environments that support innovation. Planning frameworks can offer greater flexibility in permitted employment uses, and anticipate and guide the evolution of buildings, densification, integration of transit, and other factors.

A strategic, regional perspective is key to the competitiveness and successful planning of the region. For example, conversions of employment land that are considered only in the municipal context may lead to suboptimal outcomes for the regional economy as whole. A regional economic development strategy, supported by a regional database, would also help guide the successful planning of employment areas.

Better planning for the many diverse areas that contain employment in tradeable economic activities is critical to the future of the Greater Golden Horseshoe. Areas catering to business play a key role in achieving fundamental planning objectives related to the efficient use of infrastructure, sustainable transportation, and a livable region. Also, the continued economic competitiveness and prosperity of the GGH depend in part upon effective land use planning.

Successful planning relies on integrating an understanding of the economic dynamics and new realities that we face in the Next GGH.

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CHAPTER 01
INTRODUCTION

The economic landscape of the Greater Golden Horseshoe (GGH) is in the midst of a dramatic shift. The decades-old pattern of suburbanizing economic activity, especially "office work," has reversed. Instead, we are seeing a new, hyper-concentration of economic activity in the core of the region, in and around downtown Toronto. This concentration is reinforced by the loss or slower growth of the kinds of economic activity that have historically been more dispersed throughout the region.

In the last 10 years, the region has lost 130,000 manufacturing jobs, 3,000 back-office jobs, and 18,000 wholesaling jobs. At the same time, finance grew by 47,000 jobs, and soft technology industries by 19,000.[1] "Office work" itself is being redefined, with the loss of administrative jobs resulting from computer technologies and automation, and new ways of working that mix offices, labs, tech space, startups, universities and colleges, and other uses. Disruptive technologies, like blockchain or Artificial Intelligence, have increased uncertainty, as have threats of trade disruptions.

This shift makes land use planning challenging, especially planning for employment uses. Understanding the new economic landscape and what forces are driving it will help planners create the right supply of development opportunities, in the right places, with the right planning frameworks and urban environments to meet the changing needs of business in the region. Getting this right is also key to achieving Growth Plan objectives, such as the efficient use of infrastructure or transit-supportive development. And it underpins the important role planning plays in supporting the economic resilience, productivity, and success of the regional economy.

These considerations are especially important as municipalities review and modify their Official Plans to conform with the updated 2017 *Growth Plan for the Greater Golden Horseshoe.* These plans will shape growth and land use in the region for years to come. In a time characterized by a break from past trends, and rapid, often disruptive, economic and technological change, new approaches are needed. Conventional methods of planning for employment uses often assume a continuation of past trends, entrenching past needs into the future. But this may be a risky approach in the current environment.

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1   Employment figures are for the industry groupings used in this report, known as "Archetypes."

A more anticipatory and robust approach is needed. The intention is not to predict the future, but to identify the key drivers of change that shape the economic landscape of the GGH, in order to make planning for employment uses in the GGH more effective and adaptive.

This report is intended to support land use planning for employment-related uses across the GGH by addressing the following questions:

- What kinds of economic activities should we be planning for in the GGH, and where?
- What kinds of urban environments and planning frameworks will support economic activity in the region?
- How can we plan for rapid change, such as that linked with automation, or disruptions in international trade?
- What areas of the GGH are most at risk from these potential disruptions?

By addressing these questions, the analysis also informs economic development initiatives in the region.

The report illustrates the kinds of concepts, issues, and analyses that should be considered when planning for employment uses in the GGH today and introduces a new analytical tool – that of industrial "Archetypes." This tool is designed specifically to inform land use planning by making clear links between economic change on one hand and spatial patterns on the other. It is hoped that municipal planners can use the concepts, analyses, and information in this report in the development of plans and planning policy.

In Chapter 2, we describe the fundamental concepts that help us understand what is driving the changing economic landscape. In Chapter 3, we describe the changing geography of employment in the region, and explain the Archetypes, their spatial patterns in the region, and key Archetype-specific drivers of change. In Chapter 4, we describe the geography of the jobs that are most vulnerable to automation and potential trade disruptions. In Chapter 5, we draw conclusions and offer suggestions on how planning policy can be updated to address the needs of the Next GGH.

CHAPTER 02

THE CHANGING ECONOMIC LANDSCAPE OF THE GGH

The economy of the Greater Golden Horseshoe has experienced dramatic change in recent years. Employment in manufacturing has declined, while new kinds of industries, such as digital media and app development, have emerged. Growing knowledge-intensive activities have concentrated in just a few locations in the region, mainly Downtown Toronto and a few suburban knowledge-intensive districts, and this tendency to concentrate appears to be increasing. Warehousing and logistics have also seen explosive growth in the form of new large distribution centres at the urban edge. With potential disruptive change from rapidly diffusing automation in the workplace, and the possibility of disruptions to trade, the future is more uncertain.

Under these circumstances, how can we successfully plan land uses in the GGH over the next 25 years? What kinds of economic activities should we be planning for? What kinds of urban environments do we need to best support these activities, and in what locations?

These are the central questions that this paper addresses. In this chapter, we draw on existing research to identify some of the key drivers of change that explain the evolving economic landscape of the GGH. The goal is to help planners and other policy analysts understand and monitor change in their cities and towns when developing plans or framing planning policy.

To answer these questions, first we need to understand how and why the economy of the GGH is restructuring. Which types of activities are growing quickly, which are growing slowly, and which are shrinking? What are the key drivers behind this restructuring?

Second, how are the locational requirements of these activities changing, and what qualities and characteristics do growing firms seek in an urban environment?

WHAT KINDS OF ECONOMIC ACTIVITIES SHOULD WE BE PLANNING FOR?

Restructuring and its drivers

The restructuring of the GGH economy has been under way for several decades. Between 2006 and 2016, the region lost 130,000 jobs in the manufacturing sector. At the same time, about 47,000 jobs in finance were added.[2]

Restructuring is not a one-time event; it is a continuous process. The regional economy's makeup of industries, firms, and jobs will continue to shift and evolve in response to key drivers of change. This restructuring takes place not only *between* industries (for example, the growth of finance and the decline of manufacturing employment) but also within industries. For example, *within* the finance sector, activities such as investment analysis have grown, while clerical functions in banking and insurance have declined.[3]

With a horizon of 25 years for many land use plans, planners need to estimate the demand for non-residential land uses in the context of long-term, structural economic change. This approach differs from common planning methods and rationalizations that rely on short-term market analyses to establish only that demand *currently* exists for a given use.

Moreover, it is no longer sufficient simply to extrapolate past trends forward in a linear fashion, without regard to the dynamics of change. In the current context of rapid, disruptive technological change, such an approach is a less informed and potentially risky basis for land use planning.

There are several ways to look at the regional economy from a long-term perspective. One approach suggests that since the late 1700s, there have been not one but several industrial revolutions.[4] The first was based on the invention of water and steam power, and brought about the initial mechanization of production. The second began in the late 1800s, founded on electric power, and was associated with the move to mass production in factories. The third began in the 1950s with the invention and then wide diffusion of digital technologies, the computer, new communications technologies, and the Internet. Some argue that we are now entering a fourth industrial revolution.[5] This one is characterized by the fusion of different advanced technologies, such as artificial intelligence, robotics, 3D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing.[6]

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2   Statistics Canada, Place of Work data for the Greater Golden Horseshoe. These figures are for the "archetype" industry groupings used in this report.
3   Analysis of Statistics Canada Labour Force Survey data, 2001–2014.
4   Klaus Schwab, *The Fourth Industrial Revolution*, Geneva: World Economic Forum, 2016.
5   Ibid. Some argue that the fourth industrial revolution is not fundamentally distinct from the third. See for example, Jeremy Rifkin, "The third industrial revolution: Toward a new economic paradigm," *Huffington Post*, September 25, 2011.
6   Schwab, *The Fourth Industrial Revolution*, 2016.

Another long-term, structural perspective is that of the long-wave economic cycle. Nicolai Kondratieff identified waves of economic growth and decline, each lasting about 50 years, starting with the first industrial revolution of the late 1700s.[7] Each wave is characterized by a rise and fall, consisting of prosperity, recession, depression, and improvement. According to this theory, we are now in a fifth Kondratieff wave that began in the 1990s, based on new information technologies.

The "fourth industrial revolution" and Kondratieff frameworks both identify technology as a key driver of change. The role of foundational technologies (steam power, electric power, and digital technologies) is seen as central to explaining long phases of economic growth, change, and restructuring. Today, technological innovation is seen in tandem with globalization as the two main drivers of economic restructuring.

TECHNOLOGICAL INNOVATION AND GLOBALIZATION ARE DRIVING ECONOMIC RESTRUCTURING

Understanding these drivers is essential to understanding the changing makeup of the GGH economy and the region's evolving economic landscape from a long-term perspective. Technology and globalization are themselves evolving within the broader context of our economic system, which has its own drivers and dynamics.

Technological innovation and globalization occur within the context of the economy, and an enduring dynamic of our economic system that is key to restructuring is the tendency for capital to concentrate. This has long been recognized, most recently by Thomas Piketty, who has provided strong evidence of this in 21st-century economies.[8] Piketty argues that this concentration happens because wealth (that is, capital) grows faster than economic output.

CAPITAL TENDS TO CONCENTRATE

Concentration also occurs as markets get bigger with globalization, and firms get bigger to compete in these markets. As we have seen in the GGH, corporate consolidations, acquisitions, and mergers are often accompanied by rationalizations – in which the different components of the production process are moved around, consolidated, or eliminated altogether. A recent example is the announced closure of the 87-year-old Campbell Soup plant in Etobicoke, as global food producers consolidate production in larger, modern factories, in this case in the United States.[9]

The tendency of capital to concentrate is mentioned here because it is a structural driver of urban change. It is implicated in increasing social and income polarization within cities, for example. It also shapes the economic landscape. In the GGH we have seen the geographic concentration of certain types of economic activities in recent years. Previous Neptis Foundation research highlighted the way in which knowledge-based activities focused on a limited number of locations in the region – Downtown Toronto and several suburban knowledge-intensive districts.[10]

7   An English version was published as Nikolai Kondratieff, *Long Wave Cycle*, Dutton, 1984.
8   Thomas Piketty, *Capital in the Twenty-First Century*, Harvard University Press, 2014.
9   Brennan Doherty, "Campbell Soup factory in Toronto to close," *Toronto Star*, January 24, 2018.

In the five years since that research, geographic concentration has intensified, with high levels of knowledge-intensive growth focused heavily on Downtown Toronto. The City of Toronto estimates that employment in the downtown grew by close to 100,000 jobs between 2012 and 2017 – including the addition of over 30,000 jobs in 2017 alone.[11] This concentrated growth pattern has important regional and land use planning implications, both for the places that are attracting massive growth and for those that are not.

The tendency for capital to concentrate is a key driver of economic and urban change.

Globalization

Globalization has several basic elements. The globalization of trade takes the form of expanding markets for goods and services. The reduction of trade barriers through agreements like the Free Trade Agreement in 1989, followed by NAFTA in 1994, provides freer access to U.S. and Mexican markets. The general trend has been for Canada to seek additional trade agreements, such as those with the European Union and Pacific Rim countries.

GLOBALIZATION OF MARKETS

Freer trade has had a dramatic impact on the structure of the national and GGH economy. The reduction of trade barriers also removed the need for U.S. branch plants to be located in Canada to access Canadian markets. Many factories and jobs moved to the southern U.S., Asia, Mexico, and other regions where labour costs are lower.

GLOBALIZATION OF PRODUCTION

Freer trade has led the GGH economy to focus on activities in which it has a comparative advantage, while it loses activities to other jurisdictions that can do them more efficiently or competitively. Being part of a larger market goes hand-in-hand with specialization in the regional economy in the kinds of tradable activities in which we are most competitive.

Capital has become geographically mobile. Computers, the Internet, and other communications technologies made it possible to establish global supply chains, decoupling the co-location of head office and production functions that was previously the norm. Production functions could now locate wherever it was most competitive, often in regions where labour costs are lower.

GLOBALIZATION OF CAPITAL

10   Pamela Blais, *Planning for Prosperity*, Toronto: Neptis Foundation, 2015.
11   Figures from the Toronto Employment Survey, 2017.
12   For data on employment in the Finance Archetype, see Chapter 3.

Financial capital can move around the globe instantaneously in electronic form. Along with the deregulation of the finance sector in many countries, this has led to the explosive growth of financial industries. In the GGH, employment in the finance sector expanded at 2.6 times the economy as a whole between 2006 and 2016.[12]

Labour is arguably less mobile than some forms of capital, but we have seen increasing levels of immigration to Canada in recent years, and further increases are projected. The GGH remains a strong magnet, attracting a significant share of immigrants.

GLOBALIZATION OF LABOUR

The globalization of markets, production, capital, and labour is a key driver that continues to reshape the GGH economy.

Technology

Historically, each major phase of capitalism (or each industrial revolution) was driven by a particular set of technologies. Each phase also had a distinct economic and urban geography closely associated with the dominant technologies, production systems, and markets. For example, in the early 1900s, key drivers of urbanization included access to rivers, ports, and railways for the transport of goods, and proximity to coal as a source of power.[13] Today, the creation and sharing of information and ideas drives urbanization.

NEW TECHNOLOGIES ARE PROPELLING THE SPATIAL REORGANIZATION OF PRODUCTION AT BOTH GLOBAL AND REGIONAL SCALES.

Most recently, new digital and communications technologies have played a central role in changes to multinational corporations and supply chains, prompting the spatial reorganization of production on a global scale, and with it the restructuring of economies on a regional scale, including that of the GGH. Many of the tasks and jobs that were "off-shored" to low-cost locations were of a relatively simple, routine, and repetitive nature.

NEW TECHNOLOGIES ARE PROPELLING THE AUTOMATION OF WORK.

In addition to enabling production to be organized and reorganized across the globe, new technologies have a second, far-reaching impact on the makeup of regional economies: the potential for automation of tasks or occupations. This process has been under way since the "first" industrial revolution. More recently, the computer, software, and robotics have led to the automation of many routine tasks, especially in manufacturing, and administrative tasks, such as bookkeeping (Figure 1[14]). In the GGH, the regional economy has been restructuring as certain routine tasks or occupations are automated.

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13 Paul Swinney and Elli Thomas, *A century of cities: Urban economic change since 1911*, UK: Centre for Cities, 2015, p. 7.
14 Statistics Canada, Labour Force Survey.

FIGURE 1: CHANGE IN EMPLOYMENT FOR OCCUPATIONS WITH MOST SIGNIFICANT LOSSES, GGH, 2001–2014
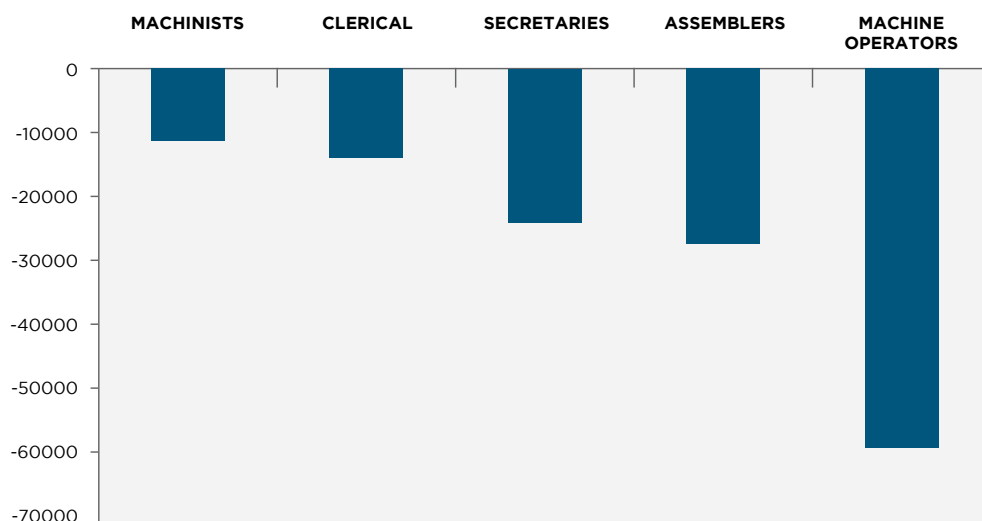
The restructuring of the GGH economy that has been unfolding for the last several decades is often described as a shift from manufacturing to services. While that shift is certainly observable, this categorization does not capture the essence of the change taking place. Underlying the shift are off-shoring and automation, primarily of routine, lower-skilled tasks. It so happened that there was a concentration of these types of tasks in manufacturing, although jobs in other sectors were also lost, as GGH data suggest (see Figure 1).

This is not fundamentally a shift from manufacturing to services, but a restructuring resulting from the automation and off-shoring of certain types of productive tasks.

This is especially true today and in the coming years, as ongoing and rapid techno-logical advances are expanding the potential for automation beyond the realm of routine, repetitive tasks to both higher- and lower-skilled types of work. Until now, jobs at both the high and low ends of the skills spectrum have been more difficult to automate. This is changing quickly.

On the higher skilled end, we are already witnessing the automation of tasks such as financial advising with "robo-advisors" like Wealthsimple. The automation of some forms of legal work, including basic contracts, is imminent.[15] On the lower-skilled end we have automated or eliminated bank tellers', travel agents', and retail checkout clerks' work.

What the GGH economy has been experiencing and will likely continue to experience is a shift to an economy driven by knowledge-intensive activities, as Figure 2 shows.[16]

FIGURE 2: CHANGE IN EMPLOYMENT BY SKILL LEVEL, GGH, 2001–2014
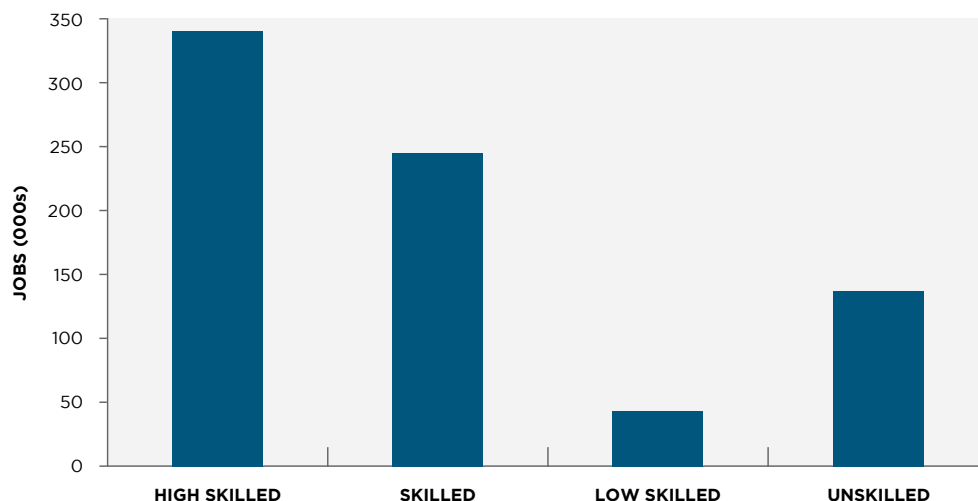
The expanding potential for automation at both the high and low ends of the skills spectrum is a key driver shaping the structure of the GGH economy.

Of course, technology has the potential not only to replace existing types of economic activities, but also to create entirely new ones. Many significant sectors in the economy simply did not exist a few decades ago, such as website and app designers.

The demand for different types of economic activities and land uses will evolve and change as the GGH economy continues to restructure – as some industries and activities expand and others contract in response to evolving technology and markets.

15 Deloitte, Developing legal talent: stepping into the future law firm, February 2016.
16 Analysis of Statistics Canada Labour Force Survey data for the nine CMAs that make up the GGH.

This restructuring in and of itself transforms the region's economic landscape. As finance grows, for example, demand for development in the high-density, corporate setting of Downtown Toronto also grows. We are seeing this demand today, with an expanded downtown headquarters for CIBC[17] and the consolidation of BMO activities in the converted former Sears store in the Eaton Centre.[18]

RESTRUCTURING OF THE GGH ECONOMY TRANSFORMS THE REGION'S LANDSCAPE.

WHAT KINDS OF URBAN ENVIRONMENTS, WHERE, SHOULD WE BE PLANNING FOR BUSINESSES?

Changing location and urban environment needs

Understanding restructuring is key to understanding what *kinds* of economic activities we should be planning for. But in addition to the effects of restructuring, the region's economic landscape is also shaped by firms' locational preferences and the specific mix of characteristics they seek from their urban environment to support day-to-day production and long-term competitiveness. These factors are also changing as firms face new and competitive challenges from emerging technologies or changing trade conditions.

The key to anticipating the evolving locational preferences of firms, and their demands of their urban environments, is an understanding of the role the urban environment plays in firms' operations and competitiveness. In short, urban environments confer special and specific advantages to businesses.

URBAN ENVIRONMENTS CONFER SPECIAL AND SPECIFIC ADVANTAGES TO BUSINESSES.

Cities support production by providing access to a labour pool that is both wide and deep, including workers with specialized skills. This is one of the key competitive benefits of large cities and urban regions. As the economy continues its transition toward knowledge-intensive activities, this factor will grow in importance. Large urban regions like the GGH support specialized businesses, providing intermediate business-to-business inputs and services. The high levels of specialization afforded by a large labour market like that of the GGH represent an important source of competitiveness for regional firms, and of productivity and wealth creation for the province.

A DEEP AND WIDE LABOUR POOL

Of course, urban regions like the GGH also provide excellent access to final business and consumer markets for goods and services of all kinds.

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17 Christina Pellegrini and James Bradshaw, "CIBC to move 15,000 staff to new downtown Toronto headquarters," *Globe and Mail*, April 12, 2017.
18 Tara Deschamps, "Bank of Montreal to open tech 'campus' in old Sears HQ at the Toronto Eaton Centre," *Financial Post*, March 1, 2018.

Urban environments also support innovation. In addition to providing access to the highly skilled labour that drives innovation, urban environments offer access to leading technologies, to formal and informal knowledge networks, and to specialized resources, such as laboratories, machinery and equipment, and research capabilities at universities and colleges.

These competitive benefits afforded by cities can be grouped under the heading "agglomeration economies." Agglomeration economies have been succinctly described by Gilles Duranton and Diego Puga[19] and others as the benefits to firms derived from sharing, matching, and learning. In complex industries and uncertain times, agglomeration economies support interactions, coordination, and certainty.

AGGLOMERATION ECONOMIES

AGGLOMERATION ECONOMIES
Sharing: e.g., of specialized local suppliers in the production chain.
Matching: e.g., of specialized workers to jobs.
Learning: localized knowledge "spillovers" and opportunities for knowledge transfer.

Agglomeration economies are not new. They have long been acknowledged as a steady driver of urbanization as early as the 19th century by Alfred Marshall.[20] What is new is the specific form that they take in the constantly and rapidly evolving knowledge-based economy in which we find ourselves today.

As the transition to a knowledge-based economy unfolds and many routine types of work are under threat from automation, it is clear that innovation and knowledge production are increasingly driving economic growth. Urban locations and environments have important roles to play in supporting innovation.

INNOVATION

Specific characteristics of urban environments have been associated with supporting innovation. It has become commonplace to note that denser, more mixed-use urban environments with flexible buildings that can be used in many different ways support innovation processes – an idea proposed by Jane Jacobs in the 1960s.[21] While this fundamental insight remains true, more recent research sheds additional light on the relationship between innovation and the characteristics of urban environments.

Gregory Spencer compared the business, locational, and urban environment characteristics of arts-related businesses with those of science-based businesses in Vancouver, Toronto, and Montreal. Arts-related businesses were more likely to be located on the edge of the downtown, in higher-density, mixed-use environments. Science-based firms were more likely to be found in suburban, low- or medium-density, single-land-use, auto-dependent environments.

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19   Gilles Duranton and Diego Puga, "Micro-foundations of urban agglomeration economies," in J. V. Henderson and J. F. Thisse (eds.), *Handbook of Regional and Urban Economics*, Elsevier, 2004, edition 1, volume 4, chapter 48, pages 2063–2117.
20   As noted in OECD, *The Metropolitan Century*, 2015, p. 47.
21   Jane Jacobs, *The Economy of Cities*, New York: Vintage, 1969.

What most explained these different locational and urban preferences was the degree to which businesses were inwardly oriented, meaning that relationships within the firm were most important, or externally oriented, meaning that relationships with other firms were most important. This characteristic is tied to the firm's business structure and the nature of the industry itself.

Science-based firms tended to be larger, corporate or multinational, focused on the development of proprietary products, all of which meant that they were more self-contained and inwardly focused. Their location in suburban, single-use employment zones reflects this orientation. Arts-related firms tended to be small, and relied more on forming relationships with other firms and entities. In these industries it is common to form and reform production networks on a project-by-project basis, for example, in the film industry. Denser, mixed-use environments offer ample opportunities for formal and informal meetings and knowledge exchange outside the firm.

This distinction between urban and suburban settings is echoed by research on the geography of innovation, as represented by patents. Suburban areas were found to be associated with innovation (a high number of patents).

However, cities, especially denser urban areas, produce a higher number of "unconventional innovations" – patents resulting from the cross-fertilization of ideas from different fields.[22]

So the story about how cities and urban environments promote innovation is perhaps more nuanced than our common narrative. Firms in different industries have different innovation processes which make different demands of their urban – or suburban – environments.

Understanding firms' needs with respect to competitive pressures, production, and innovation processes and the roles that urban environments play in serving these needs will help municipalities better plan for the right kinds of land uses in the right places.

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22 Enrico Berkes and Rubin Gaetani, "The Geography of Unconventional Innovation," conference paper published online, 2015.

EMERGING DRIVERS OF CHANGE

The key drivers described above are reshaping the makeup of the GGH economy – the concentration of capital, globalization, technological change, and automation. Within this context, certain factors become critical to firms' ability to compete, emphasizing the increasingly important roles that urban environments play in innovation, agglomeration economies, and access to labour. Together, these factors shape the emerging economic geography of the GGH.

As we look forward, key drivers of change such as innovation and automation are evolving, and newly emerging drivers, such as increasing trade in services, will play an important role in shaping the evolution of the GGH economic landscape. These evolving drivers and their potential implications for the region are outlined below.

Innovation

Innovation has become more important to the GGH economy in recent years. Innovation has led to entirely new industries, such as software development and web and app design. But it is also reshaping more traditional industries. In the auto sector, General Motors announced 1,000 new software and engineering jobs in the GGH in the areas of Autonomous Vehicle Software and Controls Development, Active Safety and Vehicle Dynamics Technology, Infotainment, and Connected Vehicle Technology.[23]

Some of these jobs are to be located at the existing Oshawa Tech Centre, but 700 positions will be created at the Canadian Technical Centre, which opened in early 2018. Interestingly, the Centre is located in Markham near Warden Avenue and Highway 7 – an example of science-based activities drawn to a suburban setting. And while Campbell's Soup announced the closing of its manufacturing operations in Etobicoke, it also stated that it would retain 200 corporate and commercial jobs at a new location in the Toronto area, to include a food innovation facility.[24]

The future prosperity of the GGH will not involve attempts to regain low-wage jobs in traditional sectors; continued economic growth places innovation at the core. The success of individual firms and of the regional economy as a whole will depend in large part on the degree to which GGH firms, workers, and institutions can innovate with new or improved products and processes.

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23 General Motors, "General Motors announces expansion of connected and autonomous vehicle engineering and software development work in Canada to reach approximately 1000 positions," news release, June 10, 2016.
24 Doherty, "Campbell Soup Factory," 2018.

As the role of innovation expands, land use planners can respond by ensuring not only that sufficient space is available for these activities, but also that the urban environments created have characteristics that support innovation. What this might mean is discussed in Chapter 5.

LAND USE PLANNERS CAN HELP ENSURE THAT URBAN ENVIRONMENTS SUPPORT INNOVATION.

Automation

Until now, automation has focused on routine tasks, such as the use of robots on assembly lines, personal computers to replace clerical and bookkeeping tasks, or ATMs to replace bank tellers. Non-routine tasks – both physical (such as personal care workers, cleaners, drivers) and cognitive (such as lawyers, engineers, designers) have to date been resistant to automation. With advances in computing technologies, sensors, and artificial intelligence, however, the possibility for non-routine tasks to be automated is becoming much more tangible, immediate, and widespread.

WITH ADVANCES IN TECHNOLOGY, MORE NON-ROUTINE TASKS CAN BE AUTOMATED.

Based on currently available technologies, a Brookfield Institute study found that for Canada as a whole, 46 percent of work activities (equivalent to 7.7 million jobs) were technically automatable. Not surprisingly, there is considerable variation by industry.[25] Both the Brookfield study and a study by the C.D. Howe Institute[26] analysed how the impacts of automation might vary by industry. The results are summarized in Table 1.

Though the methodologies and industry categories vary somewhat between the two studies, there is broad agreement that the industries most vulnerable to automation in the GGH are:
- accommodation and food services;
- manufacturing;
- agriculture;
- transportation and warehousing.

Similarly, both studies found that the industries least vulnerable to automation were:
- educational services;
- professional, scientific and technical services;
- health care and social assistance.

25 Creig Lamb and Matt Lo, *Automation across the nation: Understanding the potential impacts of technological trends across Canada*. Brookfield Institute, 2017, p. 5.
26 Mattias Oschinski and Rosalie Wyonch, *Future shock? The impact of automation on Canada's labour market*, C.D. Howe Institute: Commentary No. 472, 2017, p. 13.

TABLE 1: TWO STUDIES ON INDUSTRY VULNERABILITY TO AUTOMATION, CANADA

Listed from most to least vulnerable

C.D. Howe	Brookfield
Fishing, hunting, and trapping	Accommodation and food services
Agriculture	Manufacturing
Motor vehicle, body, trailer & parts manufacturing	Transportation and warehousing
Paper manufacturing	Agriculture, fishing, hunting, and trapping
Accommodation and food services	Mining, quarrying, and oil and gas
Food and beverage products	Construction
Manufactured mineral products	Retail trade
Mining and quarrying (except oil and gas)	Wholesale trade
Wood product manufacturing	Other services (except public administration)
Printing and related support activities	Utilities
Metal fabrication and machinery (excluding electrical)	Arts, entertainment and recreation
Other manufacturing	Finance and insurance
Rubber, plastics, and chemicals	Management of companies and enterprises
Forestry and logging with support activities	Administrative and support, waste management and remediation services
Transportation and warehousing	Public administration
Management, administrative and other support	Real estate and rental and leasing
Retail trade	Information and cultural industries
Computer, electronic and electrical products	Health care and social assistance
Other transportation equipment manufacturing	Professional, scientific and technical services
Construction	Educational services
Support activities for mining and oil and gas extraction	
Other services	
Utilities	
Information, culture, and recreation	
Finance, insurance, real estate, and leasing	
Oil and gas extraction	
Wholesale trade	
Public administration	
Professional business services	
Health care and social assistance	
Educational services	
Other professional services	
Management, scientific and technical services	
Computer system design services	

N.B.: Not all industry categories are directly comparable between the two studies; manufacturing industries highlighted in pale blue, other comparable high- and low-vulnerability industries highlighted in the same colours.

Automation, restructuring, and the evolving GGH economic landscape

As the impacts of automation are not evenly distributed across industries, so too they are not evenly distributed across the economic landscape.

The Brookfield Institute study also examined the level of vulnerability of urban areas to automation, based on their industry makeup.[27] Figure 3 shows their findings for southern Ontario Census Agglomerations and Census Metropolitan Areas, including those in the GGH. The map uses a location quotient to represent the level of vulnerability to automation, relative to Canada as a whole. An LQ greater than 1 (shown in pink) means that the municipality is more vulnerable than the national average. Blue indicates vulnerability lower than the national average.

FIGURE 3: SUSCEPTIBILITY OF SOUTHERN ONTARIO CENSUS METROPOLITAN AREAS AND CENSUS AGGLOMERATIONS TO AUTOMATION, 2011
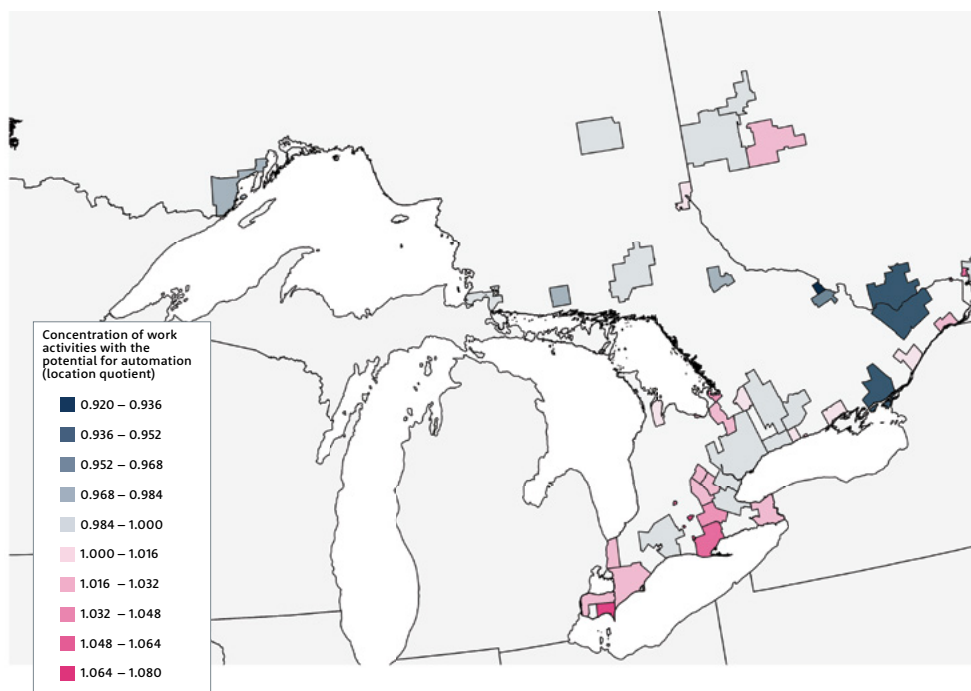
Source: Lamb, Munro and Vu, *Better, Faster, Stronger*, 2018, p. 6

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27   Creig Lamb, Daniel Munro, and Viet Vu, *Better, Faster, Stronger: Maximizing the benefits of automation for Ontario's firms and people*, Brookfield Institute, 2018, p. 6.

In general, the cities most vulnerable to automation were found to be the smaller ones, with less diversified economies, and an above-average concentration of vulnerable activities, which in smaller southwestern Ontario cities tends to mean a reliance on manufacturing jobs.

These analyses illustrate the potential for automation to replace jobs or work tasks, that is, the potential for job losses. But these and other studies also point out the potential for automation to create new jobs in areas like software engineering or data analysis that might compensate for any losses, or for existing jobs to shift towards more productive activities.

The upside of automation and therefore its net impacts on employment are not well known, however. Another Brookfield Institute study projected job growth by vulnerability to automation. Net growth for jobs with low vulnerability was estimated at 712,000 jobs in Canada between 2014 and 2024, compared to net growth of 339,200 for jobs at medium risk, and 395,700 for jobs at high risk.[28] However, this analysis was based on an economic scenario that did not take the impacts of automation into account, and noted that high-risk jobs might grow more slowly than the figures suggest.

Technological advancements throughout Canada's history have helped to drive innovation and raise productivity, improve wealth and increase consumption, and give rise to entirely new industries and economic opportunities. As a result, in the long run, technology has often helped to produce more jobs than it destroyed.

CREIG LAMB AND MATT LO, AUTOMATION ACROSS THE NATION, P. 2

So, while we have an idea of the potential employment downside of automation by industry, we do not have a good picture at this point of the potential net effects by industry, and the ways in which automation might contribute to further restructuring of the economy. What we know about the potential *overall* impacts of automation on the regional economy and on the economic landscape of the GGH is therefore limited.

What we *can* say is that the impacts of automation on particular cities, communities, or employment districts within the GGH will depend on the degree to which (1) vulnerable activities are found there, and (2) new jobs are generated in the same location versus elsewhere in the region, or indeed, in other regions altogether.

In other words, the new jobs generated by automation may require locations and urban environments that differ from the ones in which jobs were lost due to automation.

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28   Creig Lamb, *The Talented Mr. Robot*, Toronto: Brookfield Institute, 2016, p. 16.

Depending on the geography of job growth and loss, automation could further reinforce the existing concentration of knowledge-based activities in a select few locations. Areas with a concentration of vulnerable employment will be more likely to change, and may experience net employment decline. Meanwhile, areas with concentrations of jobs that are least vulnerable to automation may be subject to added growth pressure. As the impact of automation rolls out across wider segments of the economy, its effects would be amplified.

AUTOMATION COULD ACT AS A DRIVER THAT FURTHER REINFORCES THE CONCENTRATION OF KNOWLEDGE-BASED ACTIVITIES IN A SELECT FEW LOCATIONS.

In Chapter 4, we provide some clues to the geography of automation-driven change in the GGH, using a detailed, census-tract analysis of the location of employment in the industries that are most vulnerable to automation. We also discuss some potential implications specific to our Archetypes in Chapter 3.

Automation and the demand for buildings and floorspace

In addition to the potential effects of automation on the evolving structure and economic geography of the GGH economy, there is a second area of interest to planners: the potential implications of automation on the demand for non-residential floorspace.

This is another issue for which there is currently a lack of rigorous analysis. However, a few considerations may be helpful to planners.

The impact of automation on the demand for floorspace depends in part on the sector and type of automation. For example, warehousing, logistics, distribution, and manufacturing (work that tends to be routine and manual) will generally be automated with robots, which will generally require as much space in which to operate as a worker. Automation of routine cognitive tasks, such as bookkeeping or secretarial work (and increasingly, non-routine cognitive tasks) is generally undertaken by software, eliminating the worker and the need for work space. This type of automation will affect the demand for office space.[29]

An interesting analysis by CBRE for the United States explored the potential impacts of automation on the demand for office space.[30] It found that across all major office space in the U.S., 18 percent of existing office stock was at risk due to automation. Also, smaller office markets were more vulnerable than offices in larger cities.

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29 Timothy Savage, "What do advances in automation promise for U.S. office demand?" *CBRE Viewpoint*, January 19, 2017.
30 Ibid. The study assigned occupations to the different types of office buildings, and then applied a seminal analysis of the vulnerability of occupations to automation in order to understand the extent and locational impacts of automation on office space.

Like the other studies, the CBRE analysis examined the potential downside of auto-mation, not the upside. New jobs could compensate for losses due to automation, allowing demand for office space to be maintained in the long term, albeit with shifts in the types of work being undertaken in offices.

However, the CBRE finding that larger office markets and cities are more resilient to automation, and smaller markets more vulnerable, echoes not only the Brookfield findings, but also the broader tendency, noted earlier in this report, for knowledge-intensive activities to increasingly concentrate in the largest cities, and increasingly, within a small number of locations in those cities.

LARGER URBAN AREAS ARE MORE RESILIENT TO AUTOMATION, AND SMALLER MARKETS MORE VULNERABLE.

Another important implication of automation for planning is in the industrial sec-tor – in particular warehousing, distribution, logistics, and manufacturing. Jobs in all these industries were found to be highly vulnerable to automation by the Brookfield and C.D. Howe studies. This means a higher-than-average probability of workers being replaced by robots. Leaving output growth or decline aside for the moment, this finding does not, however, *necessarily* imply a reduced demand for floorspace. It may imply a continued demand for buildings, but with fewer employees (and more robots) per square metre of space. This has several implications for planning, includ-ing the amount and location of land needed for these growing activities and their relatively low employment densities, for example, which will be discussed at the end of this report.

Trade in services

When we think of trade, we often think of trade in goods, like appliances and car parts, or commodities, like oil, wheat, or potash. Trade in services, however, is a significant and growing part of the economy. It consists of exports such as financial, manage-ment, engineering, computer and information, and travel and transportation services.[31]

Services currently account for about 15 percent of Canadian exports[32] with a value of about $107 billion in 2016.[33] Since 2000, the share of manufacturing exports has been falling, while the services share has been rising, with strong export growth in finance and insurance services,[34] and the information technology service sector, which sells business solutions, software, and entertainment services.[35]

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31 Lawrence Schembri, "Wood, wheat, wheels and the web: Historical pivots and future prospects for Canadian exports,"
      remarks by the Deputy Governor of the Bank of Canada to the Atlantic Institute for Market Studies, November 8, 2016.
32 Schembri, "Wood, wheat, wheels and the web," 2016.
33 Global Affairs Canada, *Canada's state of trade: Trade and investment update – 2017*.
34 Jacqueline Palladini, *Spotlight on Services in Canada's Global Commerce*, Ottawa: Conference Board of Canada. August 2015.
35 Schembri, "Wood, wheat, wheels and the web," 2016.

With continued advancements in information and communications technology and the outsourcing of service functions by firms, there is good reason to believe that this shift to trade in services will continue and that services will play an increasingly important role in export growth[36] and the economy as a whole. This implies the growing importance of trade-oriented service industries.

EXAMPLES OF EXPORTED SERVICES
- A Canadian company provides management consulting to a company abroad.
- A Canadian engineering firm provides services for a bridge-building project abroad.
- A Canadian architecture firm designs a building abroad.
- A Canadian software program is delivered electronically to customers abroad.
- A Canadian television show is sold to a foreign network.

Identifying traded and tradable services is important. Tradable services are those with trade potential, but not necessarily currently traded. From a land use planning perspective, understanding the geography of tradable industries can help planners anticipate where there may be additional growth pressure in the GGH. Traded services are those that are currently traded are thus more vulnerable to trade disruptions.

In general, there is less analysis of trade in services compared with trade in goods and commodities. Recent research aims to identify which services have the potential to be traded.[37] A U.S. study analysed service industries according to their level of tradability, ranking them with 1 as least tradable, and 3 as most tradable.[38] In Table 2 we show the most tradable service industries, that is, those with a ranking of 2 or 3 (that is, moderate or high ranking).[39]

Some of the key tradable service industries include software; financial investments; scientific research and development services; and film, video, and sound recording industries. There can be considerable variation in the tradability of services under a common industry heading. For example, not all finance and insurance sub-sectors are tradable; it is primarily the financial investments sub-industry that is. This qualification underlines the importance of delving below the 2-digit industry level to understand the dynamics at play.

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36 Schembri, "Wood, wheat, wheels and the web," 2016; J. Bradford Jensen, "Global trade in services: Fear, facts and offshoring," Peterson Institute for International Economics, 2011; Stephen Tapp, "The growing importance of services in Canadian trade," Institute for Research on Public Policy (IPPR) *Policy Options*, August 3, 2016.

37 Antoine Gervais and Bradford J. Jensen, "The tradeability of services: Geographic concentration and trade costs," Peterson Institute for International Economics, Working Paper 15-12, 2015; Jensen, "Global trade in services," 2011.

38 Jensen, "Global trade in services," 2011. By "tradable," these studies identify industries exporting a service outside the metropolitan area or regional labour market in which the service is produced, and therefore with the potential to export that service abroad.

39 All of the other 4-digit NAICS codes in the service sector are ranked as 1. We do not show them here given space constraints.

Canadian service industries that are currently traded can be identified through measures such as the share of jobs in an industry directly linked to exports.[40] As Table 3 shows, Ontario service industries with a share of export-related jobs above the provincial average of about 10 percent (across all industries) include:
• architecture and engineering;
• scientific research and development services;
• computer systems design.[41]

TABLE 2: TRADABILITY OF SERVICE INDUSTRIES

NAICS Code	INFORMATION INDUSTRIES	Score
51	Wired telecommunications carriers	2
51	Data processing services	2
51	Other telecommunications services	2
51	Publishing, except newspapers and software	2
51	Other information services	3
51	Motion pictures and video industries	3
51	Sound recording industries	3
51	Software publishing	3
	FINANCE AND INSURANCE	
52	Insurance carriers and related activities	2
52	Non-depository credit and related activities	2
52	Securities, commodities, funds, trusts, and other financial investments	3
	REAL ESTATE AND RENTAL	
53	Commercial, industrial, and other intangible assets rental	2
53	Real estate	2
53	Automotive equipment rental and leasing	2

40 See David Schwanen and Aaron Jacobs, "*The NAFTA constellation: which Canadian industries are most vulnerable?*" C.D. Howe Institute, 2017.
41 Based on analysis conducted for this paper. Uses same method and data source as C.D. Howe, but total exports rather than just exports to the United States. Excluded are industries with total direct jobs fewer than those shown in the table.

TABLE 2 CONTINUED...

NAICS Code	PROFESSIONAL, SCIENTIFIC, AND TECHNICAL	Score
54	Architectural, engineering, and related services	2
54	Other professional, scientific, and technical services	2
54	Legal services	2
54	Specialized design services	2
54	Computer systems design and related services	2
54	Advertising and related services	2
54	Management, scientific, and technical consulting services	2
54	Scientific research and development services	3
	MANAGEMENT	
55	Management of companies and enterprises	2
	ADMINISTRATIVE SUPPORT	
56	Employment services	2
56	Other administrative and other support services	2
56	Investigation and security services	2
56	Travel arrangement and reservation services	2
	EDUCATION	
62	Business, technical, and trade schools and training	2
	HEALTH CARE AND SOCIAL SERVICES	
62	Community food and housing, and emergency services	2
62	Offices of other health practitioners	2
	ARTS, ENTERTAINMENT, AND RECREATION	
71	Traveller accommodation	2
	OTHER SERVICES	
81	Nail salons and other personal care services	2
81	Other personal services	2
81	Business, professional, political, and similar organizations	2
81	Labour unions	3
81	Footwear and leather goods repair	3
	PUBLIC ADMINISTRATION	
92	Public finance activities	2
92	Armed forces, all branches	3

TABLE 3: DIRECT JOBS EMBODIED IN EXPORTS BY SELECT INDUSTRY, SORTED BY NUMBER OF JOBS, ONTARIO, 2013

NAICS Code	INDUSTRY	Direct jobs embodied in exports	Share of all jobs in the industry (%)
3362, 33631, 33632, 33633, 33634, 33635, 33636, 33637, 33639	Motor vehicle parts manufacturing	36,343	53.0
33611, 33612	Motor vehicle manufacturing	28,972	80.7
5611	Office administrative services	27,515	57.0
5415	Computer systems design and related services	19,691	17.4
5413	Architectural, engineering, and related services	17,137	25.9
3261	Plastic product manufacturing	14,389	34.5
5614	Business support services	14,057	26.9
5417	Scientific research and development services	11,752	45.8
3364	Aerospace product and parts manufacturing	11,194	79.1
3339	Other general-purpose machinery manufacturing	10,901	72.0
5416	Management, scientific, and technical consulting services	10,494	18.7
3343, 3345, 3346	Other electronic product manufacturing	10,243	71.0
3332, 3333	Machinery manufacturing	9,864	64.0
3254	Pharmaceutical and medicine manufacturing	8,839	55.3
3344	Semiconductor and other electronic component manufacturing	6,668	91.0
3342	Communications equipment manufacturing	6,051	80.9
3341	Computer and peripheral equipment manufacturing	1,978	82.2
	TOTAL OF ABOVE	246,088	36.5
	Total direct jobs embodied in exports, all industries	673,886	9.7

Source: Cansim Table 381-0032 Value added in exports, by industry, provincial and territorial, annual

Having identified the traded and tradable service industries, we can locate them in the GGH, and understand which areas may be subject to growth or competitive pressures.

One of the defining characteristics of traded and tradable industries is their tendency to concentrate geographically. This relationship between tradability and geographic concentration is so strong that geographic concentration is often used as a means of identifying tradable industries.[42] This pattern contrasts with that of untraded services, which tend to be geographically dispersed, mirroring population distributions.

To the extent that service exports become increasingly prominent in the economy, the pattern of geographic concentration in the GGH may be further reinforced. These services also tend to be more labour-intensive than other traded sectors,[43] such as manufacturing or distribution, and so have implications for commuter travel and transportation investments.

TO THE EXTENT THAT SERVICE EXPORTS INCREASE, THE PATTERN OF GEOGRAPHIC CONCENTRATION OF ECONOMIC ACTIVITY WITHIN THE GGH COULD BE FURTHER REINFORCED.

Of course, trade is vulnerable to shifts in policy and politics, as has become apparent recently with events such as Brexit, or the introduction of new tariffs by the U.S. on steel and aluminium. In Chapter 4 of this report, we identify areas within the GGH that are currently most dependent on trade, and therefore are most vulnerable to trade disruptions.

A DYNAMIC APPROACH TO LAND USE PLANNING

Understanding the drivers and dynamics of economic change in the GGH is fundamental to more informed, effective land use planning. We make an important distinction between a dynamic approach and one based on linear growth "trends" that is common in land use planning. A dynamic approach recognizes that longer-term urban processes are not linear, but characterized by cycles of growth, change, decline, then growth again. The focus should not just be solely on accommodating growth – as has been the norm in planning and the Growth Plan – but also on responding to change, transition, and, in some cases, decline. This dynamic will continue to unfold over the planning period (and beyond).

THE FOCUS FOR LAND USE PLANNING SHOULD NOT JUST BE ON ACCOMMODATING GROWTH, BUT ALSO ON ADDRESSING CHANGE, TRANSITION, AND, IN SOME CASES, DECLINE.

42   Jensen, Global trade in services, 2011.
43   Ibid.

This dynamic can be illustrated by "the Kings" districts that border Downtown Toronto. These were formerly vibrant areas of manufacturing industry in prewar factory buildings – especially textiles and clothing –that lost employment and businesses, and declined post-1970, because of globalization pressures and free trade agreements. The Kings experienced a prolonged period of stagnation and underutilization (exacerbated, many argue, by a lack of a timely planning policy response). In recent years the factories have been occupied by 21st-century industries and reinvigorated – but this time, with firms in different industries, including some that did not even exist a few decades ago – such as information technology, app development, software, and digital advertising.

As other employment areas of the GGH age over the next 25 years, this dynamic will play out across the region. Restructuring will affect different districts within the region differently, depending on (1) their current makeup of economic activities; (2) where these industries fall within the trajectory of long waves of growth, stagnation, decline, and regeneration; and (3) in relation to key drivers like globalization or automation. The analysis of the current geography of the Archetypes in Chapter 3 of this report is intended to help illuminate these changes.

RESTRUCTURING WILL AFFECT DIFFERENT DISTRICTS WITHIN THE GGH DIFFERENTLY.

Land use planning in the GGH needs to consider proactively where and how growing activities will be accommodated. As some districts age, there are opportunities to accommodate and support new kinds of economic activities through proactive land use planning. We could expect, for example, that arts and design-related industries are likely to experience continued growth. But the kinds of places that those industries have been inhabiting – former factory spaces in prewar urban areas, for example – are increasingly limited in supply and face demand and rent pressure from other industries and from residential growth. Where can we plan for the next wave of growth for these industries?

As noted earlier, agglomeration economies drive urbanization and geographic concentration, and their effects are intensified with the rise of knowledge-based activities. But the agglomeration benefits that often drive investment and new development in a particular district are also accompanied by agglomeration "dis-benefits" or costs – such as congestion, air pollution, income inequality, or high house prices and commercial rents, for example.

The balance between agglomeration benefits and dis-benefits can shift over time. As development and workers continue to be attracted to an area, mounting dis-benefits may outweigh benefits. At this point, firms, employees, new development and other investments may be compelled to seek other locations – within the region, or even beyond the GGH.

For example, agglomeration benefits have been drawing new office development to Downtown Toronto in recent years, and this trend is expected to continue. However, this growth brings intense pressures on an already straining transportation system. Without public investments to keep up with development pressures, dis-benefits in the form of congestion and inaccessibility could begin to shift some types of businesses to other locations. This shifting balance between agglomeration benefits and dis-benefits is an element of the dynamic approach that should be kept in mind in long-range planning.

Industry Archetypes

In the next chapter, we develop the concept of industry Archetypes to hone in more closely on the relationship between specific groups of industries and their urban environment and locational requirements. The term *archetype* as used here represents a group of industries that, on one hand, faces similar competitive pressures and has similar business characteristics, and on the other hand, demonstrates similar preferences in the choice of urban environment and location. The concept of Archetypes allows us to link more closely changes in the economy to the changing economic landscape.

THE CONCEPT OF INDUSTRY "ARCHETYPES" ALLOWS US TO LINK ECONOMIC CHANGES AND A CHANGING ECONOMIC LANDSCAPE.

This differs from the concept of clusters as defined by Michael Porter[44] – a geographically proximate group of interconnected companies and institutions – in that it looks for groups of industries with *both* common economic characteristics and specific intraregional spatial patterns.

THIS APPROACH IS DESIGNED SPECIFICALLY TO PROVIDE A BETTER INFORMATION BASE FOR LAND USE PLANNERS.

This approach is designed specifically to provide a better information base for land use planners to determine what kinds of urban environments they should be planning, for kinds of businesses, and where. It goes beyond the conventional approach that looks at trends on a broader industry-byindustry basis. Simply extrapolating past trends forward – say employment by industry, for example – is risky in the current environment of disruptive technologies. Moreover, using broad industry categories (e.g., 2-digit NAICS codes, as is common) does not necessarily result in information that is useful to land use planning, as these categories often contain sub-industries with very different business characteristics, locational preferences, and land use needs.

We have identified 12 industry Archetypes. They are described in more detail in the next chapter, along with their spatial patterns, urban environments and where possible, key archetype-specific drivers.

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44   Michael Porter (1990). *The Competitive Advantage of Nations*. New York: The Free Press.

CHAPTER 03
THE REGIONAL ECONOMIC LANDSCAPE

How are the drivers described in Chapter 2 shaping the economic landscape of the Greater Golden Horseshoe? This chapter looks at how the economic geography of the region changed between 2006 and 2016. We use Census of Canada data on employment, which allow us to map jobs at the place of employment. We present data on "core" employment that drives the regional economy, as well as for each of our Archetypes.

EMPLOYMENT IN THE GREATER GOLDEN HORSESHOE

In 2016, there were almost 4.6 million workers living in the GGH, an increase of more than 400,000 workers since 2006. Of these, 3.7 million had a usual place of work. Others either worked at home, had a job that did not have a usual place of work, or worked outside Canada. Those with no fixed workplace increased substantially – by more than 110,000 jobs, an increase of nearly 27 percent. The share of GGH residents who had a usual place of work declined slightly from 2006 to 2016 – from 83 percent to 81 percent of workers (see Table 4).[45]

TABLE 4: EMPLOYMENT BY PLACE OF WORK STATUS, GGH, 2006 AND 2016

	BASED ON PLACE OF RESIDENCE				BASED ON PLACE OF WORK			
	2006	**2016**	**Change (2006–2016)**	**(%)**	**2006**	**2106**	**Change (2006–2016)**	**(%)**
Worked at usual place	3,428,445	3,700,695	272,250	7.9	3,437,935	3,710,915	272,980	7.9
Worked at home	286,495	334,000	47,505	16.6	285,220	334,090	48,870	17.1
Not fixed workplace	415,530	526,390	110,860	26.7	N/A	N/A	N/A	N/A
Worked outside Canada	21,525	25,910	4,385	20.4	N/A	N/A	N/A	N/A
Total	4,152,125	4,586,990	434,865	10.5	3,723,105	4,045,055	321,950	8.6

N/A = not applicable

45   All employment data in this report are for the employed labour force, aged 15 years and over.

In analysing where jobs are located in the GGH, and how the nature and geography of employment is changing, we rely on Place of Work data – in which jobs are counted based on the location of the job, not on where the worker lives (unlike, for example, the Labour Force Survey). With Place of Work data, we can map only those jobs that have a distinct physical location, that is, a usual place of work (office, shop, factory, etc.), or for workers whose home is their workplace.

Based on these data, Table 4 shows that there were more than 4 million jobs within the Greater Golden Horseshoe in 2016. More than 3.7 million of these jobs had a usual place of work, and more than 300,000 were located in a home.

The number of jobs within the GGH with a usual place of work or at home increased by 322,000 between 2006 and 2016, a rise of 8.6 percent.

All GGH job figures referred to and mapped in this report pertain to jobs with a usual place of work outside the home, unless otherwise noted.

THE GEOGRAPHY OF CORE EMPLOYMENT

The concept of "core employment" was introduced in the 2015 Neptis report *Planning for Prosperity*.[46] Core employment consists of jobs in traded or tradable industries that bring revenues and income into the region and drive its growth, such as manufacturing or traded services. Core employment is distinct from population-related employment, which serves local residents, for example, personal services or retail. Core employment tends to cluster spatially, while population-related employment follows dispersed residential patterns.

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46 Blais, *Planning for Prosperity*, 2015.

Between 2006 and 2016, core employment in the GGH grew by more than 75,000 jobs. The share of jobs in the core employment category relative to total job numbers, however, fell between 2006 and 2016, from 69 percent to 62 percent. Although there was a net gain in core employment between 2006 and 2016, the net figure masks the decline following the 2008 financial crisis.[47] In 2011, core employment levels were still below 2006 levels. Only since 2011 have employment gains reached and then surpassed pre-2008 employment levels. During the crisis, however, non-core employment growth was less affected, which explains the decreased share of core employment relative to total employment in 2016. (See Map 1: Core Employment, GGH, 2016, and Map 2: Core Employment Change, GGH, 2006–2016.)

TABLE 5: TOTAL AND CORE EMPLOYMENT WITH A USUAL PLACE OF WORK, GGH, 2006 AND 2016

	2006	2016	Change (2006–2016)
Core employment	2,300,015	2,375,465	75,450
Total employment	3,437,935	3,710,915	272,980
Core employment as a share of total	66.9	64.0	27.6

In the 2015 report *Planning for Prosperity*, we introduced some key elements of the GGH's economic landscape: megazones and suburban knowledgeintensive districts (SKIDs).

- **Megazones** are large, contiguous multijurisdictional areas focused on core employment. Three were identified: the Pearson airport megazone, Tor-York West around Highways 400 and 407, and Tor-York East around Highways 404 and 407.
- **SKIDs** are suburban areas that have concentrations of higher-skilled employment. Five were identified: Waterloo, Sheridan, Meadowvale, Airport (within the Airport Megazone), and Markham (within the Tor-York East megazone).

47 Data from *Planning for Prosperity* showed a decline in core employment of about 110,000 jobs between 2006 and 2011 for the GGH, following gains of roughly the same amount in the preceding five-year period.

These areas remain relevant in describing the economic geography of the Greater Golden Horseshoe. (See Map 3: Core Employment with Megazones and SKIDs, 2016, and Map 4: Core Employment Change, 2006–2016, with Megazones and SKIDs.)

The economic geography of the GGH is characterized by clustered core employment. Downtown Toronto is the dominant, densest job concentration, with 413,000 core jobs in 2016. Other dense, compact clusters include North York City Centre, Hamilton downtown, and Kitchener and Waterloo downtowns. Also dominant are the three megazones, which together account for more than 460,000 core jobs.

DESPITE NET CORE EMPLOYMENT GAINS OVERALL FOR THE REGION, MANY AREAS SAW A DECLINE IN CORE EMPLOYMENT.

Between 2006 and 2016, Downtown Toronto experienced significant, concentrated growth – adding about 67,000 new core jobs. Other core job growth has occurred at the urban edges of the region, north of Highway 407.

THE DATA SHOW A DRAMATIC RECENT SHIFT IN THE GEOGRAPHY OF EMPLOYMENT.

Despite net core employment gains overall for the region, core employment declined in certain areas. In the City of Toronto, with the exception of a few small areas, core job loss dominated inner suburban areas. Oshawa, Hamilton centre, Waterloo Region, St. Catharines and Welland, and areas south of the QEW also lost core jobs.

Overall, the Place of Work data for 2006 to 2016 show a dramatic shift in the geography of employment.

In *Planning for Prosperity*, we noted that in key areas – the SKIDs and Downtown Toronto – core employment grew considerably between 2001 and 2011 (adding 42,290 and 35,490 jobs, respectively), while the megazones (excluding SKIDs) saw modest growth (adding 3,080 jobs).

Each of the five SKIDs saw positive growth, with the Airport SKID, Meadowvale, and Waterloo expanding by about 10,000 core jobs each.

TABLE 6: CORE EMPLOYMENT BY EMPLOYMENT AREA, GGH 2006 AND 2016

	2006	2016	Change 2006–2016
Downtown Toronto	345,495	412,835	67,340
MEGAZONES			
Tor-York West Megazone	119,870	119,330	-540
Airport Megazone (incl. SKID)	255,130	252,345	-2,785
Tor-York East Megazone (incl. SKID)	92,970	90,975	-1,995
MEGAZONES TOTAL (incl. SKIDS)	467,970	462,650	-5,320
Airport Megazone w/o SKID	187,405	183,095	-4,310
Tor-York East Megazone w/o SKID	54,890	52,990	-1,900
SKIDS			
Airport	67,725	69,250	1,525
Markham	38,080	37,985	-95
Meadowvale	29,385	36,155	6,770
Sheridan	5,210	5,200	-10
Waterloo	14,400	12,515	-1,885
SKIDS TOTAL	154,800	161,105	6,305
Rest of the GGH	1,437,555	1,446,110	8,555
TOTAL CORE EMPLOYMENT GGH	2,300,015	2,375,465	75,450

Between 2006 and 2016, a significant shift occurred. Three of the SKIDs lost core employment or remained stable, while the Airport SKID experienced only modest growth. Meadowvale continued to attract core employment, expanding by almost 7,000 jobs. Overall, core employment in the SKIDs grew by a modest 8,500 jobs in the last 10 years. Meanwhile the megazones (excluding SKIDs) have experienced a net loss of about 6,750 jobs. Table 6 shows 2016 core employment and changes between 2006 and 2016 for these areas.

But the most remarkable aspect of the spatial shift is the rapid growth and concentration of core jobs in Downtown Toronto, which attracted more than 67,000 core jobs between 2006 and 2016 (and a total of 85,600 if population-related jobs are included).

This substantial shift in the geography of jobs has significant implications for planning, discussed in Chapter 5.

THE MOST REMARKABLE ASPECT OF THE SHIFT IS THE RAPID GROWTH AND CONCENTRATION OF CORE JOBS IN DOWNTOWN TORONTO.

MAP 1: CORE EMPLOYMENT, GGH, 2016

Legend

Less dense
⬍
More dense

1 Dot = 100 Jobs

— Municipal boundary

⊕ Airport

— Road

▨ 2006 Built boundary
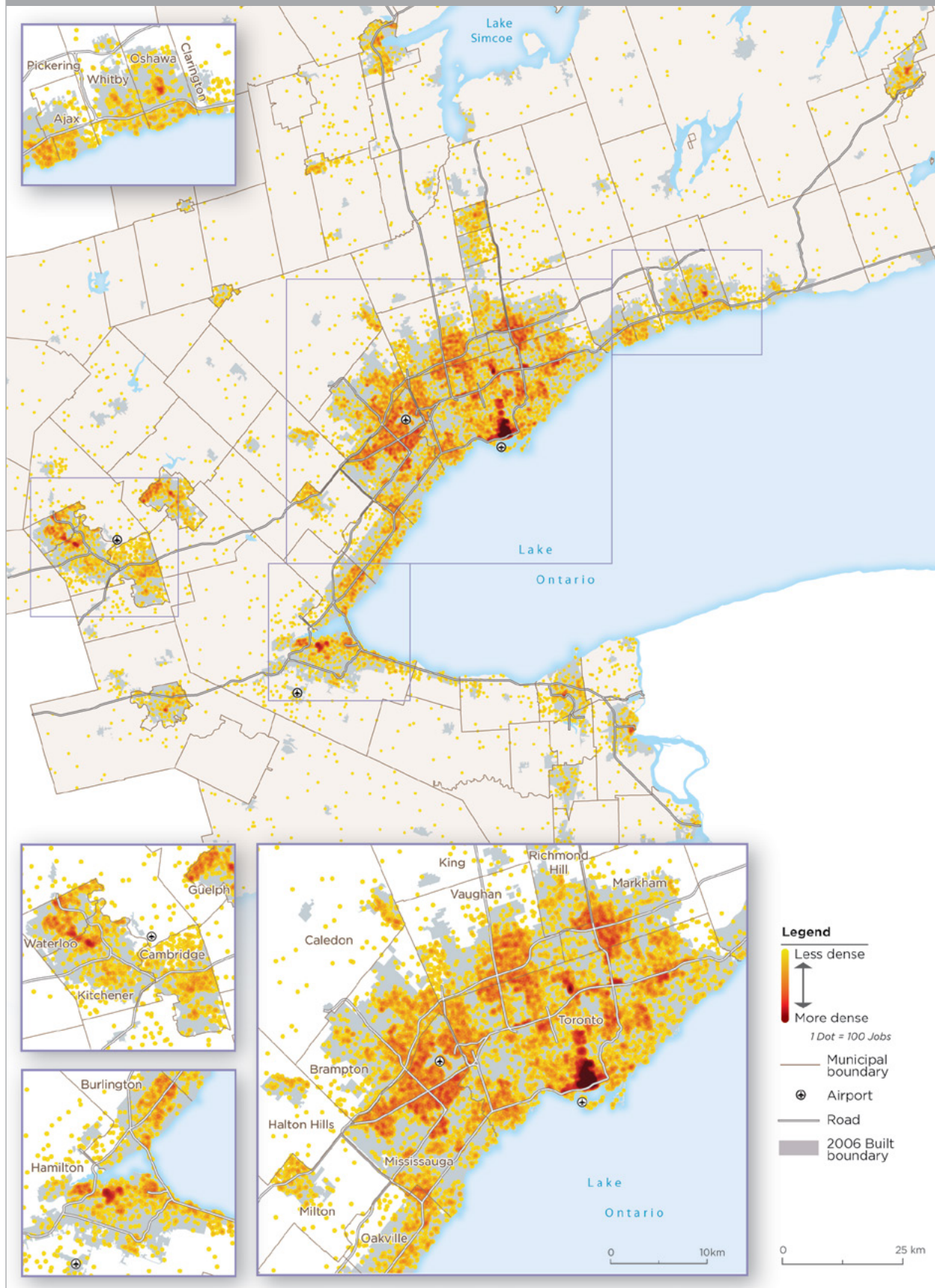
MAP 2: CORE EMPLOYMENT CHANGE, GGH, 2006–2016
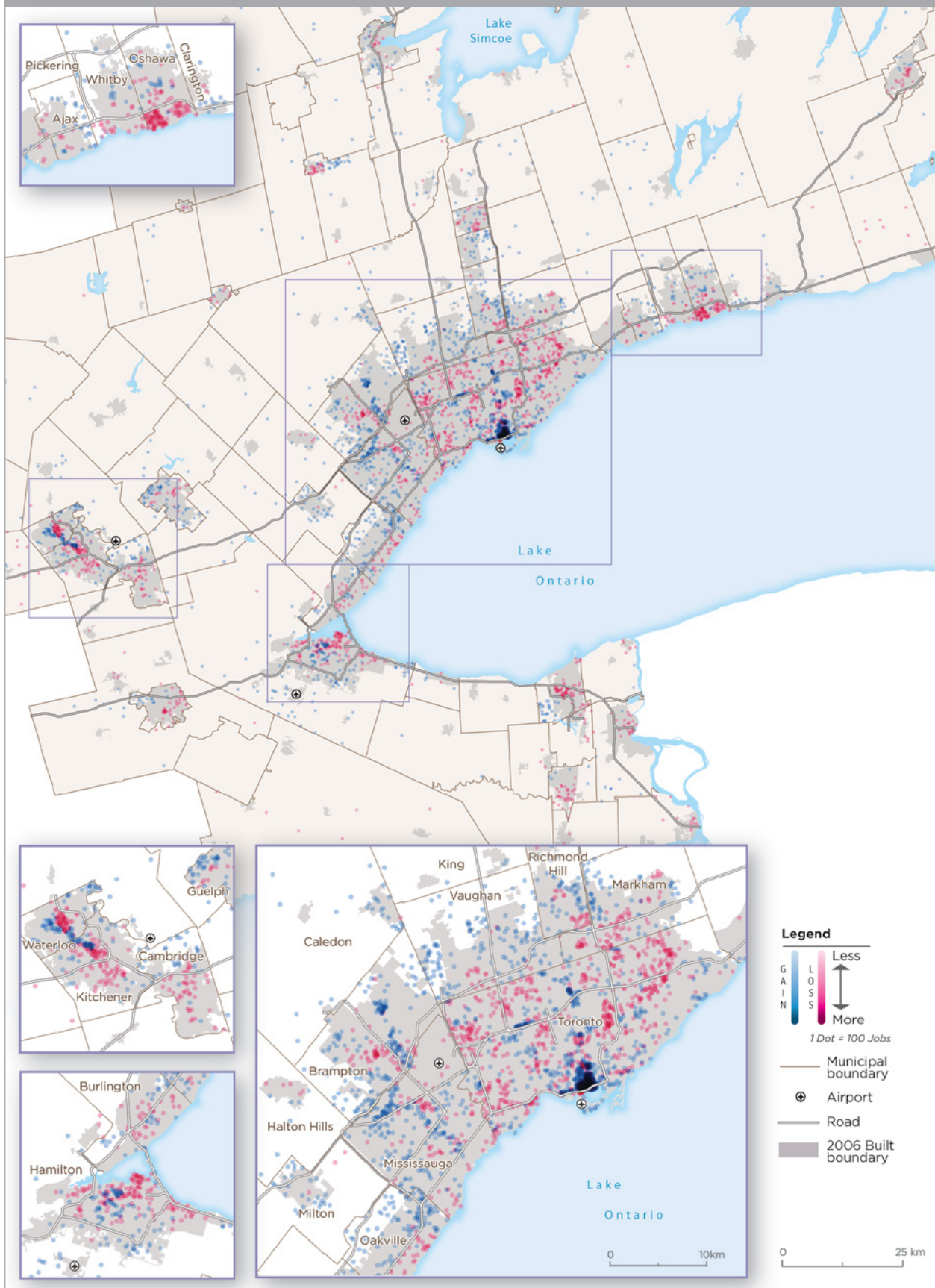
MAP 3: CORE EMPLOYMENT, GGH WITH MEGAZONES AND SKIDS, 2016

Legend

Less dense

More dense

1 Dot = 100 Jobs

Municipal boundary

Megazone

SKID

Toronto Core

Airport

Road

2006 Built boundary
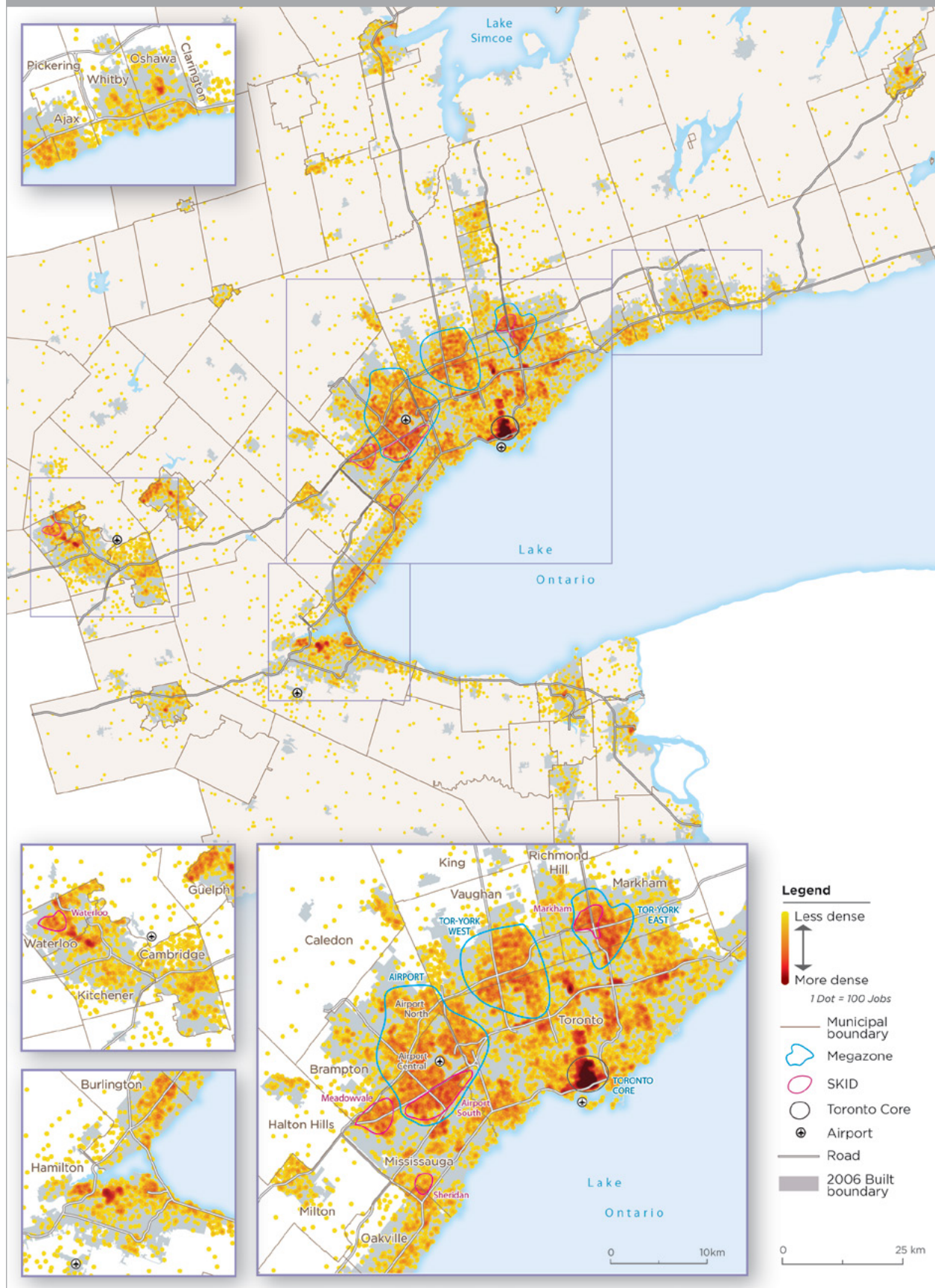
MAP 4: CORE EMPLOYMENT CHANGE, GGH WITH MEGAZONES AND SKIDS, 2006–2016

Legend

GAIN — LOSS — Less / More

1 Dot = 100 Jobs

Municipal boundary
Megazone
SKID
Toronto Core
Airport
Road
2006 Built boundary
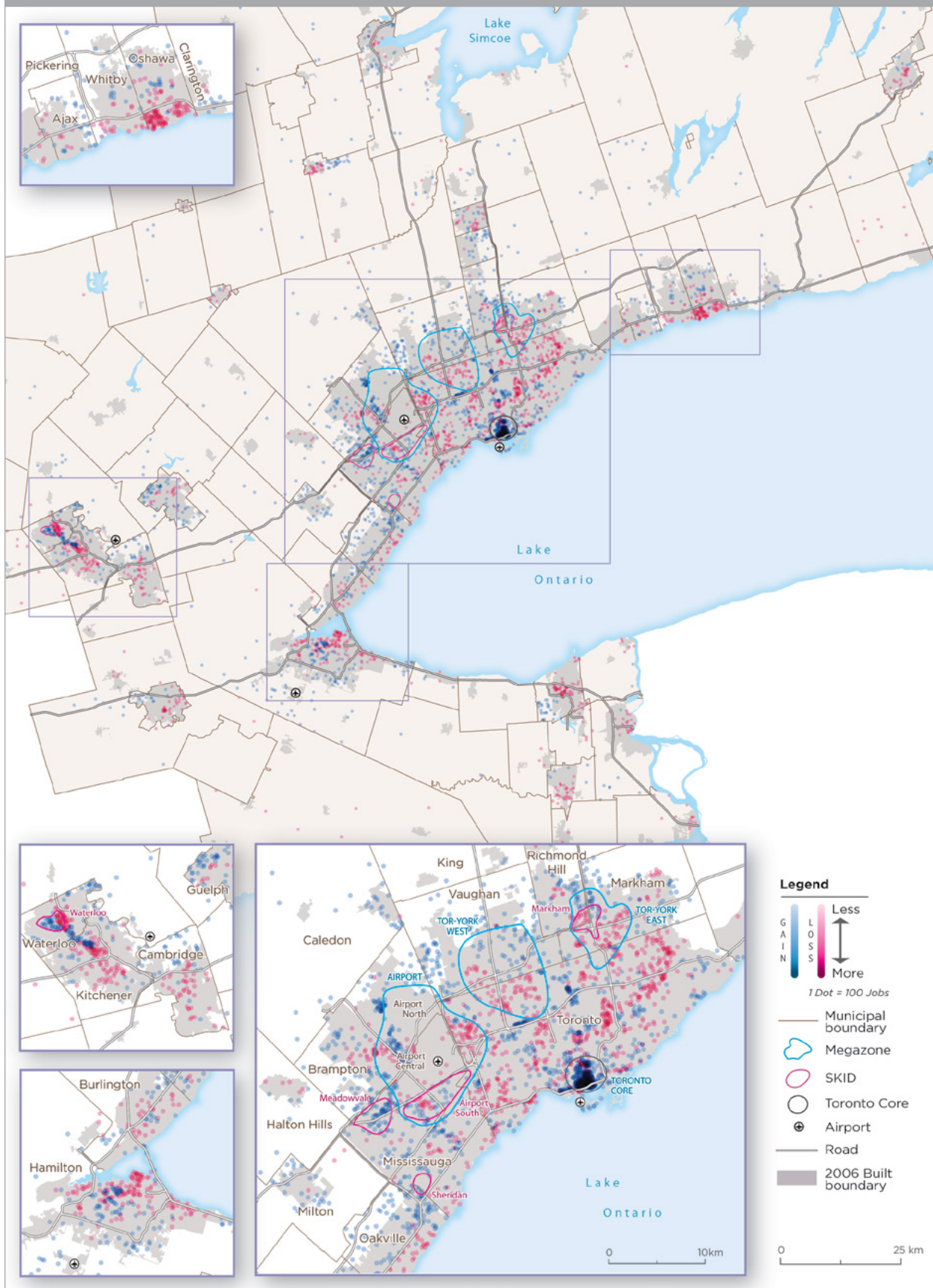
ARCHETYPES

The concept of industry Archetypes was introduced in Chapter 2, as coherent group-ings of industries that share both economic and geographic characteristics. As key traded and/or knowledge-intensive industries, the Archetypes cluster or concentrate geographically, although the specific spatial patterns vary from type to type. We found that each Archetype has a distinct spatial pattern within the GGH. Understanding these patterns, as well as the economic transformations that are under way that shape them, will help the planners develop better plans and policy responses.

EACH ARCHETYPE HAS A DISTINCT SPATIAL PATTERN WITHIN THE GGH.

For example, in 2008 Elizabeth Currid and James Connolly looked at the spatial pat-terns of six advanced service industries across the 10 largest U.S. cities and found that they all cluster geographically within their urban regions.[48] Most highly clustered were arts and culture industries, followed by media, engineering/high tech, management, finance, and professional industries. The specific clustering patterns varied, however: arts, culture, and media industries tended to be clustered in downtowns only, while other industries located in several nodes across the urban region.

We have identified 12 Archetypes for the GGH, including one "Special" category comprising three individual industries, each with unique spatial patterns. Together, the Archetypes accounted for 1.46 million jobs in 2016 (see Table 7). Overall, the Archetypes saw a net decline in employment between 2006 and 2016, mostly due to the loss of almost 130,000 Other Manufacturing jobs during that period. This category aside, employment in the remaining Archetypes grew by 108,000 jobs, or 11 percent. There was nonetheless significant variation among the Archetypes: some saw significant growth (such as Soft Tech) while others declined (such as Hard Tech).

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48 Elizabeth Currid and James Connolly, "Patterns of knowledge: The geography of advanced services and the case of arts and culture," *Annals of the Association of American Geographers*, 2008, 98 (2): 414–434.

TABLE 7: EMPLOYMENT BY ARCHETYPE GGH 2006 AND 2016

	2006	2016	Change	% Change
Finance	228,150	275,300	47,150	20.7
High Order Business Services	98,215	123,345	25,130	25.6
Back Office	54,710	51,715	-2,995	-5.5
Arts & Design	102,645	112,665	10,020	9.8
Soft Tech	71,960	91,270	19,310	26.8
Hard Tech	72,810	51,225	-21,585	-29.6
Science-based	52,950	64,980	12,030	22.7
Higher Education	59,635	78,100	18,465	31.0
Logistics	25,170	32,635	7,465	29.7
Other Wholesaling	139,920	121,750	-18,170	-13.0
Special				
Aerospace	10,815	13,150	2,335	21.6
Telecoms	25,400	32,035	6,635	26.1
Pharma	22,960	25,175	2,215	9.6
Other Manufacturing	516,255	386,480	-129,775	-25.1
Archetypes Total	1,481,595	1,459,825	-21,770	-1.5
Archetypes Total w/o Other Manufacturing	965,340	1,073,345	108,005	11.2
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

The remainder of this chapter looks at each Archetype in turn, describing its characteristics, spatial patterns, and drivers of change. Some Archetype profiles have more analysis and information on key drivers than others, reflecting the state of the literature: some industries are the subject of more research than others. Future research will be needed to fill in the gaps on the less-well-understood Archetypes.

FINANCE

The Finance Archetype comprises the finance and insurance industries.[49] In 2016, it represented 275,000 jobs in the GGH, and has the highest level of job growth amongst all the Archetypes – adding about 47,000 jobs between 2006 and 2016. Toronto is Canada's financial capital, ranking seventh in importance globally and second in North America, according to the Global Financial Centres Index.[50]

TABLE 8: FINANCE ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Finance	228,150	275,300	47,150	20.7
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

The City of Toronto accounts for 62 percent of all GGH Finance Archetype jobs. Finance employment shows a highly clustered spatial pattern, with Downtown Toronto its dominant centre. Financial services account for almost 40 percent of Downtown Toronto office space, and 52.3 percent of space in the financial heart of the city.[51] Secondary clusters are found in North York City Centre and in the Airport, Markham, and Meadowvale SKIDs. This clustered pattern is what we would expect for a dynamic, knowledge-intensive high-skills industry like Finance. Virtually all of the almost 90,000 new jobs created in the broader finance industry in the GGH between 2001 and 2014 were high-skilled or skilled. About 2,000 low-skilled finance jobs disappeared during the same period.[52]

Between 2006 and 2016, we also see a concentrated pattern of job growth – again, in Downtown Toronto, North York City Centre, and the Markham, Airport, and Meadowvale SKIDs. (See Maps 5 and 6.)

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49 Often the broader "FIRE" category is used, that is, Finance, Insurance, and Real Estate. For our analysis, real estate is not included, as it has different dynamics and characteristics.
50 GWL Realty Advisors and CBRE, Banking and the New Digital Era: What's Next for Financial Services in Canada? A Commercial Real Estate Perspective, 2016, p. 12.
51 GWL Realty Advisors and CBRE, Banking and the New Digital Era, 2016, p. 13.
52 Blais, *Planning for Prosperity*, 2015.

The urban environment in which Finance employment is found tends to be one of two types. Downtown Toronto and North York City Centre (an example of an older planned centre) are characterized by tall, corporate office towers. There is a broad mix of land uses, including residential apartments, diverse office-based companies, major institutions including universities, and services for workers such as shops, cafes, and gyms. These very dense areas are served by higher-order transit, but are also accessible by bicycle and on foot.

URBAN CHARACTERISTICS OF DOWNTOWN TORONTO AND OLDER PLANNED CENTRES

The urban characteristics of the SKIDs are very different from those of Downtown Toronto. These are planned, suburban office parks. While still dominated by corporate offices, these tend to be low- to mid-rise buildings with large surface parking lots, so the areas are of only moderate density.

URBAN CHARACTERISTICS OF SKIDS

There are no residential uses within SKIDs. They do offer a range of office-based industries, and in some cases, include higher education institutions.

Amenities for workers within the districts are limited – perhaps a coffee shop on the ground floor of an office building. Despite recent investments in transit service improvements to the Markham, Waterloo, and Airport SKIDs, the districts are auto-dependent. The public realm is characterized by low walkability – buildings are far apart, often there is little attention paid to the walking environment, roads are a challenge to cross, and there are few destinations within walking distance.

Financial industries have become even more globally integrated, taking advantage of deregulation and foreign markets. Finance and insurance services exports have been the fastest-growing of any Canadian industry, goods included, as Figure 4 (taken from a 2015 Conference Board of Canada report) shows.[53] Canada's five largest banks now derive 20 to 50 percent of their revenue from non-domestic sources.[54]

GLOBALIZATION AND TRADE

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53 Palladini, *Spotlight on Services*, 2015, Chart 1, p. 2. This ranking uses price deflators to adjust for inflation. Using nominal price growth rates over 2003–2013, the fastest-growing exports are (in order): metals and mineral products, agricultural products, finance and insurance services, primary metal products, energy products, management services, and computer and information services.

54 GWL Realty Advisors and CBRE, Banking and the New Digital Era, 2016. This revenue comes mostly through foreign affiliates, with an estimated $75 billion finance and insurance services (not including banking) sold abroad through foreign affiliates in 2012, versus $9 billion in directly exported services. See also Palladini, *Spotlight on Services*, 2015, p. 26.

FIGURE 4: CHANGE IN EMPLOYMENT BY SKILL LEVEL, GGH, 2001–2014

(fastest-growing inflation-adjusted Canadian exports; percentage change 2003–13)
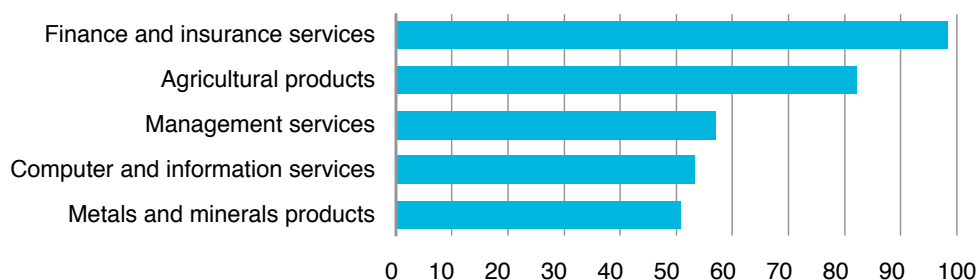
Source: The Conference Board of Canada, Canadian Interactive Trade Forecast–2014, 2015

AUTOMATION

Technological change continues to transform the financial services industry. At first, this took the form of the automation of certain routine tasks, as ATMs replaced much of tellers' work. More recently, automation has spread to higher-skilled tasks in financial services, such as investment advice (such as "robo-advisors") and equity trading.

The use of computer and information technologies is continuing to advance, with the integration of artificial intelligence in electronic trading. For example, RBC Royal Bank is developing an AI-enhanced platform that analyses data and adapts trading responses automatically. As a result, many new workers in the finance industries have skills in data management and analysis, and software engineering.

In the finance sector, "Job openings for information systems analysts and consultants together increased by 6,794 openings from 2015 to 2017, while openings for software engineers and designers nearly doubled in 2017 over 2015: from 1,117 to 2,209."

LAMB, MUNRO AND VU, *BETTER, FASTER, STRONGER,* BROOKFIELD INSTITUTE, 2018, P. 84.

FIRE is among the industries in which potential employment losses to automation are judged to be comparatively low – at 28.5 percent of jobs (see Table 21).[55] Routine tasks are at risk, such as payments, investment trading, advisory services, and credit lending. Tasks that can be characterized as intermediation, such as those performed by brokers, are vulnerable to "disintermediation" – the elimination of the middle-man function – as new technologies allow buyers and sellers to make their own trades directly electronically.[56] Some of the types of jobs vulnerable to automation represent significant numbers of workers.

Emerging technologies have prompted the creation of new financial products and processes, including the "fintech" sector.

Fintech companies include startups, tech companies entering the finance field, tech giants (such as Apple Pay), and traditional financial institutions creating their own fintech products. In some cases, fintech companies compete directly with traditional financial institutions, such as wealth management and payments; in other cases their services are complementary, such as data, security, and management software.[57] There were 100 known fintech firms in Canada in 2016, 60 of which are located in Toronto, clustered in and around the financial core (see Figure 5).[58]

FINTECH

New and emerging technologies offer not only the potential to disrupt existing financial services industries and replace certain types of work, but also suggest growth potential through new firms, products, processes, and markets. A significant potential disruptor is blockchain technology – a "distributed ledger" system that could remove need for traditional institutions to confirm the authenticity of transactions, and "drastically reduce the infrastructure costs for financial services firms."[59]

Fintech refers to "a new category of flexible and scalable companies focused on using technology to provide financial products and services. They differ from traditional financial firms such as banks due to their primary reliance on digital technologies and software to operate."

GWL REALTY ADVISORS AND CBRE, *BANKING AND THE NEW DIGITAL ERA*, **2016, P. 10.**

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55 Oschinski and Wyonch, *Future Shock?* 2017.
56 GWL Realty Advisors and CBRE, *Banking and the New Digital Era*, 2016, p. 10.
57 Ibid.
58 Ibid.
59 Lamb, Munro, and Vu, *Better, Faster, Stronger*, 2018, p. 82.

FIGURE 5: 60+ FINTECH FIRMS AND THEIR LOCATIONS IN TORONTO

Source: GWL Realty Advisors and CBRE, "Banking and the New Digital Era," 2016, p. 16.

The drivers described above have important implications for the nature of work, as well as for the structure of employment, firms, and the industry as a whole in the Finance Archetype. These changes in turn have implications for the geography of Finance employment and activities within the GGH.

On one hand, routine work, which is the most vulnerable to automation, has tended to locate in suburban areas. But as automation progresses into higher-skilled tasks, we could see automation affect downtown jobs as well.

On the other hand, the growth of high-skilled jobs, the increasing technological element of Finance, the emerging firms and innovation associated with fintech, office consolidations, and an increasing role for exports – all suggest further geographic concentration, particularly in and around Downtown Toronto. Further concentration, however, will occur only if Downtown continues to offer a high-quality environment with access to the region-wide talent pool, and if the financial district can absorb future growth and access by transit remains functional.

SEVERAL KEY DRIVERS SUGGEST A FURTHER GEOGRAPHIC CONCENTRATION OF FINANCE, PARTICULARLY IN AND AROUND DOWNTOWN TORONTO.

Jobs most vulnerable to automation:
- *Insurance agents and brokers (60% automatable tasks, 27,825 jobs in Ontario, 2016)*
- *Insurance adjusters and claims examiners (81% automatable, 11,886 jobs in Ontario, 2016)*
- *Banking, insurance and other financial clerks (81% automatable, 11,050 jobs in Ontario, 2016)*

LAMB, MUNRO AND VU, *BETTER, FASTER, STRONGER,* **BROOKFIELD INSTITUTE, 2018**

MAP 5: FINANCE ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

MAP 6: FINANCE ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN — LOSS — Less / More

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
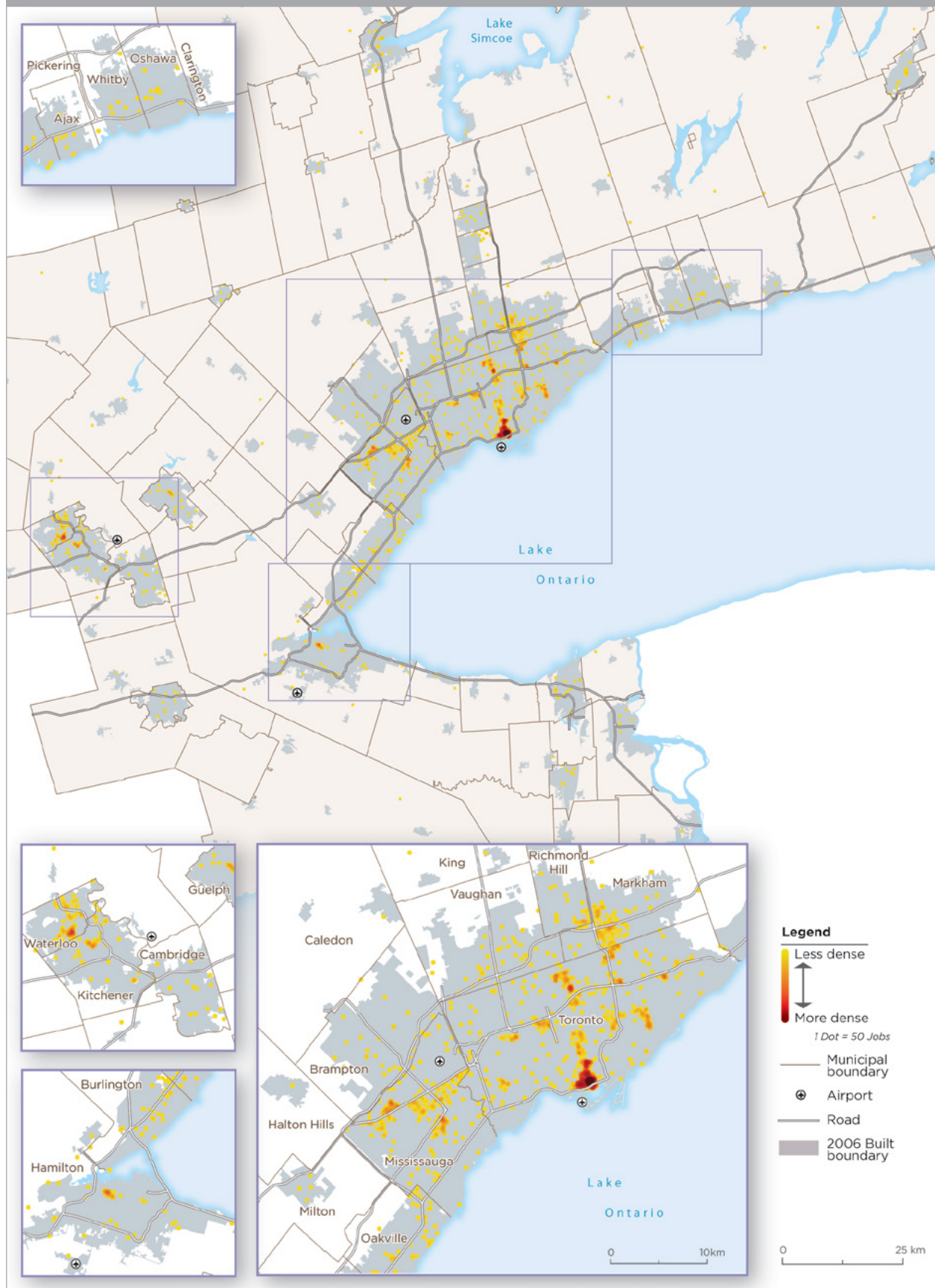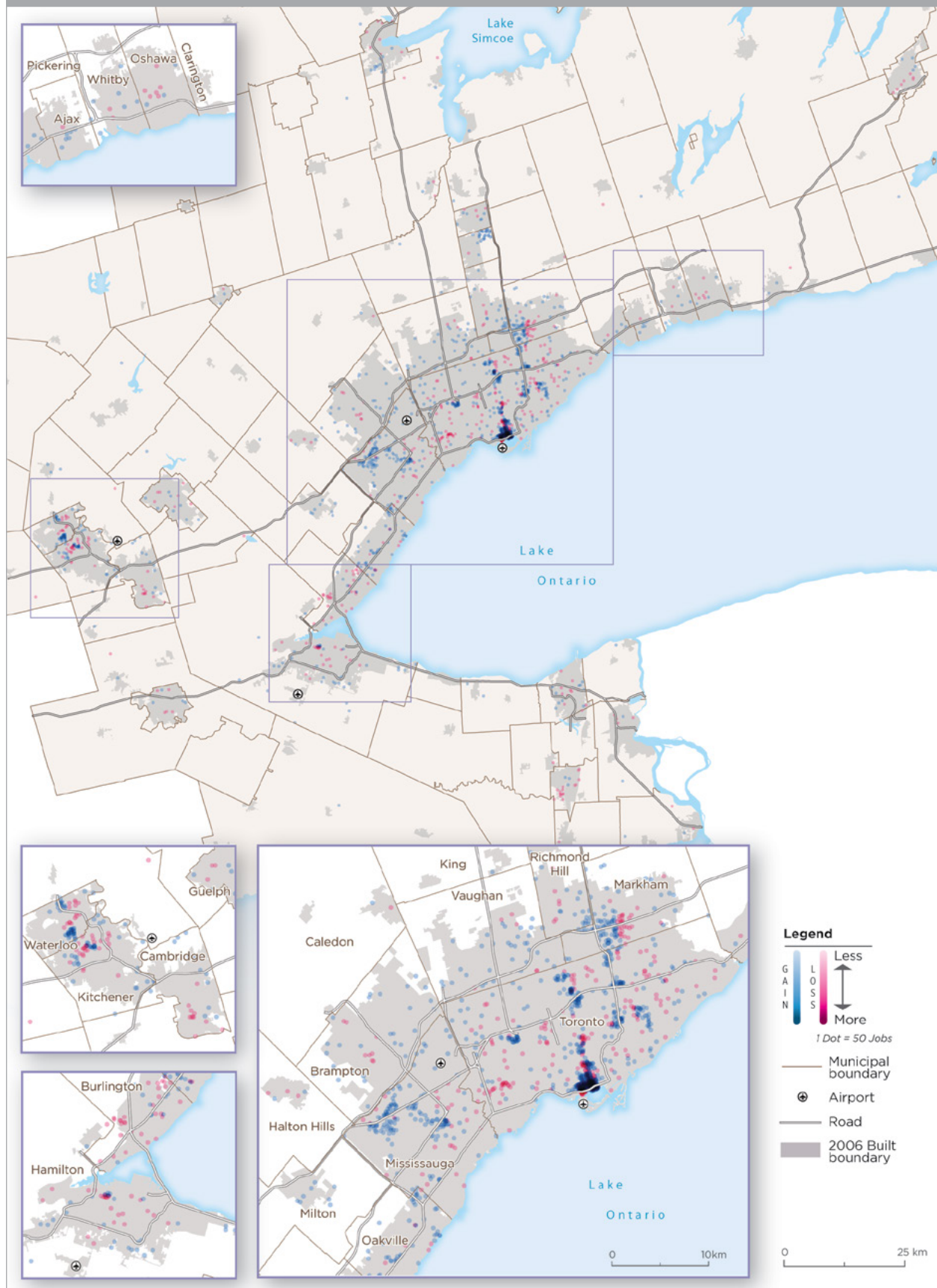
HIGH ORDER BUSINESS SERVICES

The High Order Business Services (HOBS) Archetype consists of companies that serve other businesses. It includes accounting, law, business management, headquarters, and some scientific and technical consulting.[60] In 2016, it represented 123,000 jobs in the GGH, and has shown strong job growth – some 25,000 additional jobs, or an increase of 25 percent, between 2006 and 2016.

TABLE 9: HIGH ORDER BUSINESS SERVICES ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
High Order Business Services	98,215	123,345	25,130	25.6
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

HOBS establishments provide advice, knowledge, information, and expertise to client firms. In this sector, "products" are often customized and co-produced with clients and are generally high-value-added or high-order services. HOBS play an important role as producers of knowledge and information, facilitators of information and knowledge exchange, and sources of specialized know-how, all of which support the potential for innovation, exports, and economic development.[61]

HOBS tend to concentrate in large urban centres and deliver services across large territories from their urban bases.[62] As these firms often collaborate with their clients, HOBS locations tend to reflect those of their clients. Access to a skilled talent pool is another locational factor.

The geography of HOBS employment in the GGH shows a dominant concentration of jobs in Downtown Toronto, which extends along the Yonge Street corridor to the North York City Centre. Other concentrations are found in the Markham SKID, the Airport SKID, and in Hamilton centre. Additional employment is scattered in suburban locations, especially along the Highway 401 and 407 corridors.

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60 The Archetype includes NAICS 5416, "Management, scientific and technical consulting services." That category is included in HOBS because the most significant occupational category in the industry is "professionals in business and financial consulting," that is, the industry is more financial and business management–oriented than scientific.

61 Richard Shearmur and David Doloreux, "Conceptualising KIBS as both innovators and service providers to innovators: an exploration of firm-level and geographic factors," working paper, 2017.

62 Ibid.

Employment change between 2006 and 2016 generally reflects this existing pattern. The dominant concentration of growth is in the downtown. Some areas experienced job loss; these tend to be scattered across the region. (See Maps 7 and 8.)

Like jobs in the Finance Archetype, HOBS employment is found in both urban and suburban locations. The urban environment characteristics of Downtown Toronto and the older planned node of North York City Centre, as well as the SKIDs have already been described.

HOBS are also found in older downtowns, where they likely serve other local businesses. Hamilton centre is an example of an older city centre, like the downtowns of Brampton, Kitchener, Oshawa, or Burlington. These areas are relatively dense, and contain a wide mix of uses, including office, residential, institutions, shopping, and services. As these city centres were laid out before the Second World War, their environments tend to be compact, walkable and cyclable, with low- to mid-rise buildings, parks, and a high-quality urban realm. Most have good transit service, often with connections to the region as a whole through the GO train network. Over time, they have been through various phases of development and redevelopment.

URBAN CHARACTERISTICS OF OLDER DOWNTOWNS

While the fortunes of HOBS businesses are closely linked to their client industries, some also export their services. In fact, management services was one of the fastest-growing export sectors in Canada (see Figure 4, above).[63]

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63   Palladini, Spotlight on Services, 2015.

MAP 7: HIGH ORDER BUSINESS SERVICES ARCHETYPE EMPLOYMENT, GGH, 2016
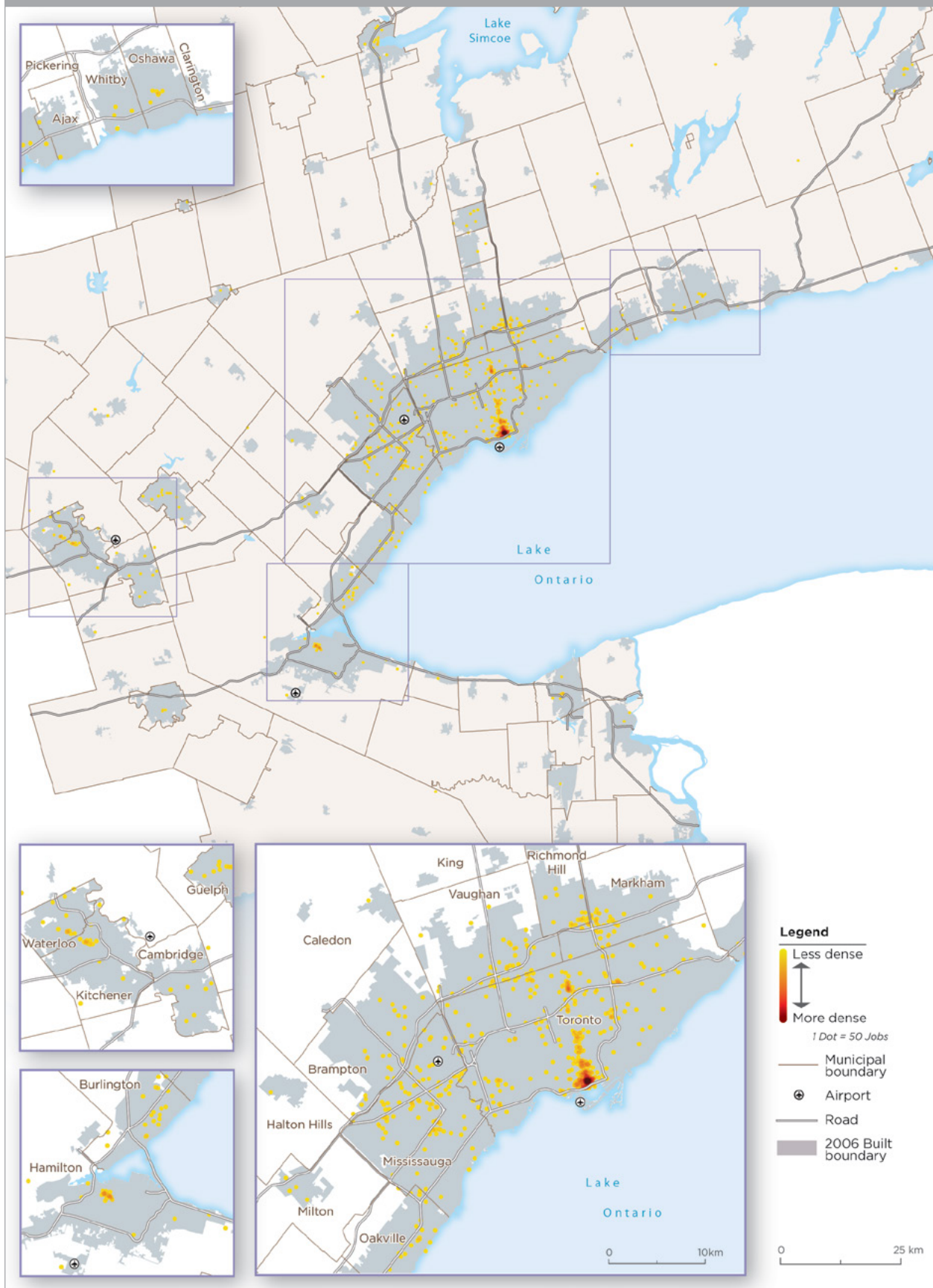
Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

Airport

Road

2006 Built boundary

MAP 8: HIGH ORDER BUSINESS SERVICES ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN / LOSS

Less / More

1 Dot = 50 Jobs

⊕ Municipal boundary
⊕ Airport
— Road
▨ 2006 Built boundary
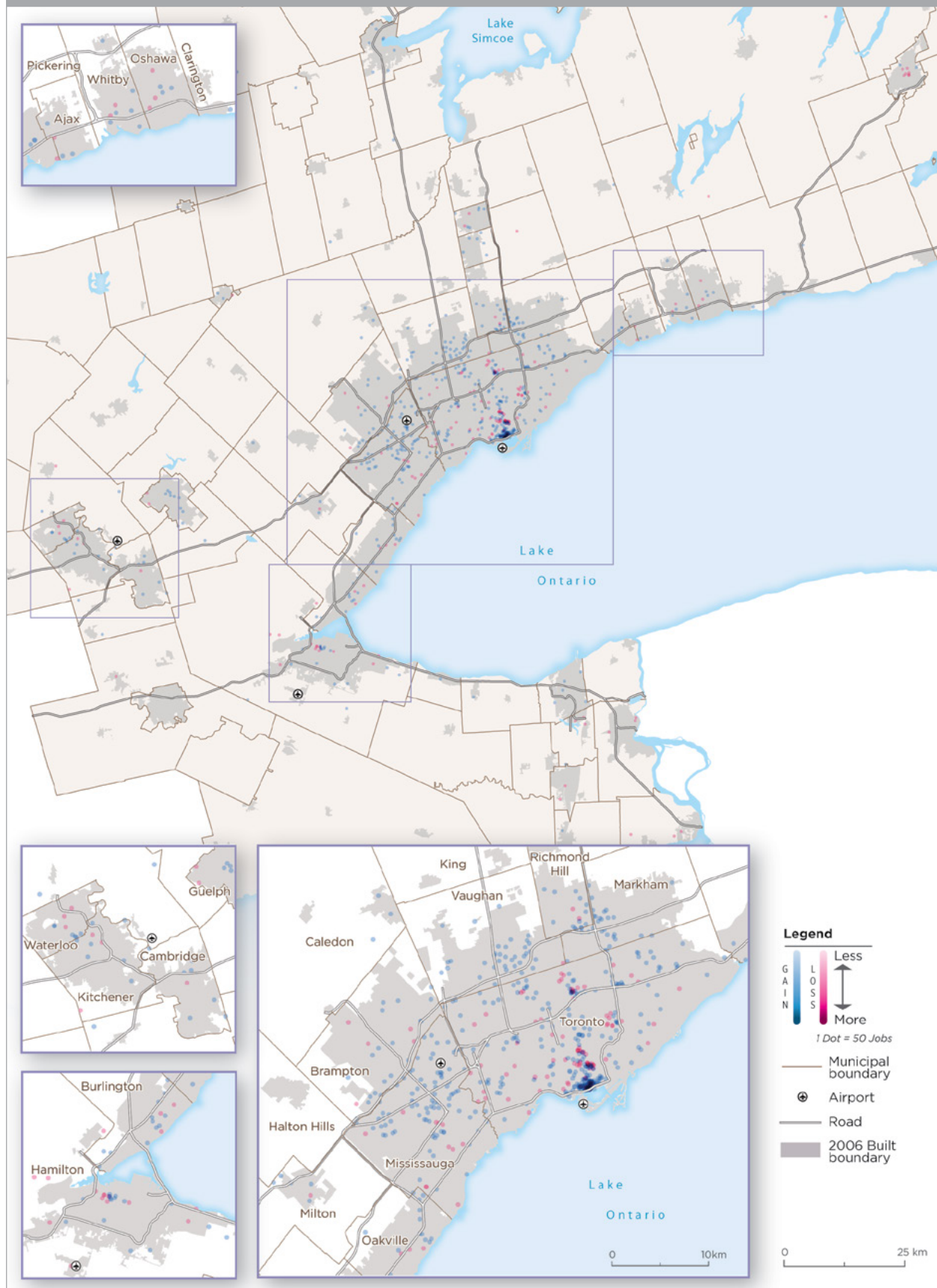
BACK OFFICE

The Back Office Archetype comprises employment in establishments providing services in office administration and the day-to-day functioning of businesses. These tasks include billing, record-keeping, personnel, employment placement, temporary help services, call centres, document preparation and handling, and credit bureaus.

Activities included in the Back Office Archetype tend to be routine, and the majority of employment in this Archetype is categorized as low-skilled or unskilled.[64] These are the kinds of activities that are vulnerable to automation. Indeed, back-office employment in the GGH declined from 55,000 jobs in 2006, to 52,000 in 2016.

TABLE 10: BACK OFFICE ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Back office	54,710	51,715	-2995	-5.5
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Similar to HOBS, back-office locations have tended to follow those of client firms, with a dominant concentration in the Toronto core. Back-office employment extends north along the Yonge Street corridor, with small nodes in the Hamilton and Waterloo downtowns. Otherwise, back-office jobs tend to be scattered across inner and outer suburban areas, including in the Markham, Airport, and Meadowvale SKIDs. The urban environment characteristics for these SKIDs have been described above.

The loss of jobs has taken place primarily in Toronto's inner suburbs and in older urban areas near Highway 401, east and west of the City. There was also a net loss of these jobs in some parts of Downtown Toronto. The City of Toronto as a whole experienced a net loss of some 2,600 back-office jobs between 2006 and 2016. Meanwhile, newer suburban areas in Vaughan, Markham, Mississauga, and Brampton experienced some modest job growth, as well as in Barrie. (See Maps 9 and 10.)

While there was a net loss of back-office jobs in the GGH, and we would expect this trend to continue given the ongoing automation of routine tasks, it appears that some geographical sorting is also occurring within the region.

Some back-office uses may be abandoning the relatively high-cost downtown to relocate in lower-cost suburban areas.

64   From an analysis of Labour Force Survey data.

MAP 9: BACK OFFICE ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
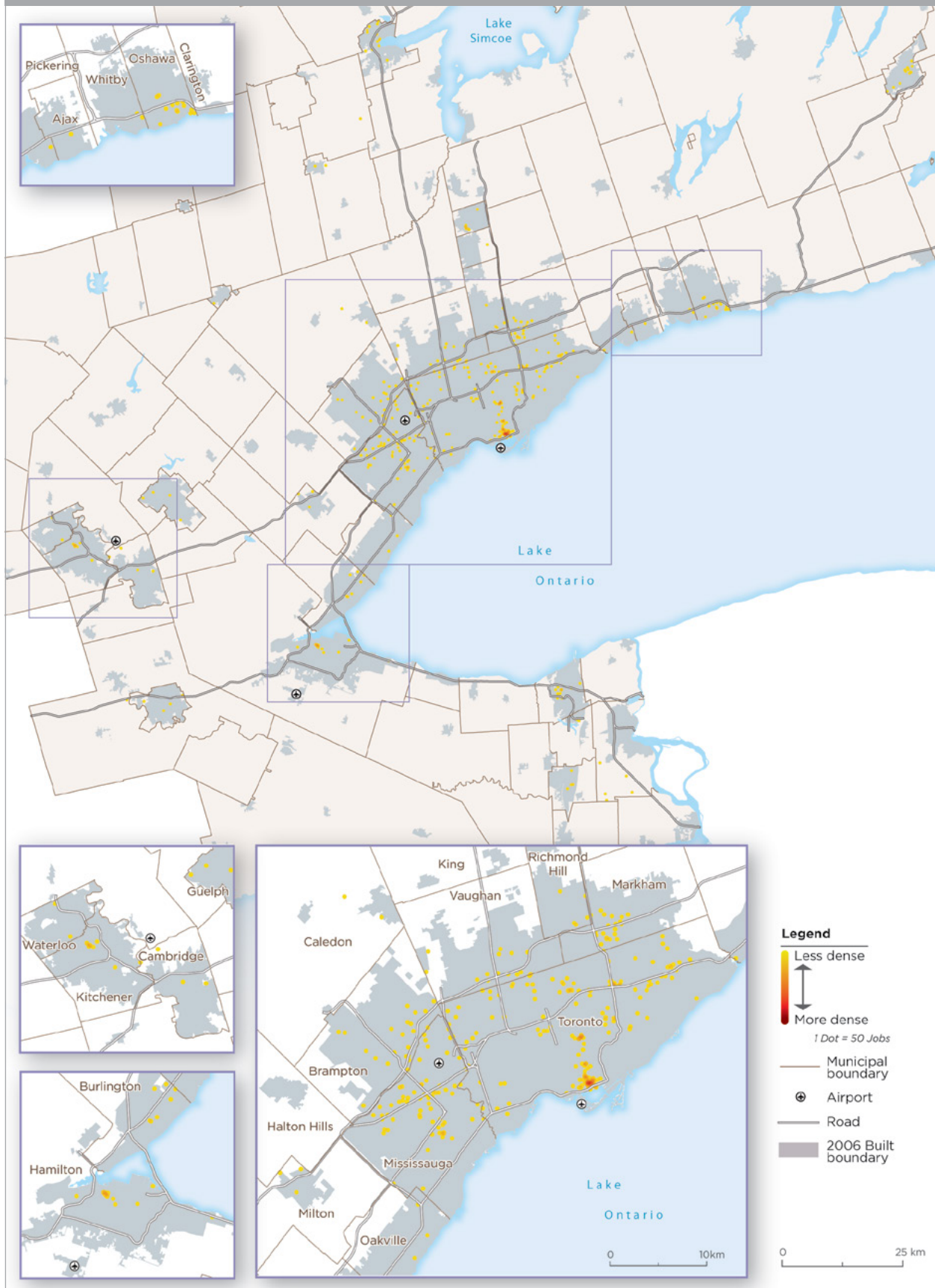
MAP 10: BACK OFFICE ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016
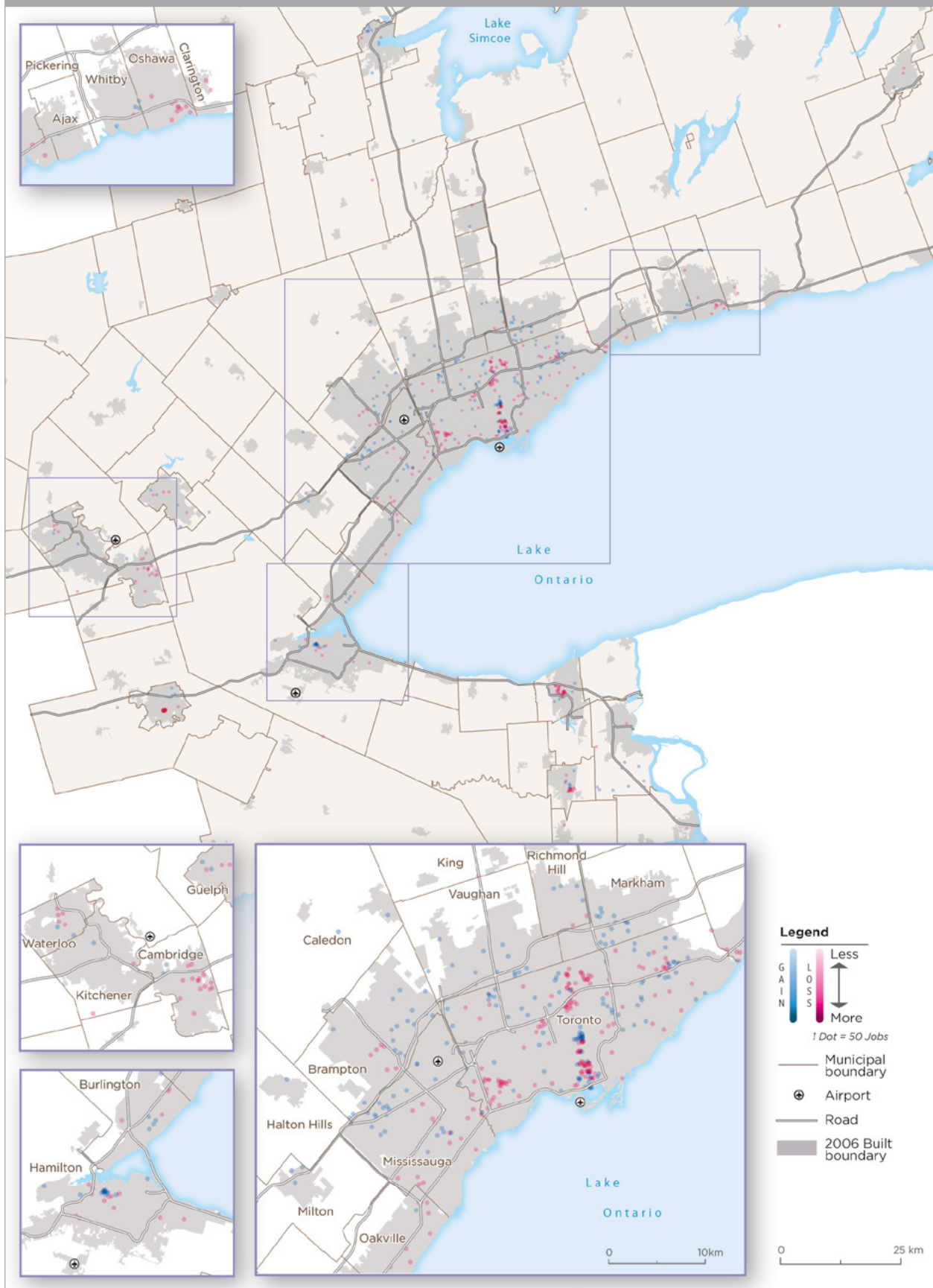
ARTS AND DESIGN-RELATED

The Arts and Design-Related (A&D) Archetype comprises employment in films, television, sound recording, advertising, book and magazine publishing, and performing arts and artists. Arts- and design-related industries tend to cluster in large cities,[65] and this is true of the GGH, where A&D represented almost 113,000 jobs. The Archetype has shown above-average job growth – some 10,000 additional jobs, or an increase of almost 10 percent, between 2006 and 2016.

TABLE 11: ARTS AND DESIGN ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Arts & design	102,645	112,665	10,020	9.8
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Not only does A&D employment tend to concentrate in the largest cities, but within those cities has a strong tendency to cluster in central areas. One study for U.S. cities found that of a selection of advanced industries, arts and culture industries were the most highly clustered at the regional scale, and as well the most clustered in the central city.[66]

Research by Gregory Spencer on the location of arts-related firms in Toronto, Montreal, and Vancouver mirrored the findings for U.S. cities: locational patterns were similar in all three Canadian cities.[67] Arts-related businesses tended to locate at the edges of the central business district, in older, denser, mixed-use, transit-served, and walkable areas. There was considerable overlap between living and working; many arts workers lived and worked in the same neighbourhoods, often in the same premises. In fact our data show that in this Archetype, many worked at home – representing 34,000 jobs in 2016 (in addition to the 113,000 jobs at a usual place of work indicated in Table 11).

The pattern for A&D employment in the GGH is consistent with these observations. Employment in this Archetype is mainly concentrated in and at the edges of Downtown Toronto, extending east and west along Queen Street. There is scattered employment elsewhere in the region, but no secondary concentrations outside the central area. In fact, the City of Toronto accounted for almost two-thirds of GGH jobs in the Arts and Design-related Archetype. (See Maps 11 and 12.)

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65 Currid and Connolly, "Patterns of knowledge," 2008; Carl Grodach, Elizabeth Currid-Halkett, Nicole Foster, and James Murdoch III, "The location patterns of artistic clusters: A metro- and neighborhoodlevel analysis," *Urban Studies* 2014, 5 (13): 2822–2843; Gregory M. Spencer, "Knowledge neighbourhoods: Urban form and evolutionary economic geography," *Regional Studies*, 2015, 49 (5): 883–898.
66 Currid and Connolly, "Patterns of knowledge," 2008.

The edges of the core tend to contain a tight and fine-grained mix of uses, including residential neighbourhoods, a wide range of industries, shops, services, and meeting places like cafes. These are dense older urban areas with low- or mid-rise buildings – although in some areas with intense development pressures, taller buildings are being built. Many businesses are located in repurposed former factory or warehouse buildings, which have proved very flexible and attractive to a wide range of new businesses. As well, these areas tend to have higher levels of transit service.

Some of the scattered A&D employment outside Downtown Toronto and its edges could include relatively large employers in television broadcasting studios or film production locations. These locations require large studio facilities, often with extensive truck and vehicle parking. Some are currently found on the 401 in Scarborough (CTV), or in the Don Mills office park (Global TV), for example. New large-scale production facilities have recently been announced for Markham and Mississauga.[68]

Research has found that individual arts and culture industries benefitted by co-locating with other industries, especially design with art; music with film; and performing arts with music, as well as other knowledge-intensive industries (such as technology and media) and amenities such as cafes.[69]

Older, denser, mixed-use, transit-served and walkable areas offer the possibility of social interaction and networking on both formal and informal bases, in a sector characterized by smaller firms, supporting production that is often organized on a project-by-project basis.

Globalization has affected the Arts and Design Archetype. Many industries have strong national and international roles. For example, Toronto is the third-largest film and television production location in North America, after Los Angeles and New York City.[70] Motion pictures, videos, and sound recording are all tradable industries. The film industry, for example, attracts foreign productions to shoot in Toronto, while Canadian-made movies can be sold in international markets.

URBAN CHARACTERISTICS OF THE EDGES OF THE CORE

68 Tim Kelly, "Markham Movieland project gives big boost to TV, film production in city," *Markham Economist and Sun*, September 12, 2018; Tony Wong, "Why CBS set its sights on Mississauga for new TV production hub," *Toronto Star*, September 27, 2018.
69 Elizabeth Currid and Sarah Williams, "Two cities, five industries: Similarities and differences within and between cultural industries in New York and Los Angeles," *Journal of Planning Education and Research*, 2010, 29 (3): 322–335, p. 331; Grodach et. al., "The location patterns of artistic clusters," 2013.
70 Communications MDR, "Environmental Scan of the Culture Sector," Ontario Culture Strategy Background Document, prepared for the Ontario Ministry of Tourism, Culture and Sport, 2016, p.12.

Digital and communications technologies are also transforming these industries. This transformation includes the digitization of content (movies, books, TV shows, music, etc.), as well as the creation of new products and industries, such as mobile apps, e-learning, mobile gaming, and new services, such as music streaming. In some cases, opportunities are created by lowering barriers to entry (such as online publishing, marketing, distribution, and selling), and improving access to markets, including global markets. However, the same forces have also created increased competition in the home market from foreign sources.[71] Industries in this Archetype are still adapting to and exploiting change associated with new and emerging technologies.

Arts and culture industries have resisted migrating outside central areas, despite direct and indirect costs, such as congestion or high house prices. Researchers suggest that even in cities like New York, "particular geographies attain a competitive lock-in that is almost impossible to usurp."[72] There is some evidence, however, of some activities relocating away from central Toronto, to lower-cost locations, such as artists moving to Hamilton. Spencer notes a gradual shift farther away from the edges of the Downtown Toronto core, from Queen West to Parkdale to the Junction,[73] a push likely resulting from increasing rents in central areas and competition from other industries, like Soft Tech.

This shift raises an important issue: if the Arts and Design Archetype continues to expand, and given its particular urban characteristics, where will firms and employment locate in the GGH? Opportunities in the traditional types of urban environment sought by Arts and Design firms (central, older, flexible warehouse spaces) are becoming rare and/or unaffordable. This is a strategic land use planning question that a forward-looking land use plan could and should address.

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71 Ibid.
72 Currid and Connolly, "Patterns of knowledge," 2008, p. 429.
73 Spencer, "Knowledge neighbourhoods," 2015, p. 893.

MAP 11: ARTS AND DESIGN-RELATED ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
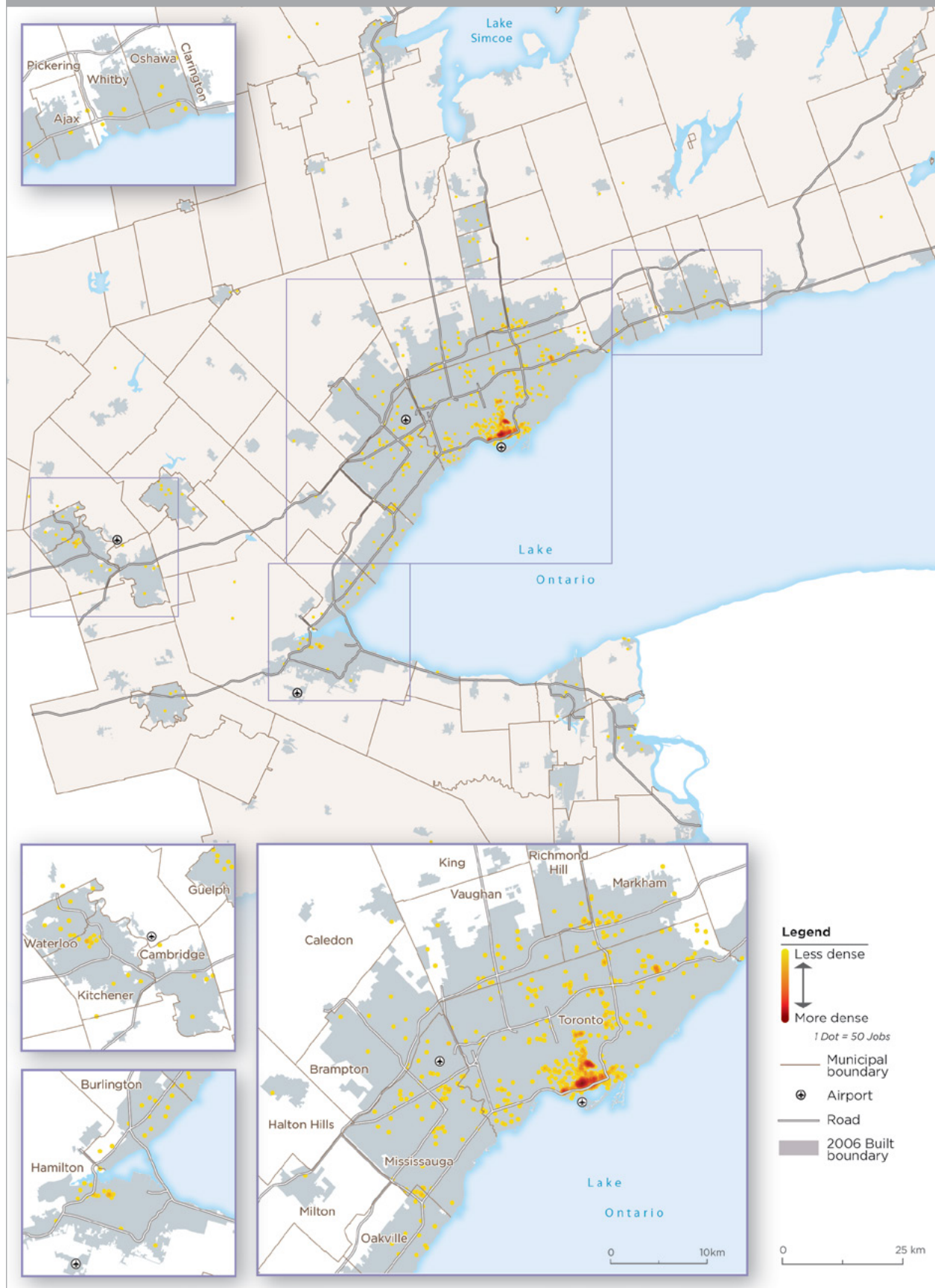
MAP 12: ARTS AND DESIGN-RELATED ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016
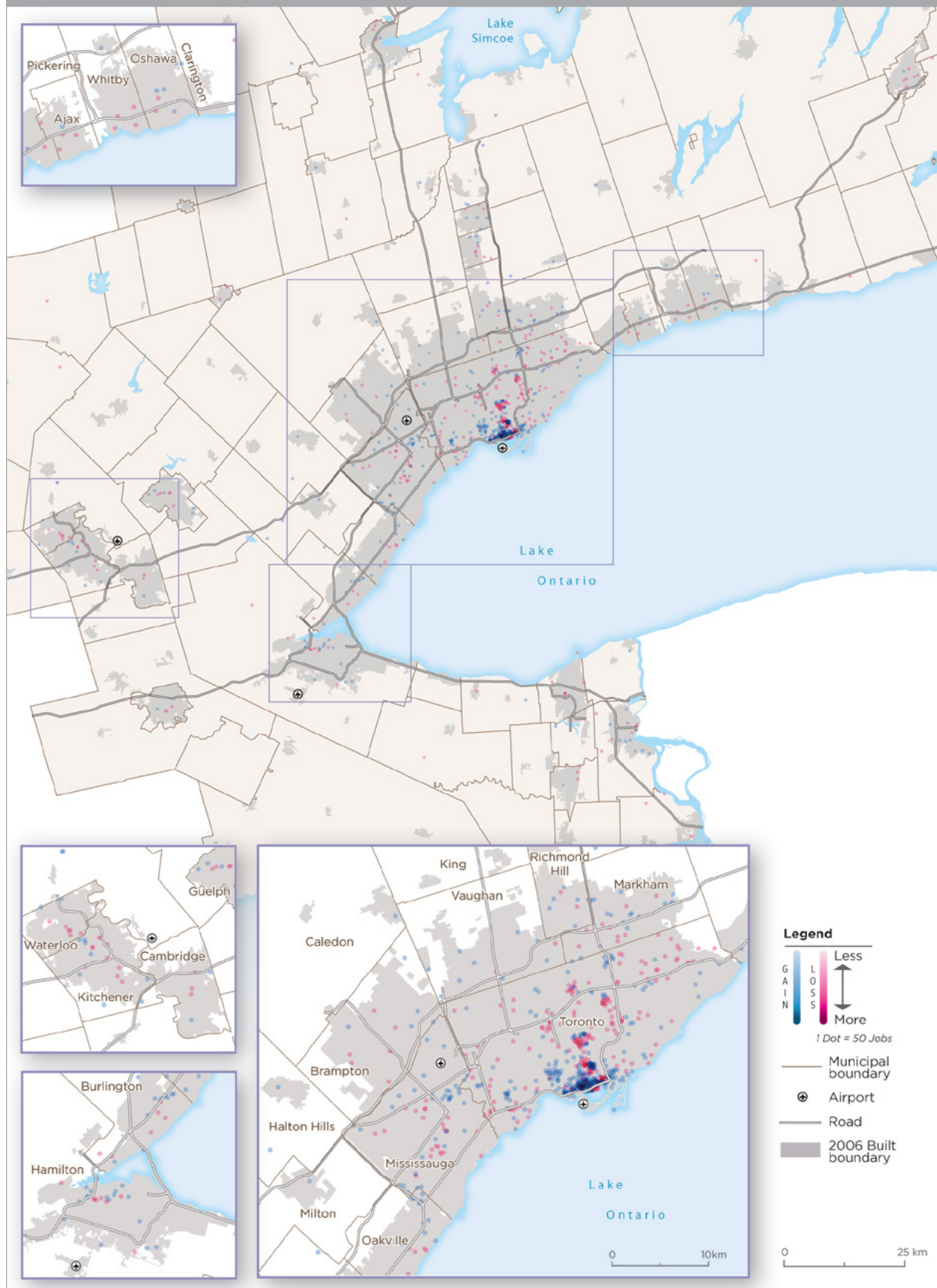
SOFT TECH

The Soft Tech Archetype comprises employment in establishments in computer systems design; data processing; web hosting; software design, publishing and distribution; and business-to-business electronic markets. It also includes electronic game design and development, as well as website and app design and development. The largest component is computer systems design, which accounted for about 68,000 of the 91,000 jobs in this Archetype in 2016. In addition, a large number of workers in this Archetype worked at home – almost 30,000 (in addition to the 91,000 with a usual place of work).

This is a high-growth Archetype, adding more than 19,000 jobs between 2006 and 2016, a growth of almost 27 percent during the period.

TABLE 12: SOFT TECH ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Soft Tech	71,960	91,270	19,310	26.8
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Employment in this high-skilled, knowledge-intensive Archetype is highly clustered, with a dominant cluster in Downtown Toronto, and significant clusters in three SKIDs: Markham, the Airport, and Waterloo, as well as in North York City Centre and in office parks along the Don Valley Parkway.

URBAN CHARACTERISTICS OF INNER SUBURBAN OFFICE PARKS

The urban environment characteristics of downtown Toronto, the SKIDs and North York City Centre have been described above. Inner-suburban office parks, such as those found along the Don Valley Parkway, share many traits with SKIDs. They are planned, single-use, suburban, and corporate. However, the inner-suburban parks tend to be denser, with less surface parking than those in outer suburbs. They often have sidewalks and can support walking. They also tend to have a relatively high level of transit service – usually frequent bus service.

In 2016, the biggest share of Soft Tech jobs was found in the City of Toronto – almost 44,000. Toronto also accounted for the largest increase in Soft Tech jobs of any municipality – adding 13,000 new jobs between 2006 and 2016, almost two-thirds of the region's Soft Tech job growth. Many of these new jobs have located in Downtown Toronto. Other Soft Tech job growth has been focused in the Waterloo SKID, the Airport SKID, and North York City Centre, while the Markham SKID lost Soft Tech jobs. (See Maps 13 and 14.)

As a knowledge-intensive sector that creates and maintains platform technologies for other industries, we would expect this sector to expand further, and continue to see clustered growth, building on existing clusters and agglomeration economies.

MAP 13: SOFT TECH ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense
More dense
1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

MAP 14: SOFT TECH ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN — LOSS

Less ↑
More ↓

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
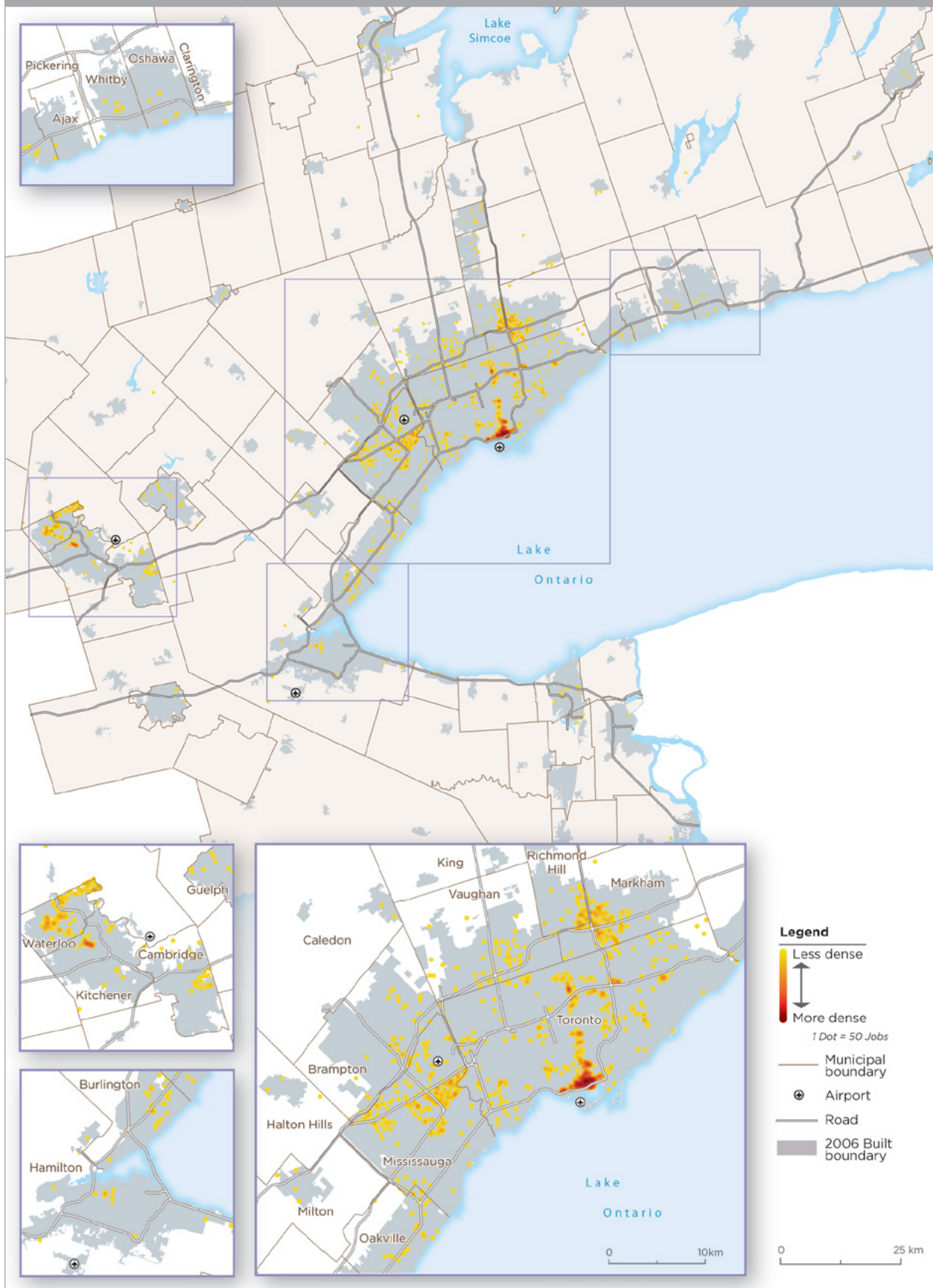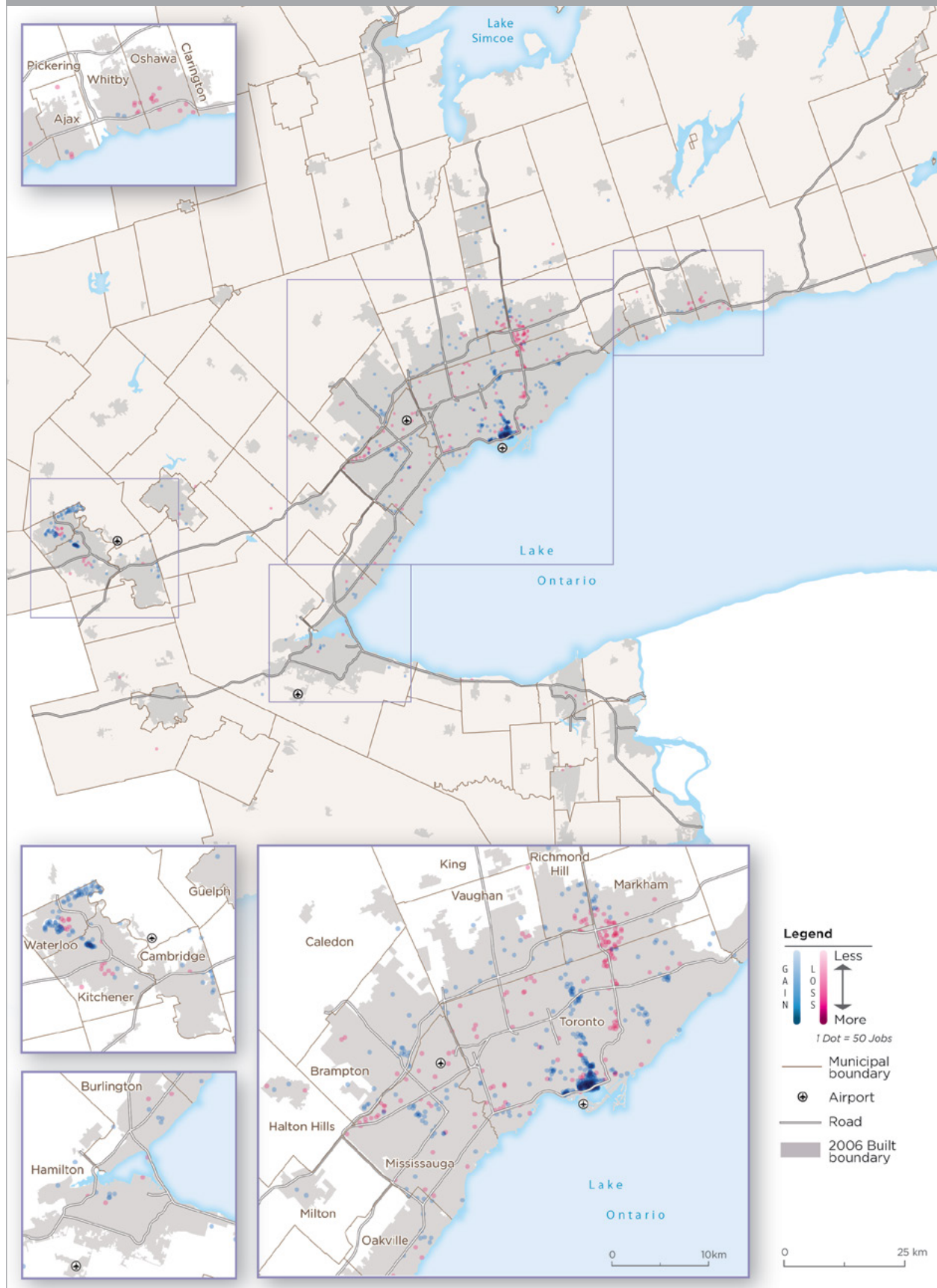
HARD TECH

The Hard Tech Archetype comprises the manufacturing and wholesaling of tech-nological products, such as computers and peripheral equipment, communications equipment, semiconductors, and other electronic components. Wholesaling jobs accounted for over 30,000 of the 51,000 jobs in this Archetype in 2016.

In contrast to fast-growth Soft Tech, employment in Hard Tech in the GGH decreased significantly between 2006 and 2016. This decline was experienced across all the industries that make up the Hard Tech Archetype.

In total, the Archetype saw a net loss of over 21,000 jobs between 2006 and 2016, a decline of almost 30 percent.

TABLE 13: HARD TECH ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Hard Tech	72,810	51,225	-21,585	-29.6
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Employment in Hard Tech is highly clustered, primarily in suburban areas, with the dominant concentration in the Markham SKID. Other clusters appear in the Airport and Meadowvale SKIDs, with a smaller concentration in Downtown Toronto. Hard Tech jobs are also found in the Tor-York West megazone, Burlington, Don Mills, and Guelph.

The geography of employment change is dominated by job loss – especially in the Markham SKID, and in Don Mills, Eastern Scarborough, and the Waterloo SKID. There are some areas of job growth, on the edge of the Airport SKID, in the Meadowvale SKID, and in Burlington and north Guelph. (See Maps 15 and 16.)

Hard Tech industries are highly integrated in the global market, and so face intense competitive pressure, which may have contributed to the loss in jobs. As well, the wholesaling sector is being disrupted by e-commerce (see Other Wholesaling, below).

MAP 15: HARD TECH ARCHETYPE EMPLOYMENT, GGH, 2016

Pickering
Oshawa
Whitby
Clarington
Ajax

Lake
Simcoe

Lake
Ontario

Guelph
Waterloo
Cambridge
Kitchener

Burlington
Hamilton

King
Richmond
Hill
Vaughan
Markham
Caledon
Toronto
Brampton
Halton Hills
Mississauga
Milton
Oakville

Lake
Ontario

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal
boundary

Airport

Road

2006 Built
boundary

0   10km

0   25 km

MAP 16: HARD TECH ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN — LOSS

Less — More

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

0 — 10km

0 — 25 km

SCIENCE-BASED

The Science-Based Archetype comprises employment in establishments in engineering, scientific research and development services, testing laboratories, surveying, and medical equipment and supplies manufacturing.[74] As of 2016, this Archetype represented 65,000 jobs in the GGH. This is a fast-growth Archetype, adding more than 12,000 jobs since 2006, a 23 percent increase.

TABLE 14: SCIENCE-BASED ARCHETYPE EMPLOYMENT GGH 2006 AND 2016

	2006	2016	Change	% Change
Science-Based	52,950	64,980	12,030	22.7
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Science-based firms are frequently found in suburban locations, especially suburban office parks.[75] In the GGH, concentrations are found in all five of the regional SKIDs (though to a lesser degree in Waterloo). But the GGH also has a significant concentration of Science-Based employment in Downtown Toronto, no doubt representing the presence of large consulting firms, as well as research and development facilities.

As Gregory Spencer notes, Science-based firms locate in suburban office parks beacause they tend to be larger, multinational, and developing proprietary products.[76] Their production and innovation processes tend to be in-house, rather than inter-firm, thus they rely to a lesser extent on external connections through their urban environment. As well, they can draw upon a skilled labour force in the surrounding suburban residential areas.

The geography of employment change for this Archetype is primarily one of growth, with some areas of job loss. Growth has clustered in Downtown Toronto, as well as the Markham, Airport, and Meadowvale SKIDs, although the other two SKIDs also have some areas of job loss. Other areas of growth include Toronto's inner suburbs, especially at the Highway 427 and QEW interchange, and the Don Valley Parkway and Highway 401 interchange. (See Maps 17 and 18.)

74 This Archetype includes employment in NAICS 5413, Architectural, engineering and related services. Although the dominant types of occupation in this industry are engineering and science-related, it also includes architecture and landscape design.
75 Spencer, "Knowledge neighbourhoods," 2015.
76 Ibid.

MAP 17: SCIENCE-BASED ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

MAP 18: SCIENCE-BASED ARCHETYPE EMPLOYMENT CHANGE, 2006–2016

Legend

GAIN LOSS

Less

More

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
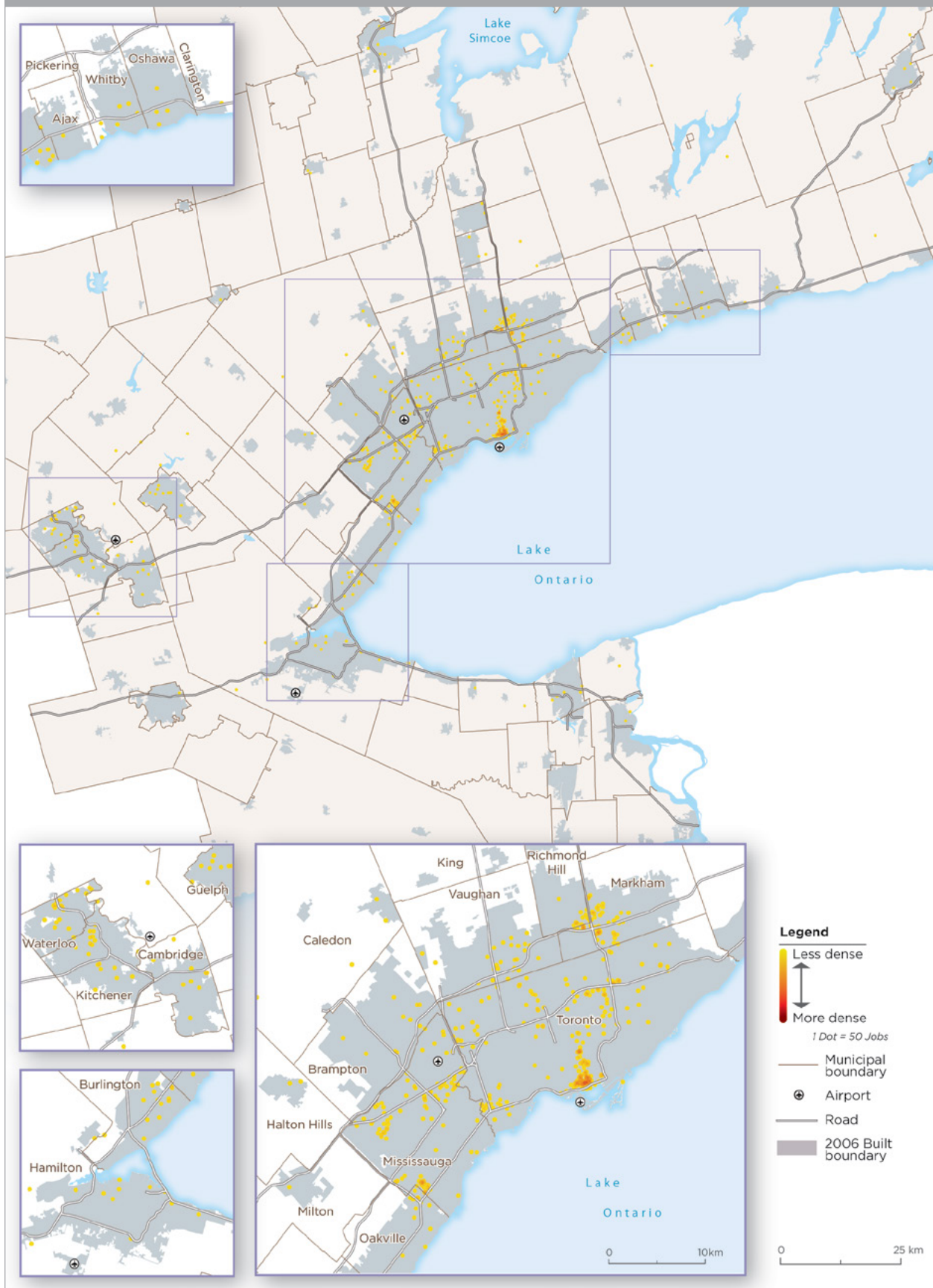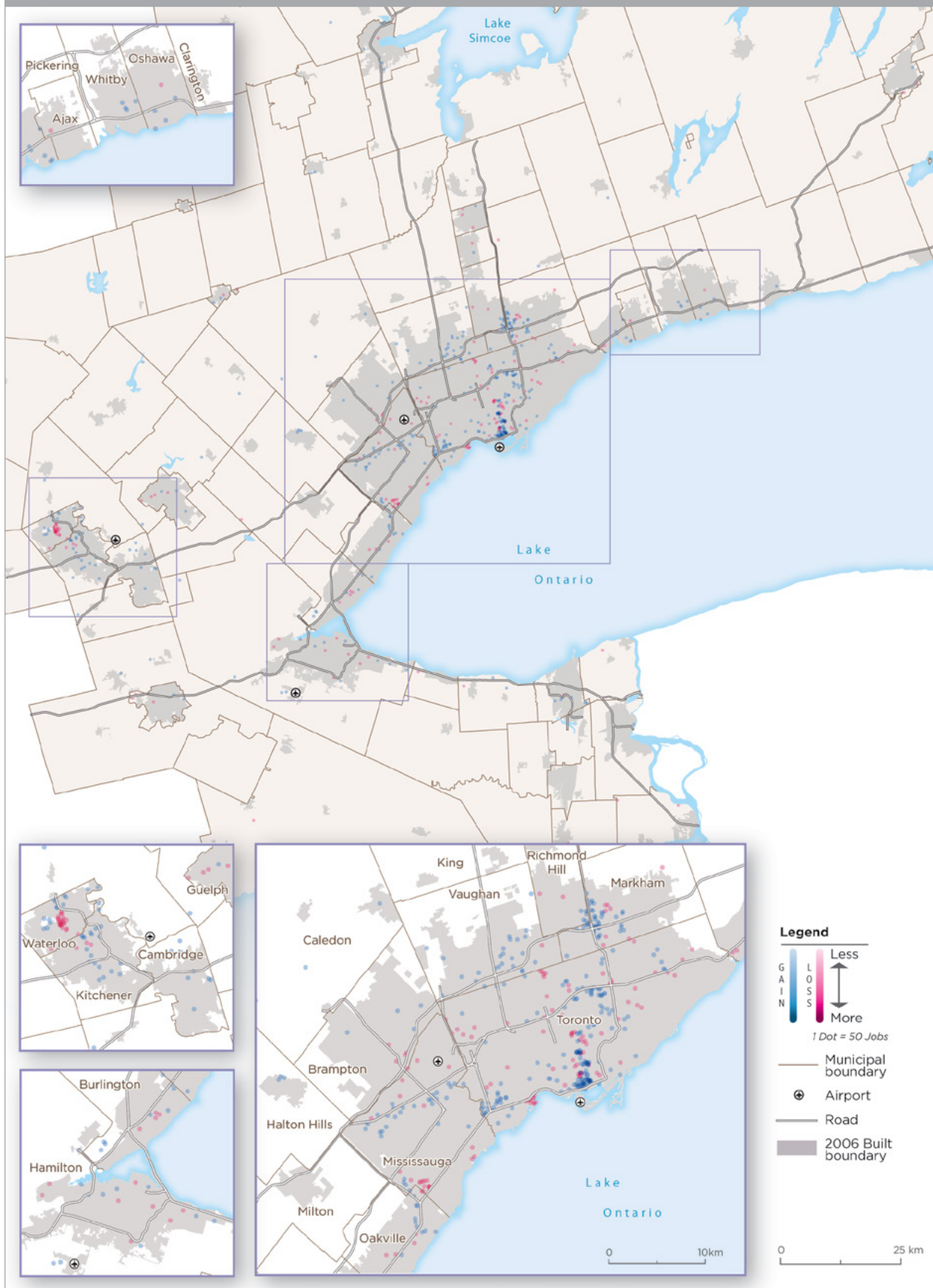
HIGHER EDUCATION

The Higher Education Archetype comprises employment in universities and commu-
nity colleges. As of 2016, this Archetype represented 65,000 jobs in the GGH. This
is a fast-growth Archetype, adding more than 18,000 jobs since 2006, a 31 percent
increase. Given the important role of institutions of higher learning in a knowledge-
based economy, this employment growth is expected.

TABLE 15: HIGHER EDUCATION ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Higher Education	59,635	78,100	18,465	31.0
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Not surprisingly, the geography of Higher Education employment in the GGH cor-
responds to the locations of institutions of higher learning, including the University
of Toronto, York, Ryerson, McMaster, UOIT, Guelph, and Waterloo.

These locations are of strategic importance, given growing partnerships between
universities, community colleges, businesses, and non-profit groups, as well as the
institutions' roles as sites of business incubators, innovation, research, and develop-
ment. (See Maps 19 and 20.)

MAP 19: HIGHER EDUCATION ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

Airport

Road

2006 Built boundary
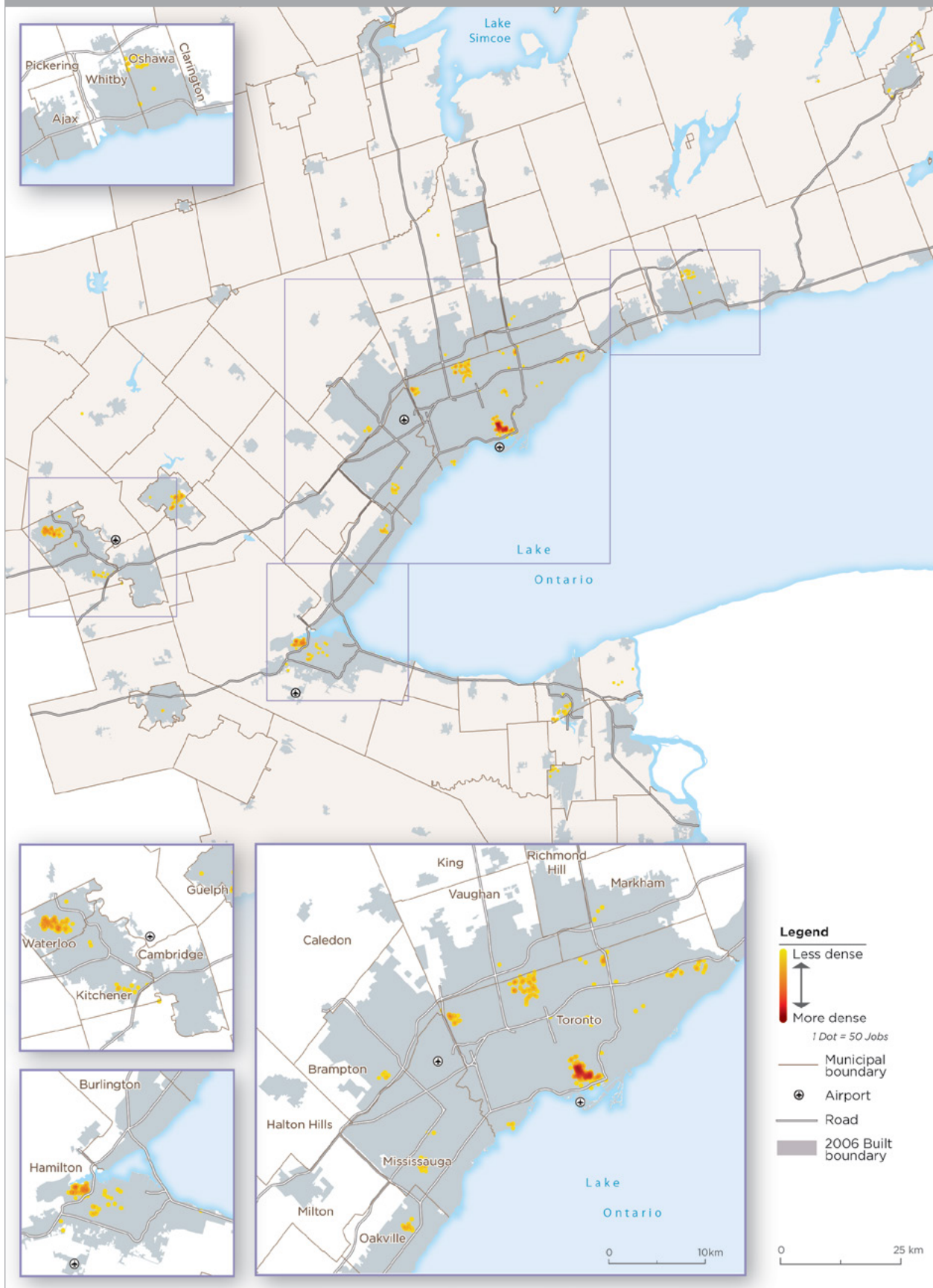
MAP 20: HIGHER EDUCATION EMPLOYMENT CHANGE, GGH, 2006–2016

Pickering
Oshawa
Clarington
Whitby
Ajax

Lake
Simcoe

Lake
Ontario

Guelph
Waterloo
Cambridge
Kitchener

Burlington
Hamilton

King
Richmond Hill
Vaughan
Markham
Caledon
Toronto
Brampton
Halton Hills
Mississauga
Milton
Oakville

Lake
Ontario

Legend

GAIN
LOSS
Less
More

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

0 — 10km

0 — 25 km
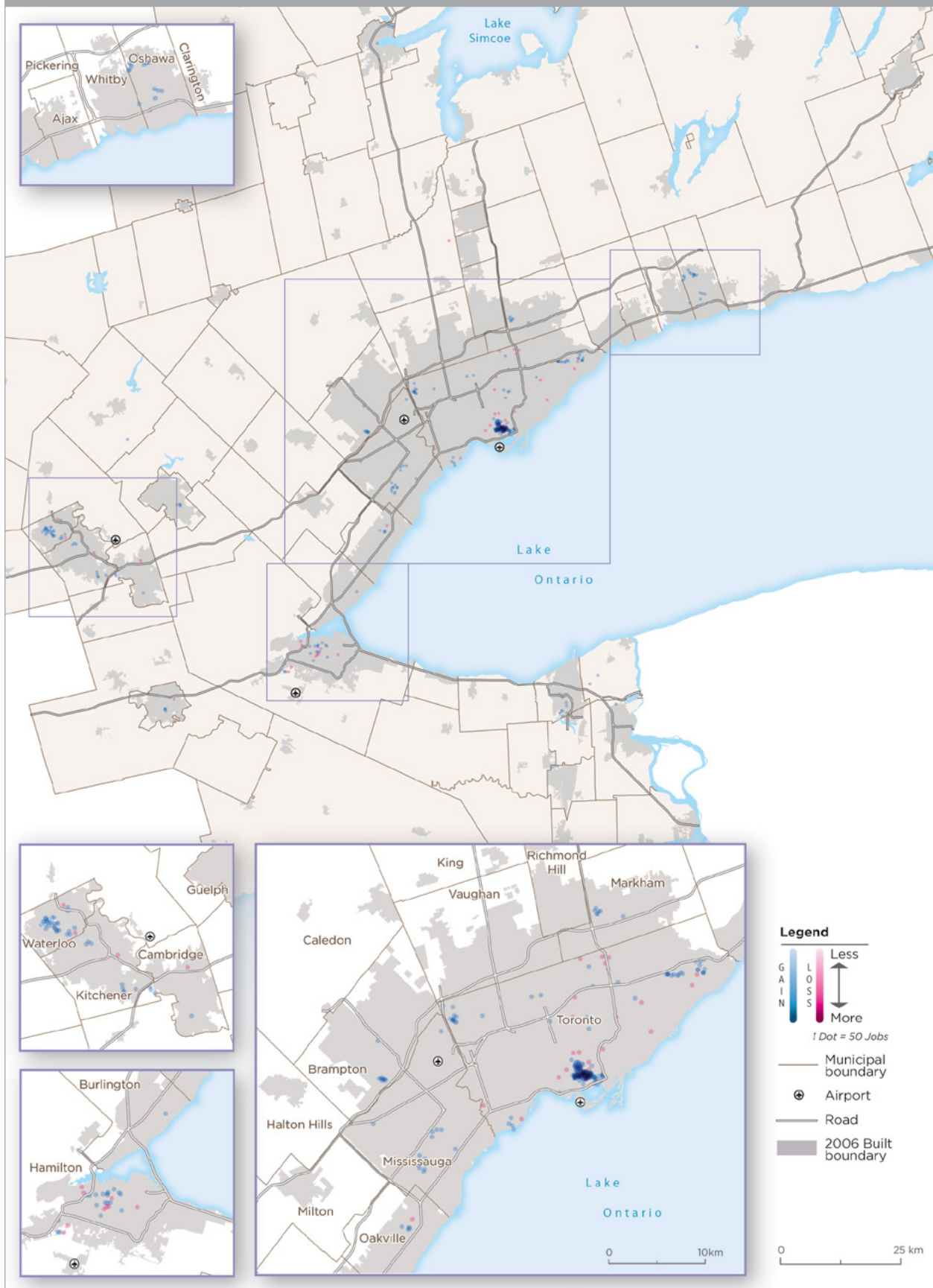
LOGISTICS

The Logistics Archetype includes freight transportation arrangement (freight forwarders, shipping agents, customs brokers), warehousing, and storage. In conjunction with storage, this Archetype includes services such as labelling, breaking bulk, inventory control and management, light assembly, order entry and fulfillment, packaging, pick-and-pack, price marking and ticketing, and transportation arrangement. Logistics establishments may be part of a broader corporation, such as a retail company, or a third-party warehouser serving corporate clients.

The Logistics Archetype saw significant employment growth between 2006 and 2016 − 7,500 jobs, a 30 percent increase.

TABLE 16: LOGISTICS ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Logistics	25,170	32,635	7,465	29.7
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Logistics employment is primarily clustered around Pearson International Airport. There is a second, smaller cluster around the Intermodal terminal in Vaughan, and some additional employment in Milton and Kitchener-Waterloo. Proximity to intermodal facilities and airports is important, as is access to the highway network. Buildings can be extremely large − more than 1 million square feet in some cases, with high levels of truck traffic.

Logistics has been a growing sector of the economy in recent years, accounting for the construction of many warehouse and distribution facilities across the GGH, as evidenced by employment growth in Brampton, Mississauga, Caledon, and Vaughan, as well as locations along the 407, 401, and QEW Highways, including Pickering, Ajax, Cambridge, and Bradford. Notably, there have been few areas of employment loss in this Archetype. (See Maps 21 and 22.)

Different types of warehousing facilities exist, each with different functions and characteristics (see text box[77]) and subject to different drivers of change.

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77 Definitions for warehouse, distribution centre and truck terminal from NAIOP, "NAIOP Terms and definitions: North American office and industrial market," NAIOP Research Foundation, 2012. Definition for fulfillment centre from CBRE, Keeping Pace: The rising importance of supply chain management, CBRE Research, 2015.

TYPES OF WAREHOUSE/DISTRIBUTION BUILDINGS

Warehouse: A building primarily used for storage, and/or distribution of materials, goods and merchandise, e.g. bulk warehouse, refrigerator storage.

Distribution centre: A type of warehouse facility designed to accommodate efficient through-movement of goods, including overnight delivery services and air cargo.

Truck terminal: A specialized distribution building for redistributing goods from one truck to another as an intermediate transfer point.

Fulfillment centre: A distribution facility focused on fulfilling e-commerce orders, shipping to final consumers.

Globalization and technological change are key drivers for this archetype. Levels of trade, the geography of that trade (that is, where goods are coming from and going to), and emerging technologies together shape supply chain configurations and in turn the amount, nature, and location of warehousing and distribution activity.

GLOBALIZATION OF PRODUCTION AND SUPPLY CHAINS

The expanding use of global supply chains has increased the demand for goods movement from production sites outside the country to final users in the cities of the GGH – and with it, demand for warehouse and distribution facilities.

GLOBALIZATION OF SHOPPING

At the same time, advances in information technology that have propelled e-commerce have brought about the globalization of consumer markets – or what some call the "globalization of shopping."[78] With the expansion of ecommerce, GGH consumers can buy products from around the world quickly and cheaply.

TRADE SHIFTS

Growth in Canada-U.S. trade is expected to create additional demand for trucking facilities and warehouses.[79] However, disruptions to global trade could also have significant impacts, such as a reorientation of supply chains to accommodate greater domestic flow of goods (rather than networks arranged to distribute goods from overseas[80]) and "may reduce the need for large seaports in advanced economies, while increasing the need for larger inland and intermodal ports closer to population centres."[81] Such a shift could increase demand for warehousing facilities in and around the GGH. Any move away from off-shoring of production toward "nearshoring" could further add to the demand for trucking and warehousing facilities in the GGH.[82]

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78 NAIOP, "NAIOP Terms and definitions," 2012.
79 CBRE, *Keeping Pace*, 2015.
80 CBRE, "Globalization and Logistics: What Next?" 2017.
81 Ibid., p. 6.
82 CBRE, *Keeping Pace*, 2015.

E-commerce and online shopping are also key drivers reshaping distribution networks and facilities. E-commerce is still evolving, with the potential for future technological and business model disruption that will affect the demand for, nature of, and location of warehousing and distribution facilities.

E-COMMERCE

In this context, it is important to consider where we are currently on the e-commerce trajectory: have we reached peak online shopping (so that demand for warehousing facilities will level off) or does additional growth potential remain? In Canada, the take-up of online shopping lags behind that of other countries, suggesting additional growth potential. E-commerce accounted for 7 percent of $352 billion Canadian retail sales in 2016, compared with 10 percent in the U.S. and 15 percent in the U.K. (despite similar levels of computer use and Internet penetration).[83] Almost half of Canadian spending is from U.S. e-tailers, including Amazon, Walmart, Costco, eBay, and Apple.[84] Many Canadian retailers have yet to put in place e-commerce platforms. Indications are that the sector is still in its relative infancy, with the potential for further growth and disruption.

There has been a tendency for warehouses and distribution facilities to get larger over time – more than doubling in floor area, on average, in the last five years compared with those built between 2002 and 2007.[85] Distribution centres now range from 20,000 to 1,000,000 square feet, while fulfillment centres, the largest type, range from 400,000 to 1,500,000 square feet, typically with greater heights to allow for vertical storage.[86] For example, a recently completed Canadian Tire distribution centre in the municipality of Caledon measures 1,500,000 square feet and aims to serve all stores across the country.[87]

On the other hand, with pressures for next-day delivery, many are anticipating the addition of smaller distribution facilities or "localized delivery hubs" within urban areas, closer to final consumers and stores, as "last-mile" distribution facilities.[88] These local buildings do not need the size or height of regional facilities, and older existing buildings could be re-used for this purpose.[89] As well, future transportation infrastructure facilities (airports, intermodal terminals) will shape the geography of this Archetype.

Automation, including the use of robots in distribution and fulfillment facilities, will alter the employment profile of these buildings, including the worker-to-floorspace ratio. The amount of employment in these facilities is of interest to planners, particularly with respect to planning transportation and transit services that serve logistics clusters.

These observations suggest an ongoing need to plan for growth for this archetype in the GGH. Given the significant land needs associated with each facility, as well as the associated truck traffic, a more detailed assessment of this archetype's future needs is warranted, including a strategic, regionwide approach to accommodating and locating logistics facilities.

MAP 21: LOGISTICS ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

MAP 22: LOGISTICS ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN | LOSS | Less
More

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
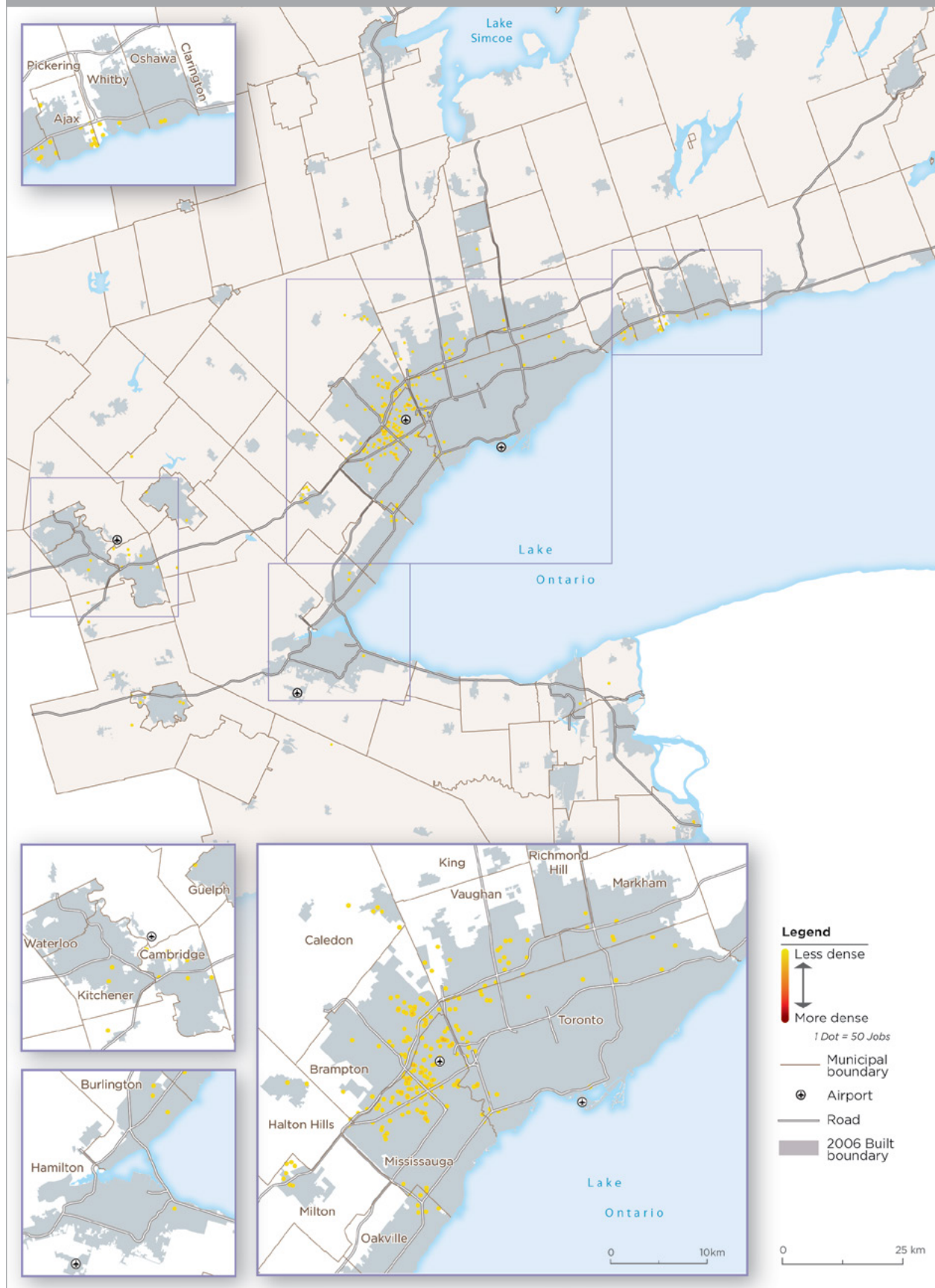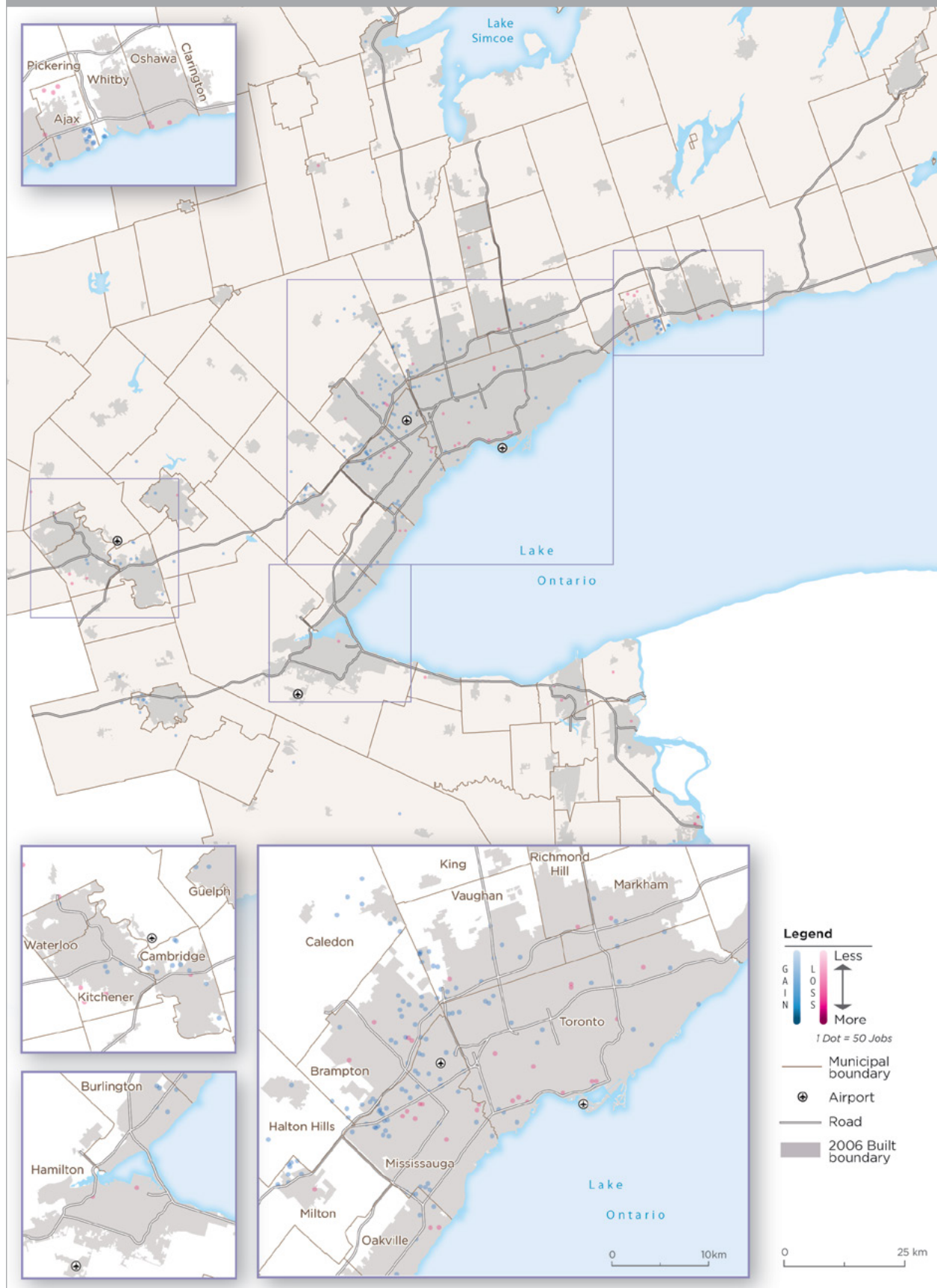
OTHER WHOLESALING

The Other Wholesaling archetype includes wholesaling in all industries except those included in other Archetypes (that is, computer equipment and other machinery whole-saling included in Hard Tech, Business-to-Business electronic markets included in Soft Tech, and pharmaceuticals wholesaling in Pharma, part of the Special Archetype).

Wholesalers generally buy goods to resell to retail shops, businesses, and institutions. The main difference between wholesalers and companies in the Logistics Archetype is that wholesalers buy and sell the goods they handle, while warehouse and logistics operations do not own the goods they handle, manage, and store. Wholesalers often operate out of warehouses where they store their goods, but offices and warehouses may be located separately, or in some cases wholesalers arrange shipping directly from manufacturers to their clients. Other Wholesaling includes a wide range of products: food, vehicles, building materials, household goods, etc.

This Archetype represented almost 122,000 jobs in 2016 in the GGH. However, the industry has been losing employment, with a decline of 18,000 jobs since 2006. The losses were experienced across the full range of wholesaling industries, with just a few showing some modest gains (such as beverage wholesalers).

TABLE 17: OTHER WHOLESALING ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Other Wholesaling	139,920	121,750	-18,170	-13.0
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

In the GGH, Other Wholesaling employment is distributed across the region's subur-ban areas, especially in the three megazones, but in other employment areas as well (including the inner suburban areas of northeast Scarborough and Etobicoke, and along the QEW and Highway 401 in Milton). There is also some Other Wholesaling employment in Downtown Toronto.

The megazones are large, contiguous areas of employment. Their urban environments can be quite mixed; they are not uniform. Two contain SKIDs: the Airport and Tor-York East. Outside the SKIDs and some other office environments, the megazones are more industrial in nature. They are low density, generally with single-storey, large-footprint buildings, and significant lands for truck access and surface parking. Little attention is paid to the public realm, which is not intended for walking or cycling, and few roads have sidewalks.

These areas accommodate many of the manufacturing and warehousing activities that underpin the GGH economy, as well as telecoms, utilities, and construction. Shops and restaurants are located along flanking arterial roads and accessible by car only. Some older, denser areas have permitted additional uses, such as warehouse retail, recreation facilities, and places of worship. Transit service to all three megazones has been improved in recent years with BRT in Mississauga and Markham and an extended subway to Vaughan. But the megazones extend well beyond the limited areas served by these lines, and transit service levels are low overall.

Despite a net loss of wholesaling jobs in the GGH overall, there are areas of employment growth, particularly at the outermost edges of the region's urban area, in municipalities such as Vaughan, Mississauga, and Markham, but also in locations scattered along the QEW. Notably, one of the areas with some employment growth is central Toronto.

Employment loss generally follows the spatial pattern for Other Wholesaling employment, scattered across the megazones and other employment areas, with some areas of more significant loss in the three megazones and south Etobicoke. (See Maps 23 and 24.)

Employment decline in Other Wholesaling is likely related, at least in part, to the rise of e-commerce. As manufacturers supply their products directly to online retailers like Amazon, the need for the intermediary function provided by wholesalers is eliminated – an example of the "disintermediation" effect of new technologies. This has the effect of shifting the warehousing function from wholesaling to distribution and logistics – indeed, the Logistics Archetype has seen employment growth during the period in which Other Wholesaling experienced a net loss.

The GGH may experience a spatial shift away from the Other Wholesaling pattern towards a Logistics geography, with employment and facilities more closely associated with transportation facilities like multimodal terminals and airports.

URBAN CHARACTERISTICS OF MEGAZONES

MAP 23: OTHER WHOLESALING ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

— Municipal boundary

⊕ Airport

— Road

2006 Built boundary

MAP 24: OTHER WHOLESALING ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN — LOSS — Less / More

1 Dot = 50 Jobs

⊕ Airport

Road

2006 Built boundary

Municipal boundary
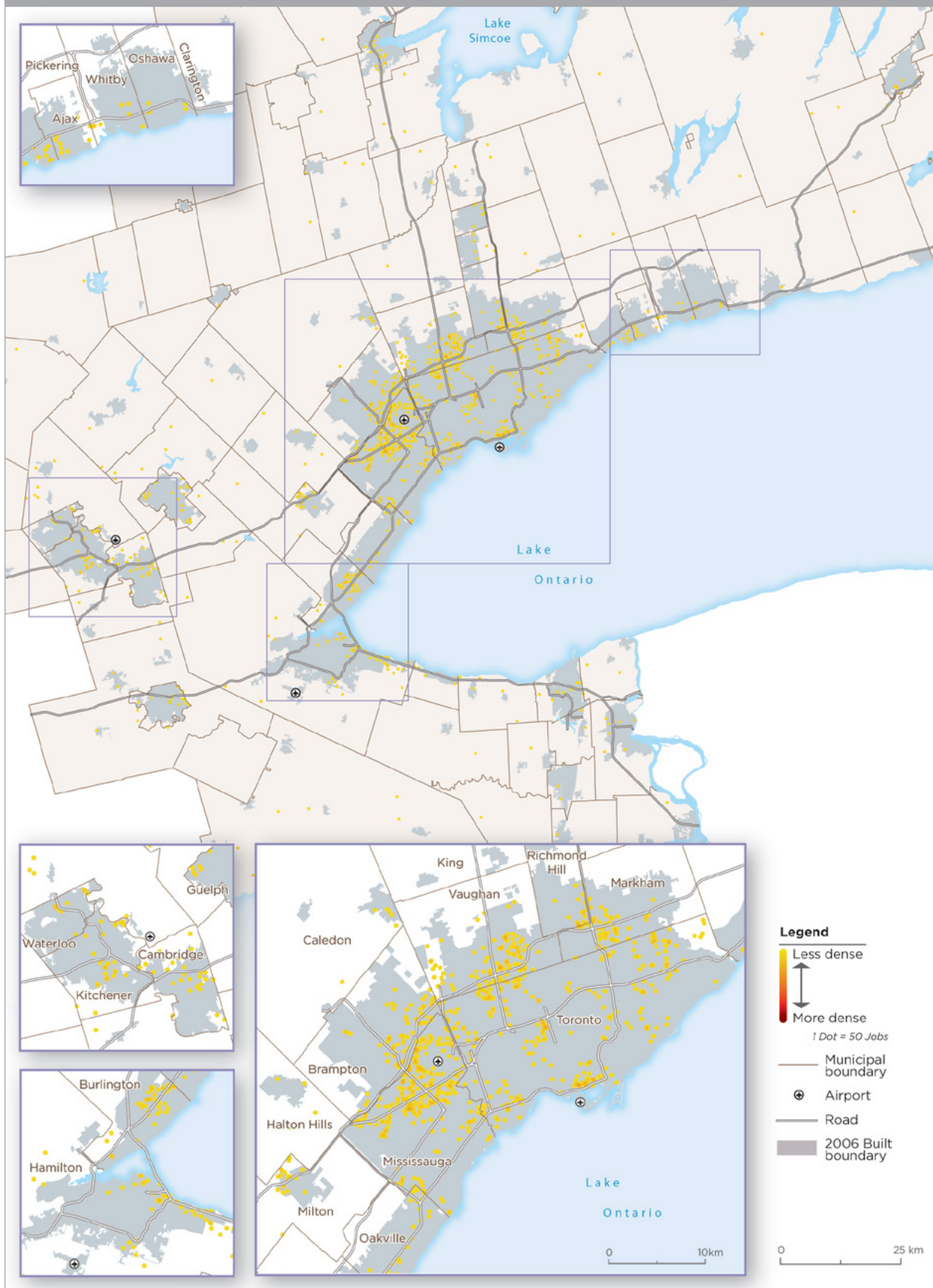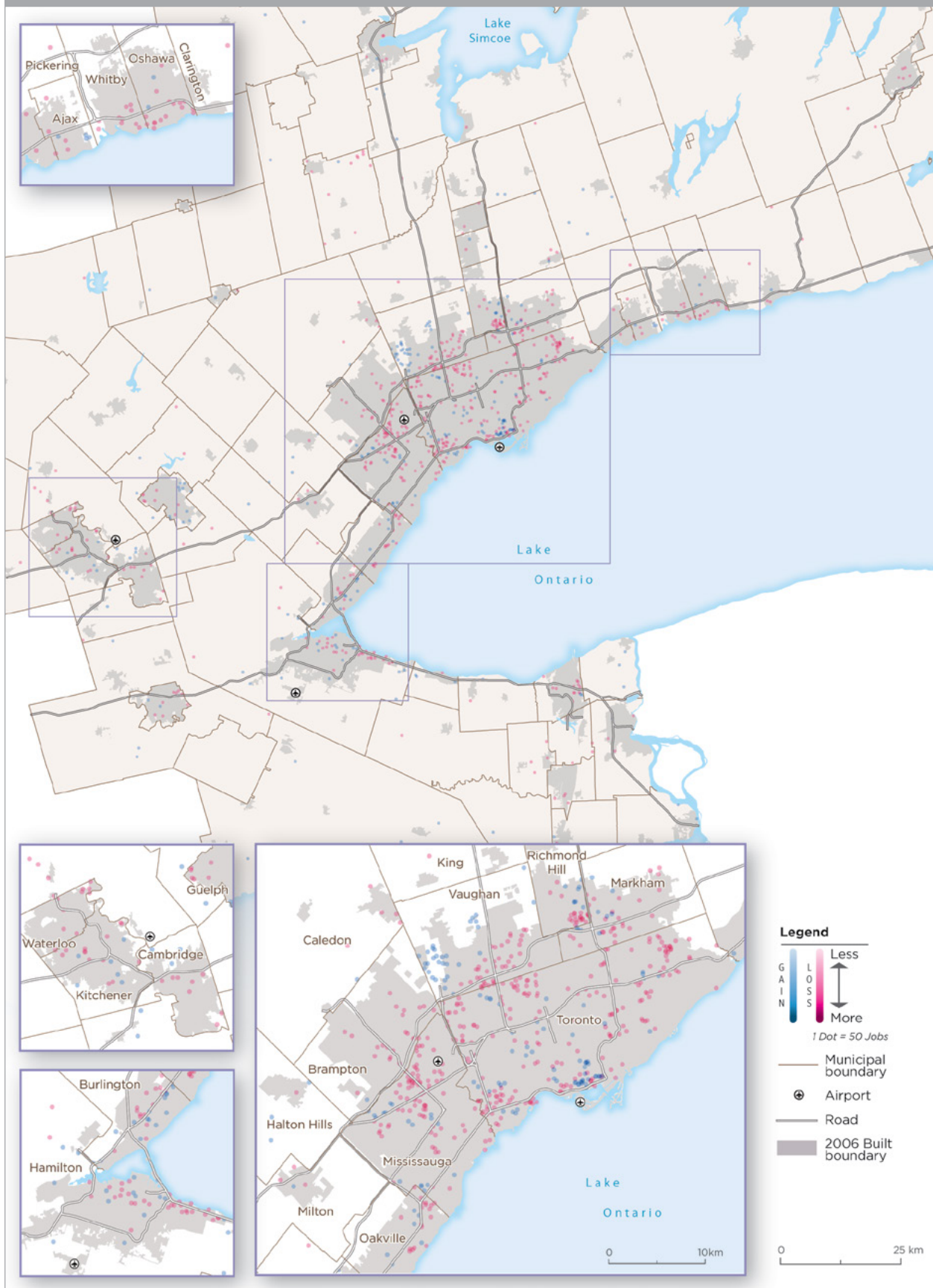
SPECIAL

The Special Archetype includes three industries, each of which has a unique spatial pattern: aerospace manufacturing, telecom carriers, and pharmaceuticals manufacturing and wholesaling. Their spatial patterns are unlike those of any of the other Archetypes, and unlike each other. These differences may be due to particular industry characteristics, including the fact that each is dominated by a few large firms and has a relatively concentrated ownership pattern. So the spatial patterns we are seeing may be those of a few large establishments. At the same time, these companies provide advanced manufacturing and services, so it is important to understand their economic and spatial patterns.

Each of these industries experienced significant employment growth between 2006 and 2016, together accounting for over 11,000 new GGH jobs. In 2016, they together represented over 70,000 jobs in total.

TABLE 18: SPECIAL ARCHETYPE EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Telecoms	25,400	32,035	6,635	26.1
Aerospace	10,815	13,150	2,335	21.6
Pharma	22,960	25,175	2,215	9.6
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Employment in each industry is highly spatially clustered, most likely representing employment in a few large establishments. However, each has a unique geography.

- Aerospace has clusters at Downsview and at Pearson Airport, with smaller clusters in Ajax, Oakville, and Waterloo region.
- Telecom has clusters in Downtown Toronto and the Airport SKID, as well as in Brampton, and inner suburban Toronto at Don Mills and Scarborough City Centre.
- Pharma has several smaller clusters along Steeles Avenue, as well as in the Airport and Meadowvale SKIDs.

Modest growth in Aerospace is seen in the Airport and Meadowvale SKIDs, as well as in Cambridge. Telecoms has seen growth reinforced in the Airport SKID, Brampton, and Don Mills, with a loss of employment in Downtown Toronto. Pharma has seen growth in the clusters along Steeles Avenue, and in the Markham and Meadowvale SKIDs, with some scattered losses in older parts of Toronto and Mississauga. (See Maps 25 to 30.)

MAP 25: AEROSPACE – SPECIAL ARCHETYPE EMPLOYMENT, GGH, 2016
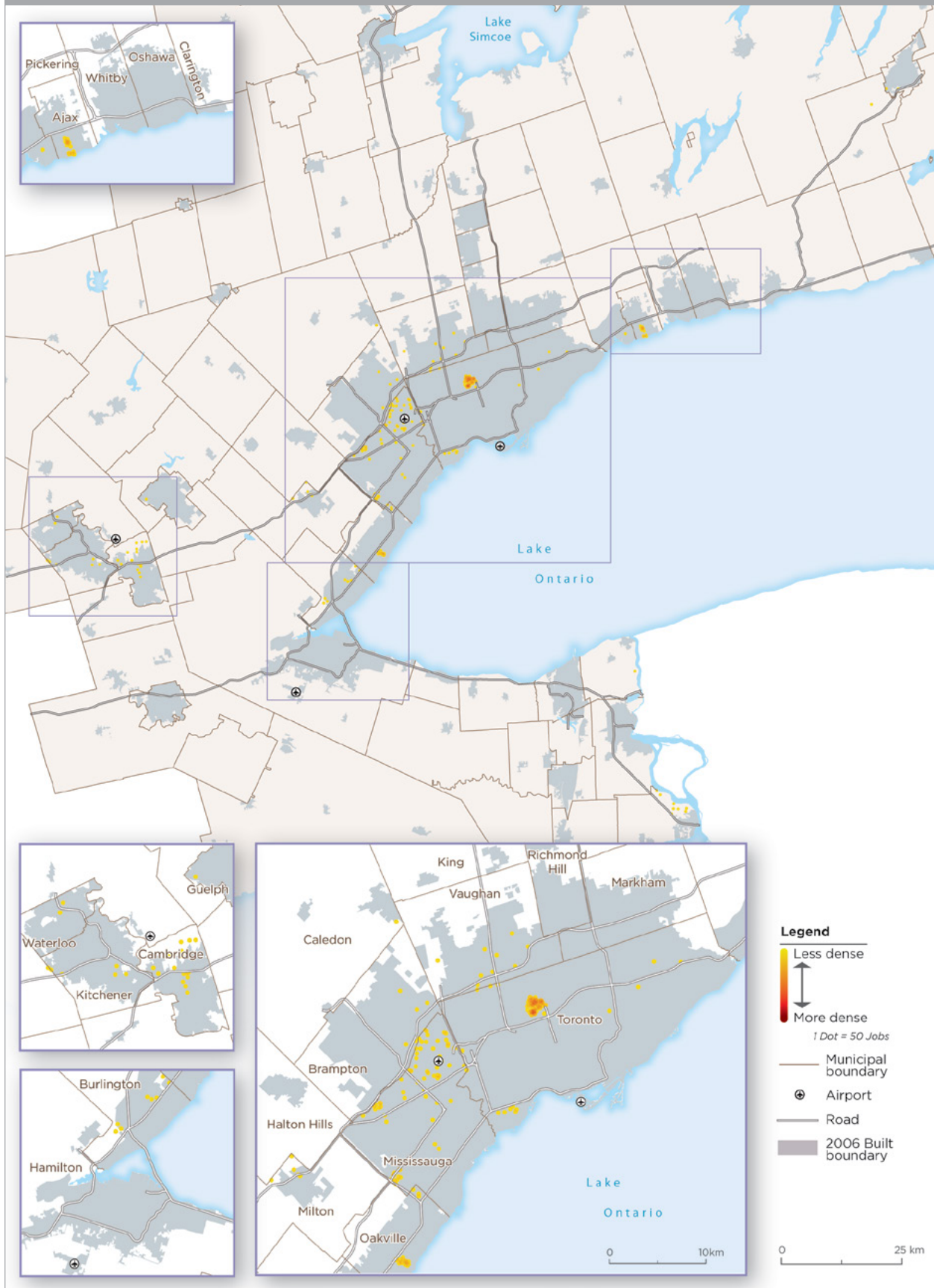
Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

MAP 26: AEROSPACE – SPECIAL ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN — LOSS

Less

More

1 Dot = 50 Jobs

Municipal boundary

Airport

Road

2006 Built boundary

MAP 27: TELECOMS – SPECIAL ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

⊕ Airport

Road

2006 Built boundary

Municipal boundary

MAP 28: TELECOMS – SPECIAL ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN — LOSS

Less
More

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

MAP 29: PHARMA – SPECIAL ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

MAP 30: PHARMA – SPECIAL ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016

Legend

GAIN / LOSS — Less / More

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
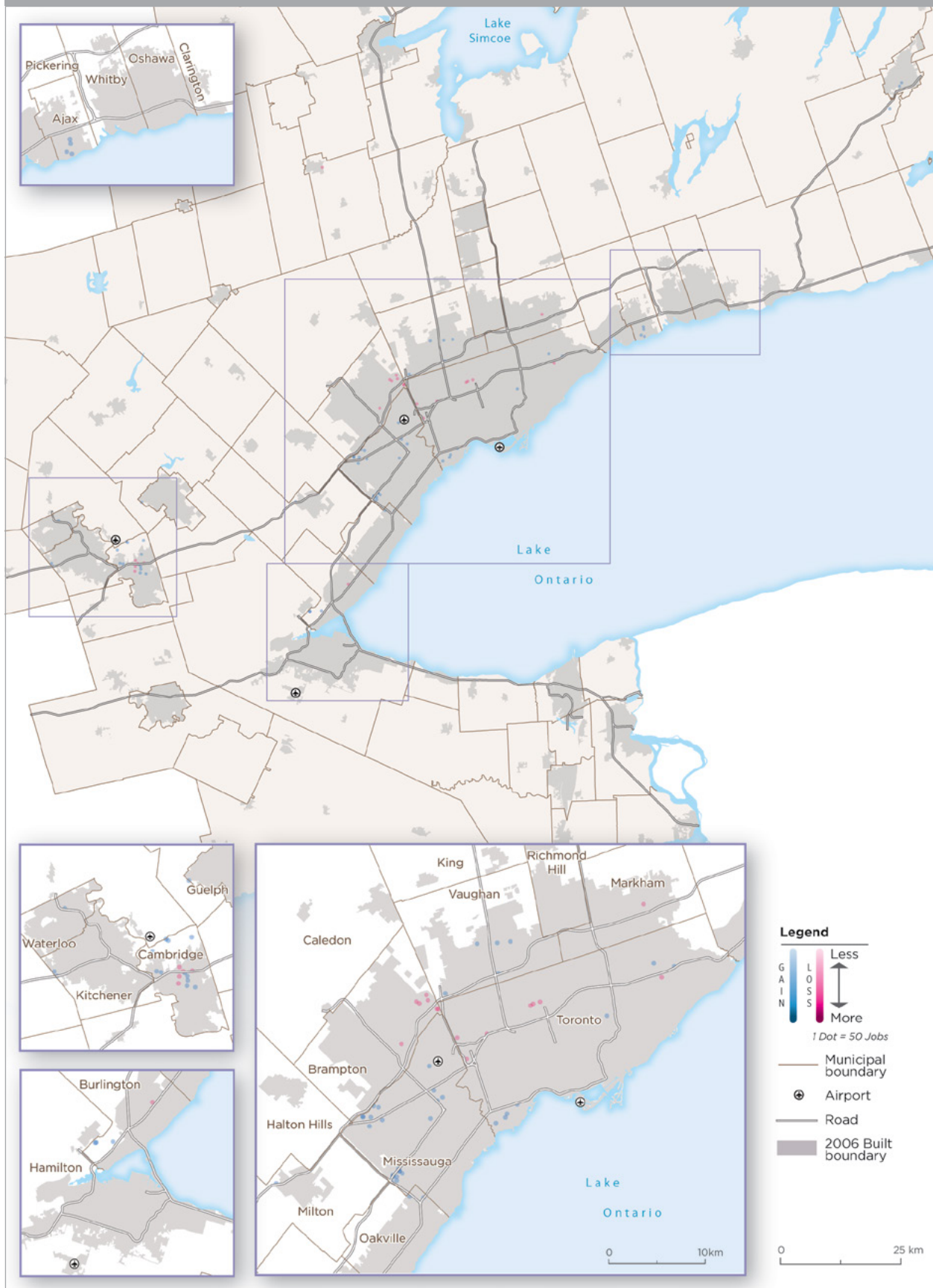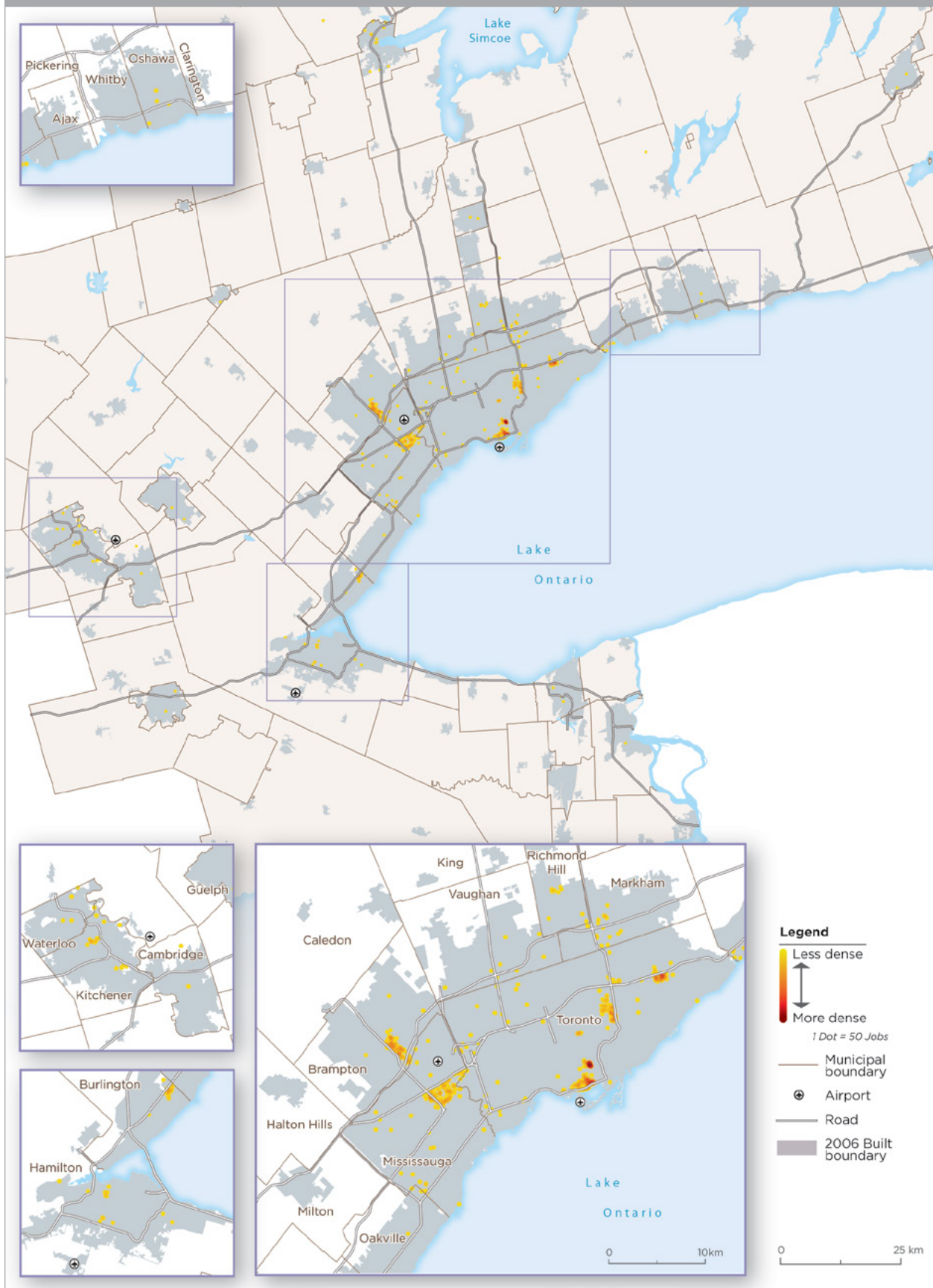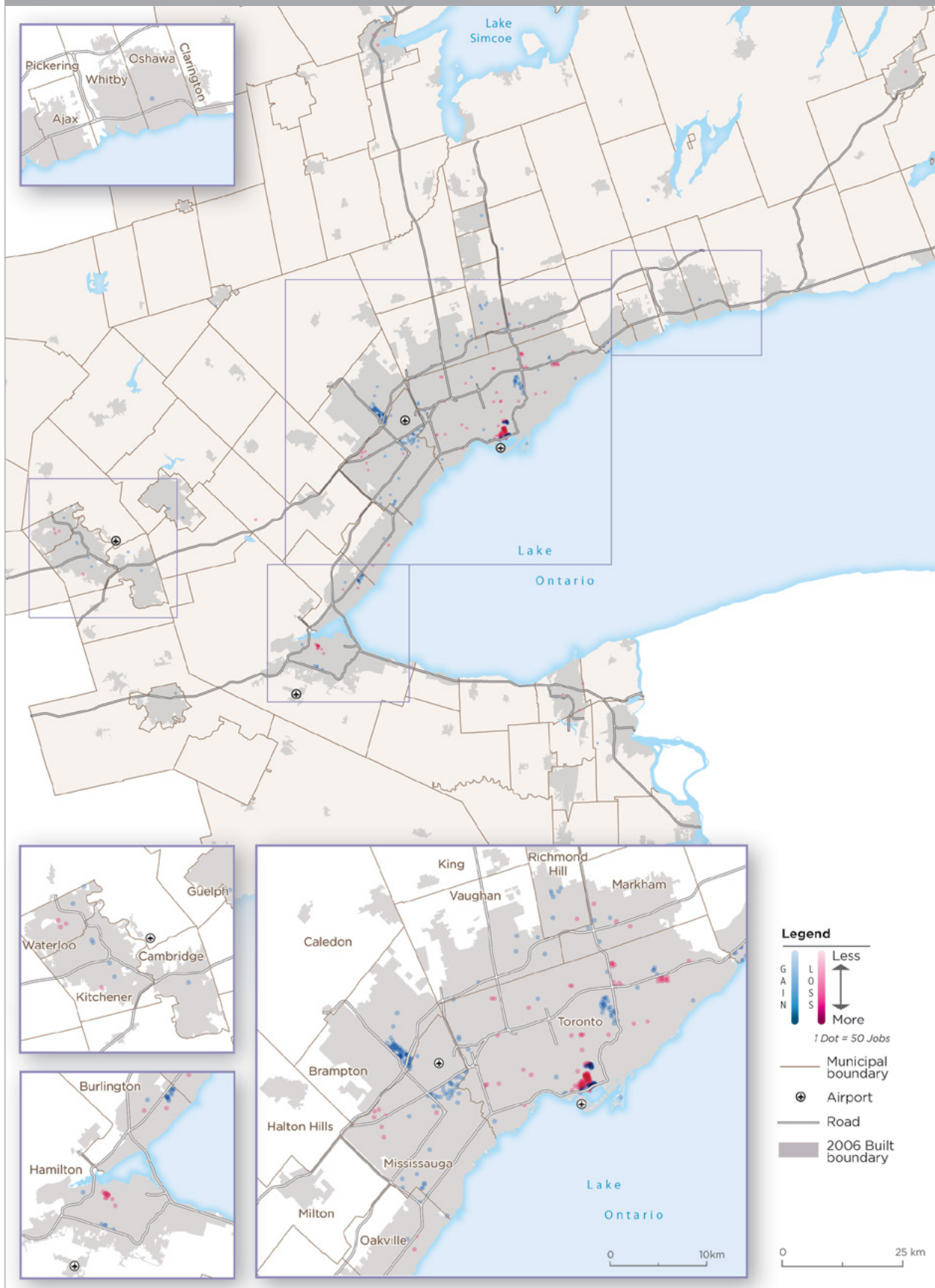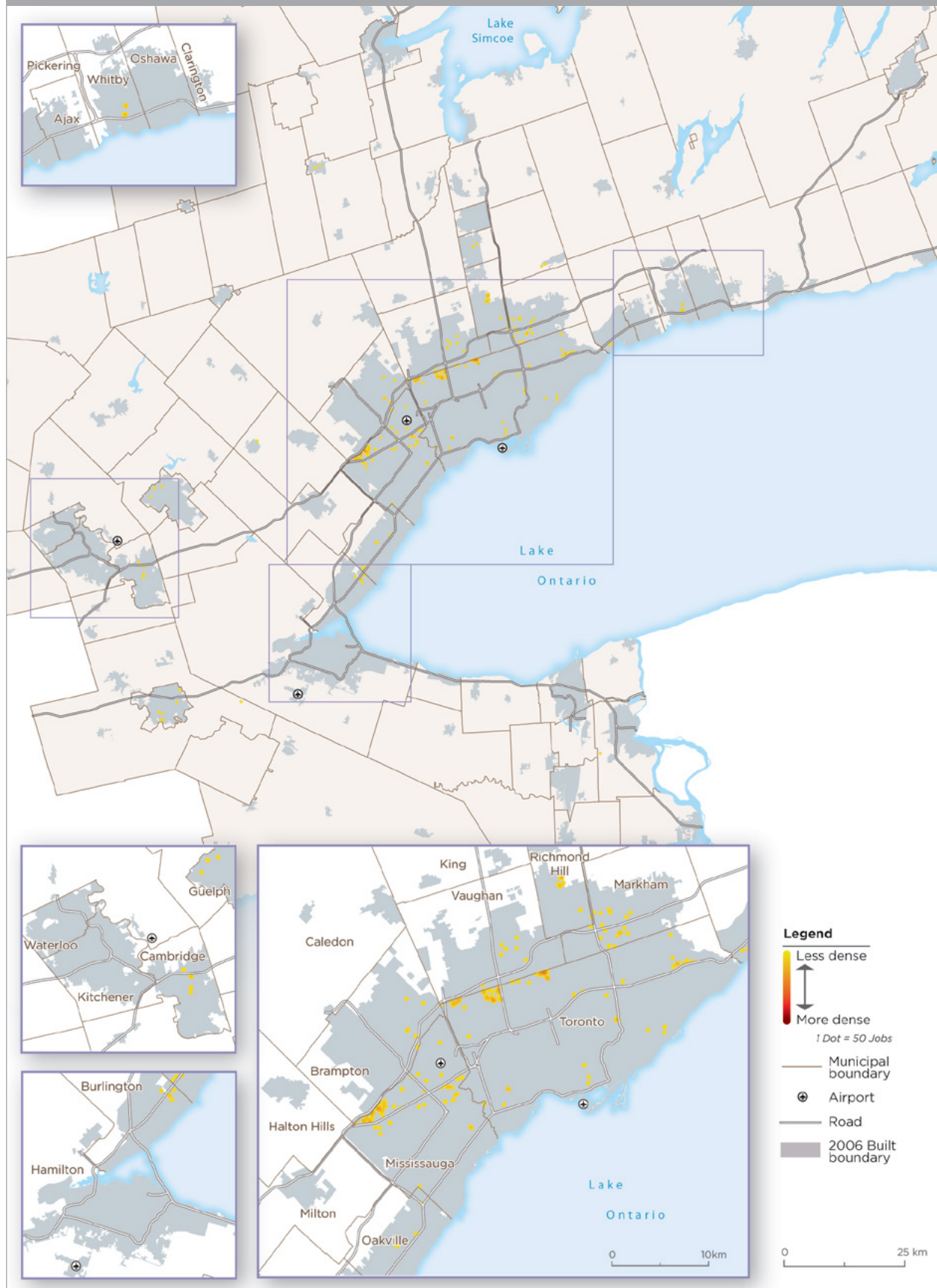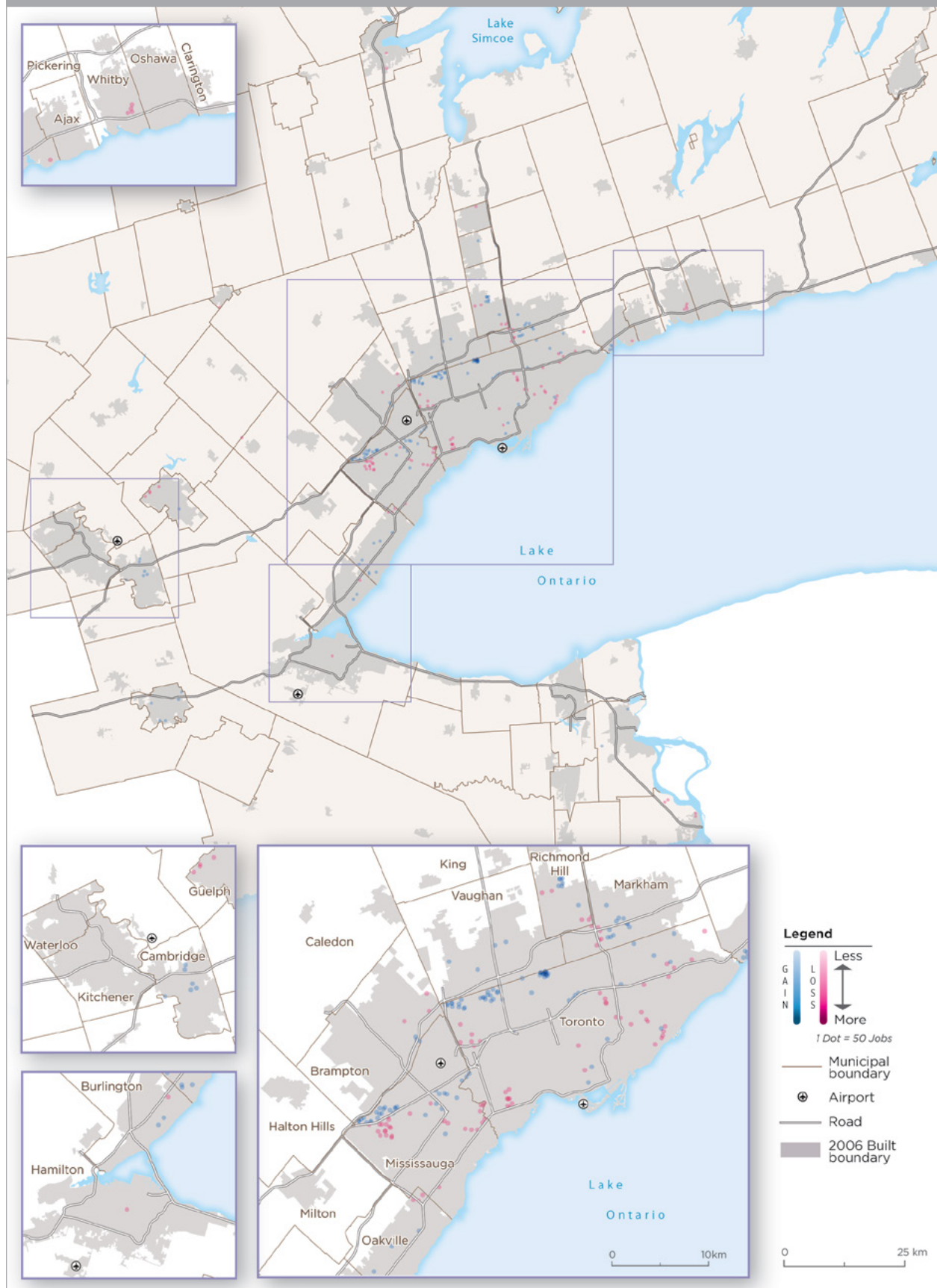
OTHER MANUFACTURING

The Other Manufacturing Archetype includes all manufacturing jobs that have not been included in other Archetypes (that is, excluding manufacturing in the Hard Tech, Science-Based, and Special – Aerospace and Pharma – Archetypes). This Archetype represents the largest number of jobs of all Archetypes – 386,000 in the GGH in 2016 – and is a backbone of the GGH economy. It also exhibited one of the highest rates of job loss – 130,000 jobs lost between 2006 and 2016, a 25 percent decline.

TABLE 19: OTHER MANUFACTURING EMPLOYMENT, GGH, 2006 AND 2016

	2006	2016	Change	% Change
Other Manufacturing	516,255	386,480	-129,775	-25.1
Archetypes total	1,481,595	1,459,825	-21,770	-1.5
Total GGH core employment	2,300,015	2,375,465	75,450	3.3
Total GGH employment	3,437,935	3,710,915	272,980	7.9

Job losses were not confined to a few industries, but were experienced across all the 4-digit industries that make up Other Manufacturing. Only a handful of industries experienced modest gains or remained stable. The most significant losses were sustained in motor vehicle parts manufacturing (down almost 18,000 jobs), plastic products (down 13,000 jobs), and printing (down more than 9,000 jobs).

Manufacturing employment is found across the GGH's employment lands, with some especially dense areas in the Vaughan and Airport megazones, Guelph, central Hamilton, and the City of Toronto's inner suburbs.

The geography of job loss is also widespread across the region. Areas of concentrated job loss include the older areas of Oshawa, central Hamilton, and Kitchener. Despite overall job losses in the region, a few areas show growth, including Meadowvale, north Guelph, and eastern Oakville. There is also scattered growth at or near the urban edge, in the newest employment areas. (See Maps 31 and 32.)

Manufacturing job loss is not a recent phenomenon (see Figure 6).[90] Rather it is a long-standing pattern associated with freer trade, fluctuations in exchange rates, and more recently, the adoption of automation technologies.

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90 Statistics Canada. Table 14-10-0023-01 Labour force characteristics by industry, annual (x 1,000).
    https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410002301

In particular, the globalization of production and supply chains (enabled by information technology) and the automation of production with robots are key drivers of change. Figure 6 shows the trajectory of manufacturing employment in Ontario over the last 40 years, including a decline post the 1989 Canada-U.S. free trade agreement, and declines since 2000. However, it is worth noting that in Ontario as a whole, the precipitous decline seems to have let up, and manufacturing employment has been relatively stable in recent years.

FIGURE 6: EMPLOYMENT IN MANUFACTURING, ONTARIO, 1976–2017
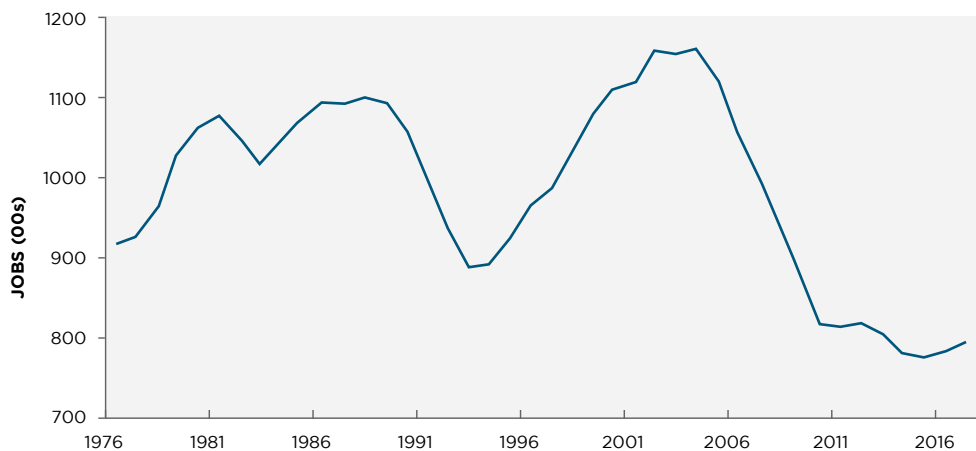
Falling trade barriers and shipping costs, combined with a revolution in global communication and lower labour costs overseas have led to large-scale off-shoring of routine production. The resulting reconfiguration of production on a global scale led to a loss of Ontario-based branch plants to the U.S., Mexico, China, and other low-cost locations. The impacts were especially felt in Ontario and the GGH, given the concentration of manufacturing found in these jurisdictions.

As well, automation, including the use of industrial robots in manufacturing, has been growing and transforming production processes. The automotive sector is the most robot-intensive manufacturing industry,[91] a fact with particular implications for Ontario and the GGH.

91 International Federation of Robotics, 2017.

As globalization proceeds with the further integration of markets, such as the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), it is helpful to understand where the GGH is situated along the path of rationalizing production processes and restructuring. Is there potential for further restructuring and contraction or loss of manufacturing firms – or is most restructuring already complete as a result of previous trade liberalization?

Although we cannot provide a definitive answer, we can make a few observations. The impacts of freer trade as a result of recent agreements such as CETA and the CPTPP could be expected to have relatively modest impacts. Analysis of the potential impacts of CETA, for example, suggests an overall increase of 9 percent in exports of Canadian goods.[92] However, there is considerable variability in the impacts between industries. While some manufactured products, such as apparel and motor vehicles, are expected to see a bump in exports, others, such as paper and meat products, are projected to see export growth slow down.

Some argue that "today's hyper-extended supply chains have reached their limits."[93] Labour costs, a main driver of off-shoring, have been rising abroad. For example, it is estimated that labour costs in China are now nearly as high as in the U.S., compared with less than one-third 15 years ago.[94] Increasing consumer demand for faster response in product delivery is attracting production and inventory closer to the end user – that is, near consumer markets.[95] As well, the ongoing take-up of automation and robotics in production processes frees production from the need to locate in low-wage locations. It is suggested that supply chains in some industries are compressing to bring production and inventory closer to the end user, with manufacturers moving production facilities closer to markets.[96]

These factors point to the potential repatriation of manufacturing activity to locations in the advanced economies. Whatever term is used to describe the phenomenon – "reshoring," "nearshoring," or the "renaissance" of manufacturing – it signals a fundamental shift in the locational drivers of production from access to cheap labour to access to final markets and other key inputs.[97]

RESHORING SIGNALS A FUNDAMENTAL SHIFT IN THE KEY LOCATIONAL DRIVERS OF PRODUCTION FROM ACCESS TO CHEAP LABOUR TO ACCESS TO FINAL MARKETS.

92 Office of the Parliamentary Budget Officer, *The Canada-EU Comprehensive Economic and Trade Agreement: A prospective analysis*, 2017; see also Global Affairs Canada, *Economic impact of Canada's participation in the Comprehensive and Progressive Agreement for Trans-Pacific Partnership*, 2018, regarding the impacts of the CTPPP.
93 CBRE and Oxford Economics, *The Future of Global Manufacturing*, 2017, p. 16.
94 Ibid., p. 21.
95 Ibid., p. 16.
96 Ibid., p. 16.
97 Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, Norton, 2014.

As the economy continues to restructure to focus on more high-value-added, sophisticated products, as the costs of advanced manufacturing techniques and robotics fall, as the potential costs of complexity and vulnerability of global supply chains mount, as the benefits of co-locating manufacturing with innovation and research capacity emerge, the economics and competitive advantages of local production improve.

Despite evidence that the reshoring of manufacturing has already taken place in some industries in the U.S., and that more is anticipated,[98] there is no Canadian research to draw upon. Conditions and drivers in Canada and the GGH may differ from those in the U.S. and will require research and analysis. Nevertheless, the potential reshoring of manufacturing signals a significant shift in locational patterns from previous decades, and has important implications for planning, chief among them the need to ensure suitable sites in the GGH.

Automation and advanced manufacturing technologies are prompting a transformation in manufacturing referred to by some as "Industry 4.0," "Manufacturing 4.0," or the "smart factory." In addition to the use of robotics in manufacturing and assembly, other technologies include additive manufacturing (that is, 3D printing), "smart" systems, including the augmented use of sensors and data analytics in prodution processes, and computer numerically controlled machine tools and production cells.

Table 20 shows the share of firms in the manufacturing sector that have adopted different advanced technologies in Ontario, compared with the country as a whole.[99] Although advanced technologies are being adopted by Ontario companies, Canada still lags behind many countries in the adoption of production robotics.[100] Investment in technology among Canadian manufacturers remains significantly lower than that of manufacturers in other countries, especially in the United States.[101]

98   Boston Consulting Group, "Reshoring of manufacturing to the US gains momentum," 2015.
99   Statistics Canada, CANSIM 358-0404.
100 Oschinski and Wyonch, *Future Shock?* 2017, Figure 2, p. 6.
101 Lamb, Munro, and Vu, *Better, Faster, Stronger*, 2018.

TABLE 20: ADOPTION OF SELECT ADVANCED TECHNOLOGIES IN MANUFACTURING, CANADA AND ONTARIO, 2014

Type of advanced technologies	Canada	Ontario
	% OF FIRMS ADOPTING	
Virtual product development or modelling software, including computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided manufacturing (CAM)	36.8	42.3
Intercompany computer networks, including extranet and electronic data interchange (EDI)	25.9	31.3
Wireless communications for production	17.5	20.3
Computer-integrated manufacturing (CIM)	14.9	13.6
Automated systems for inspection (for example, vision-based, laser-based, X-ray, high-definition (HD) camera or sensor-based)	10.9	13.3
Robot without sensing or vision systems	8.0	10.6
Software integration of quality results with planning and control software	9.2	8.7
Flexible manufacturing cell (FMC) or flexible manufacturing system (FMS)	6.5	8.2
Virtual manufacturing	7.3	7.8
Sensor network and integration	7.1	7.6
Automated machinery for sorting, transporting, or assembling parts	6.3	6.9
Robot with sensing or vision systems	5.7	6.0
Additive manufacturing including rapid prototyping for plastics and 3D printing for plastics	4.6	5.8
Additive manufacturing including rapid prototyping for materials other than plastics and metals, and 3D printing other than plastics and metals	1.9	3.1
Additive manufacturing including rapid prototyping for metals and 3D printing for metals	2.5	2.8

The potential impact of robots and other forms of automation on employment within manufacturing is the subject of some debate. Some research across industrialized countries shows that the rising use of robots in manufacturing was not associated with overall manufacturing employment losses.[102] Other analysis shows that employment in manufacturing industries is amongst the most vulnerable type of employment to automation.

To date, robots have been relegated to highly controlled environments, but they are becoming more integrated with AI and will come to perform a wider range of tasks, including less routine ones. In Chapter 4 we present an assessment of the vulnerability to automation for manufacturing and all other GGH industries, and the geography of that vulnerability.

This analysis looks only at the potential job losses associated with automation. There is also potential job gain. Automated production processes still require workers, although of a different kind – such as AI specialists, engineers, data analysts, or computer programmers. Analytics is increasingly being used to improve production, planning, process monitoring, and decision-making.[103] Workers will still be needed in factories "to manage and make sense of the new technologies."[104] So the adoption of automated technologies in factories will likely require fewer but more skilled workers.

With off-shoring and the shedding of lower value-added production, "developed-world manufacturing," like that in the GGH, has tended to become more focused on sophisticated, high-value engineered products that call for particular skills, investments, and technical know-how, such as pharmaceuticals, aerospace, and automobiles.[105] The GGH has experienced this kind of restructuring in its manufacturing sector.

102 George Graetz and Guy Michaels, "Robots at Work," CEP Discussion Paper 1335, London: Centre for Economic Performance, 2015, cited in Oschinski and Wyonch, *Future Shock?* 2017.
103 Lamb, Munro, and Vu, *Better, Faster, Stronger*, 2018.
104 JLL Inc., "How will Industry 4.0 impact US manufacturing?" Real Views article, 2018.
105 CBRE and Oxford Economics, *The Future of Global Manufacturing*, 2017, p. 11.

However, new drivers and technologies may alter past trajectories. The new technologies, in combination with other factors, suggest at least the possibility of some reshoring of production. However, even if the GGH were to see a repatriation of some types of manufacturing, it would not necessarily be accompanied by significant numbers of manufacturing jobs, especially low-skilled ones, but rather, rely more on automation and other advanced production technologies, and a smaller number of higher-skilled jobs.

At the same time, the manufacturing of products aimed at local markets may expand, as population and jobs continue to grow in GGH. The food and beverage sector is one example. Overall, there remains the possibility of demand for sites to accommodate advanced and other manufacturing facilities, which should be factored into discussions about the future of employment lands across the GGH.

The adoption of automated and advanced production technologies suggests that access to high-skilled workers may become a more important locational factor for manufacturing, while access to the low or moderately skilled labour that was needed in the past may become less important.

And as manufacturing facilities become less employment-intensive and more capital-intensive, employment trends, which have been used in the past, may become a less reliable predictor of the demand for manufacturing floor area.

MAP 31: OTHER MANUFACTURING ARCHETYPE EMPLOYMENT, GGH, 2016

Legend

Less dense

More dense

1 Dot = 50 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
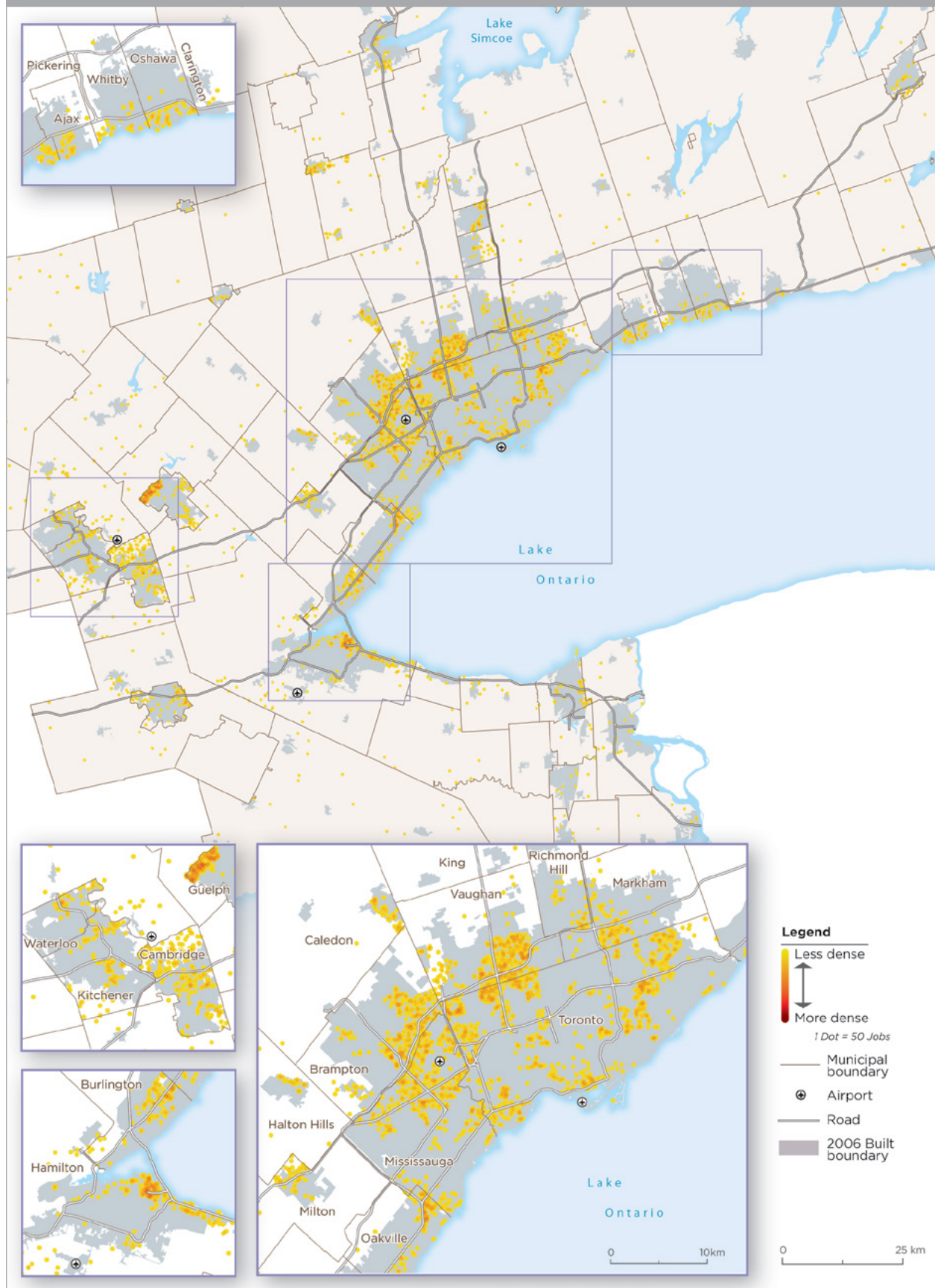
MAP 32: OTHER MANUFACTURING ARCHETYPE EMPLOYMENT CHANGE, GGH, 2006–2016
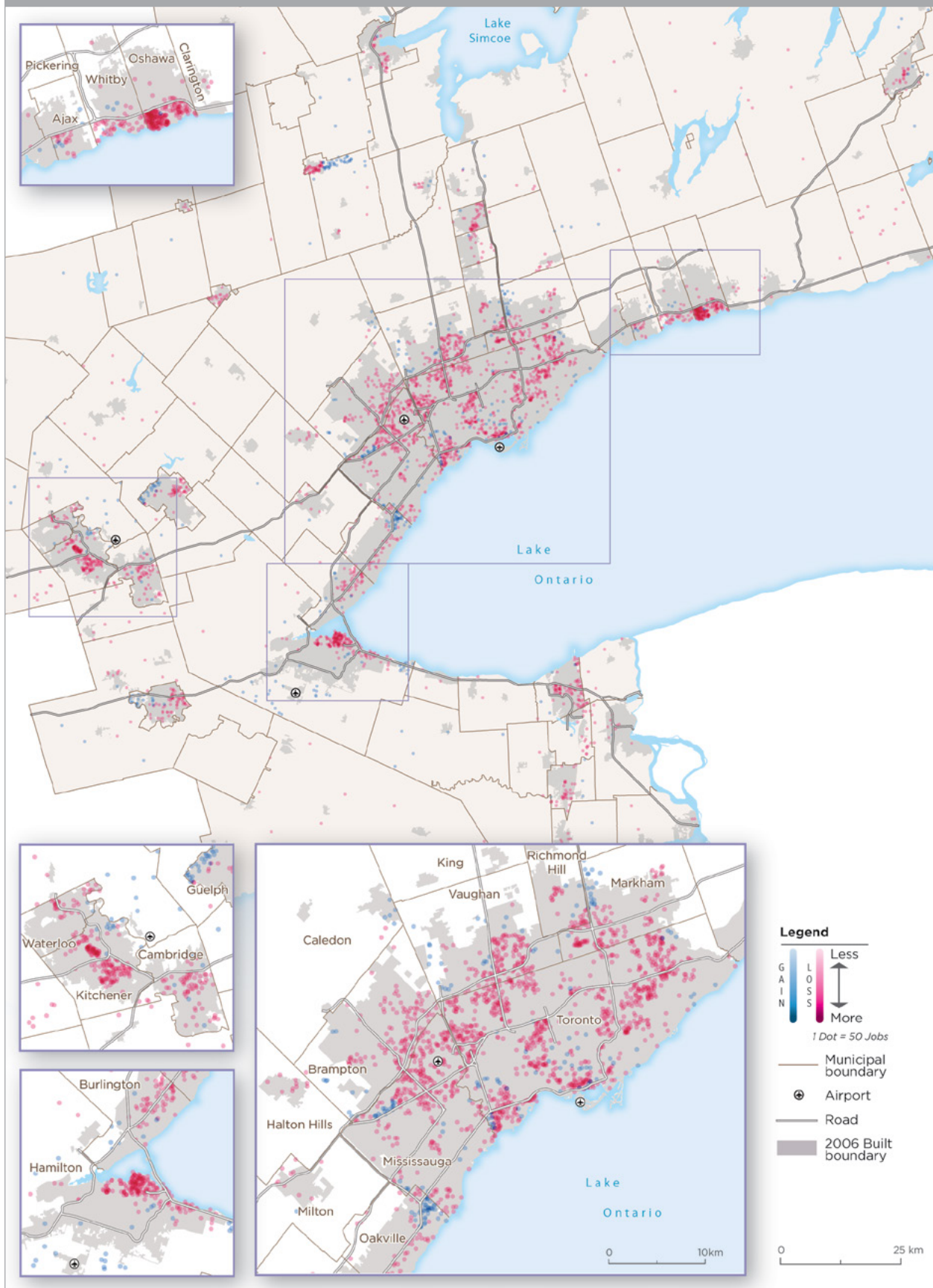
SUMMARY

In this Chapter, we have seen how the employment geography of the GGH shifted dramatically between 2006 and 2016, to an even stronger tendency toward geographic concentration than we found for 2001 to 2011 in *Planning for Prosperity*. We've identified key industry Archetypes, and shown that each has a unique spatial pattern in the GGH.

This analysis can be used by municipalities to understand the changing economic landscape within their own jurisdictions, contributing to land needs assessments, employment strategies, and Municipal Comprehensive Reviews. For example, any given municipality will contain a particular mix of Archetypes. The relevant profiles can be used to understand the associated spatial patterns, urban environment characteristics, drivers, and growth or loss potential for each of these to help inform more nuanced planning policy and plans.

CHAPTER 04
THE GEOGRAPHY OF DISRUPTION

Climate change–related extreme weather events, political upheavals, rapid and often disruptive technological change – we are entering a period of growing uncertainty. Planning for and creating urban environments is a long- term endeavour, and creates a tension with a world that is changing ever more rapidly. Being aware of potential sources of disruption and their impacts, and integrating potential responses into planning and other policy is prudent and promotes economic resilience.

Two potential sources of disruption are automation technologies and disruptions to the flows of continental and global trade that underpin the GGH economy. Here we consider what the geography of that disruption might look like, that is, how these potential disruptors might affect the geography of employment across the GGH.

VULNERABILITY TO AUTOMATION

With the adoption and diffusion of new and emerging automation technologies, certain types of work could be eliminated or workers replaced by machines. The potential for automation to expand from routine work tasks to more complex, non-routine tasks is a further challenge.

Some types of work and industries are more vulnerable to automation than others. As a result, some employment areas, towns, and cities within the GGH will experience the impacts of automation more than others because of the resulting job losses, industry restructuring, or the changing needs of industry and businesses.

Automation could alter demand for certain types of facilities (increasing or decreasing), which in turn affects planning for areas of growth, transition, or decline. It could also change companies' facility requirements (building floor areas, heights), locational requirements (as labour needs change), and requirements for specific urban environments.

AUTOMATION HAS IMPLICATIONS FOR ALL ASPECTS OF PLANNING FOR EMPLOYMENT USES.

In this section, we map the location of employment in the industries with the largest proportion of jobs at high risk to automation. Of course, automation will also *create* employment. This job creation will also have a particular geography, but there are no available data to draw upon to map the potential upside to automation. The upside may have a different geography – that is, job losses may not occur in the same places as job growth.

Method

Our analysis builds on research undertaken by Matthias Oschinski and Rosalie Wyonch of the C.D. Howe Institute. In their 2017 analysis, *Future Shock? The Impact of Automation on Canada's Labour Market*, the authors estimated, for each industry, the share of employment that was considered at low, medium, or high risk of automation.

We applied this automation vulnerability assessment to employment in the GGH. We focused on industries in which more than 60 percent of employment was determined to be at high risk. We then mapped the location of employment in those industries within the GGH using our 2016 Place of Work data.

WE MAP THE LOCATION OF EMPLOYMENT IN THE INDUSTRIES WITH THE LARGEST PORTION OF JOBS AT HIGH RISK TO AUTOMATION.

Results

Table 21 presents the data. The first thing to notice is that in fact the share of employment at high risk of automation is substantial across almost all industries. Most of the industries with the highest levels of vulnerability to automation are in manufacturing. In the GGH, employment in these most vulnerable industries adds up to 692,635 jobs.

Map 33 shows the locations of those jobs, with the exception of employment in restaurants, a sub-category of accommodation and food services accounting for 227,000 jobs, which are shown separately on Map 34. Map 33 reveals that the locations with high vulnerability to automation reflect locations of manufacturing employment generally. The three megazones, Toronto's inner suburbs, and, perhaps surprisingly, its downtown area (primarily employment in hotels), included in Accommodation and food services all show a significant presence of the most vulnerable employment. Other vulnerable areas include Guelph, Oshawa, Alliston, Cambridge, and Oakville, likely representing concentrations of motor vehicle–related manufacturing.

Map 34 shows employment in restaurants separately, as this not considered "core" employment but rather population-related, and tends to mirror the geographic distribution of residential population.

Note that the employment mapped represents all the employment in any given industry – not just jobs that are most vulnerable. We have no way of knowing which exact jobs in which particular locations fall into the 62 percent of jobs in rubber, plastics, and chemicals manufacturing, for example, that are at high risk, versus the 38 percent that are at medium or low risk. Still, the map indicates the locations of employment in those industries with the highest vulnerability. Oschinski and Wyonch's 2017 analysis used data for Canada, and we have assumed that the same percentages of jobs at high risk by industry that they found nationally apply within the GGH.

Some municipalities may be more vulnerable to automation than others, depending upon their current industrial structure. Table 22 shows employment in those industries at highest risk to automation (the industries highlighted in blue in Table 21) as a share of total employment by municipality. Only GGH municipalities with total employment of more than 10,000 jobs are shown in this table. Vulnerable industry employment makes up a significant share of total jobs as well as large absolute numbers in cities such as Cambridge, Guelph, Brampton, and Vaughan.

Other municipalities focused on tourism (the accommodation and food services industry), such as Niagara and Niagara-on-the-Lake, also have high employment vulnerability. Although the City of Toronto has the highest overall number of vulnerable jobs, given its diversified economy, as a share of total jobs, its vulnerability is well below the GGH average of 18.7 percent.

Some municipalities, such as Waterloo, may have relatively low vulnerability because their economy skews toward the less vulnerable industries, such as computer systems design, with just 3 percent of jobs considered at risk.

Other, smaller municipalities may be dominated by population-related industries, with little vulnerable manufacturing. While the potential impact of automation would be lower in industries with less than 60 percent of employment determined to be at high risk, automation can still have significant effect on all industries and municipalities.

SOME MUNICIPALITIES MAY BE MORE VULNERABLE TO AUTOMATION THAN OTHERS.

TABLE 21: SHARE OF EMPLOYMENT AT HIGH RISK OF AUTOMATION BY INDUSTRY, GGH, 2016

Sorted by share of employment at high risk, from highest to lowest

	% of employment at high risk	Number of jobs
Fishing, hunting, and trapping	94.2	115
Agriculture	92.2	18,885
Motor vehicle, body, trailer, and parts manufacturing	74.6	73,235
Paper manufacturing	71.9	10,600
Accommodation and food services	71.8	278,220
Food and beverage products	69.8	63,615
Manufactured mineral products	69.0	31,555
Mining and quarrying (except oil and gas)	67.7	3,100
Wood product manufacturing	67.2	7,530
Printing and related support activities	64.9	18,425
Metal fabrication and machinery (excluding electrical)	63.7	74,910
Other manufacturing	62.2	53,590
Rubber, plastics, and chemicals	61.8	58,855
TOTAL OF ABOVE		**692,635**
Forestry and logging with support activities	59.5	635
Transportation and warehousing	56.7	163,780
Management, administrative, and other support	54.7	151,490
Retail trade	49.7	463,405
Computer, electronic, and electrical products	44.1	30,345
Other transportation equipment manufacturing	42.5	16,350
Construction	40.3	127,390
Support activities for mining and oil and gas extraction	40.1	1,440
Other services	31.6	156,045
Utilities	30.0	26,730
Information, culture, and recreation	29.0	174,290
Finance, insurance, real estate, and leasing	28.5	347,275
Oil and gas extraction	26.5	860
Wholesale trade	25.5	169,880
Public administration	25.2	181,140
Professional business services	21.7	144,660
Health care and social assistance	17.8	406,545
Educational services	16.4	300,175
Other professional services	12.6	55,650
Management, scientific, and technical services	7.9	30,460
Computer system design services	3.0	68,210
TOTAL ALL INDUSTRIES		**3,710,915**

TABLE 22: EMPLOYMENT IN INDUSTRIES AT HIGH RISK OF AUTOMATION AS A SHARE OF TOTAL INDUSTRY EMPLOYMENT, MUNICIPALITIES WITH OVER 10,000 TOTAL JOBS, GGH, 2016

Sorted by share of employment at high risk, from highest to lowest

	Employment in Most Vulnerable Industries	Total Employment	% of Total Employment
Greater Golden Horseshoe	692,635	3,710,915	18.7
New Tecumseth	8,685	16,515	52.6
Niagara-on-the-Lake	3,500	10,240	34.2
Cambridge	21,075	62,130	33.9
Haldimand County	4,385	12,955	33.8
Niagara Falls	12,025	35,560	33.8
Woolwich	4,175	12,540	33.3
Guelph	23,040	69,670	33.1
Brant	3,415	10,820	31.6
Caledon	5,710	19,770	28.9
Brantford	10,170	36,910	27.6
Vaughan	42,045	158,280	26.6
Halton Hills	4,360	17,845	24.4
Brampton	36,365	156,125	23.3
Milton	6,900	30,490	22.6
Orangeville	2,455	10,930	22.5
Oakville	16,820	81,240	20.7
Aurora	4,625	22,355	20.7
Burlington	16,100	78,665	20.5
Hamilton	38,055	187,500	20.3
Newmarket	6,975	35,220	19.8
Ajax	4,960	25,500	19.5
St. Catharines	9,715	51,275	18.9
Clarington	3,825	20,295	18.8
Whitby	6,950	37,060	18.8
Kitchener	15,350	83,365	18.4
Oshawa	8,845	48,340	18.3
Barrie	9,875	56,110	17.6
Whitchurch-Stouffville	1,765	10,155	17.4
Kawartha Lakes	3,010	17,425	17.3
Mississauga	66,895	394,660	17.0
Richmond Hill	9,150	54,890	16.7
Orillia	2,490	15,015	16.6
Welland	2,385	14,780	16.1
Peterborough	6,000	38,435	15.6
Pickering	4,540	29,515	15.4
Waterloo	8,855	59,025	15.0
Markham	18,145	127,400	14.2
Toronto	181,865	1,342,435	13.5

MAP 33: EMPLOYMENT IN INDUSTRIES WITH HIGHEST VULNERABILITY TO AUTOMATION, GGH, 2016

Legend

Less dense

More dense

1 Dot = 100 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
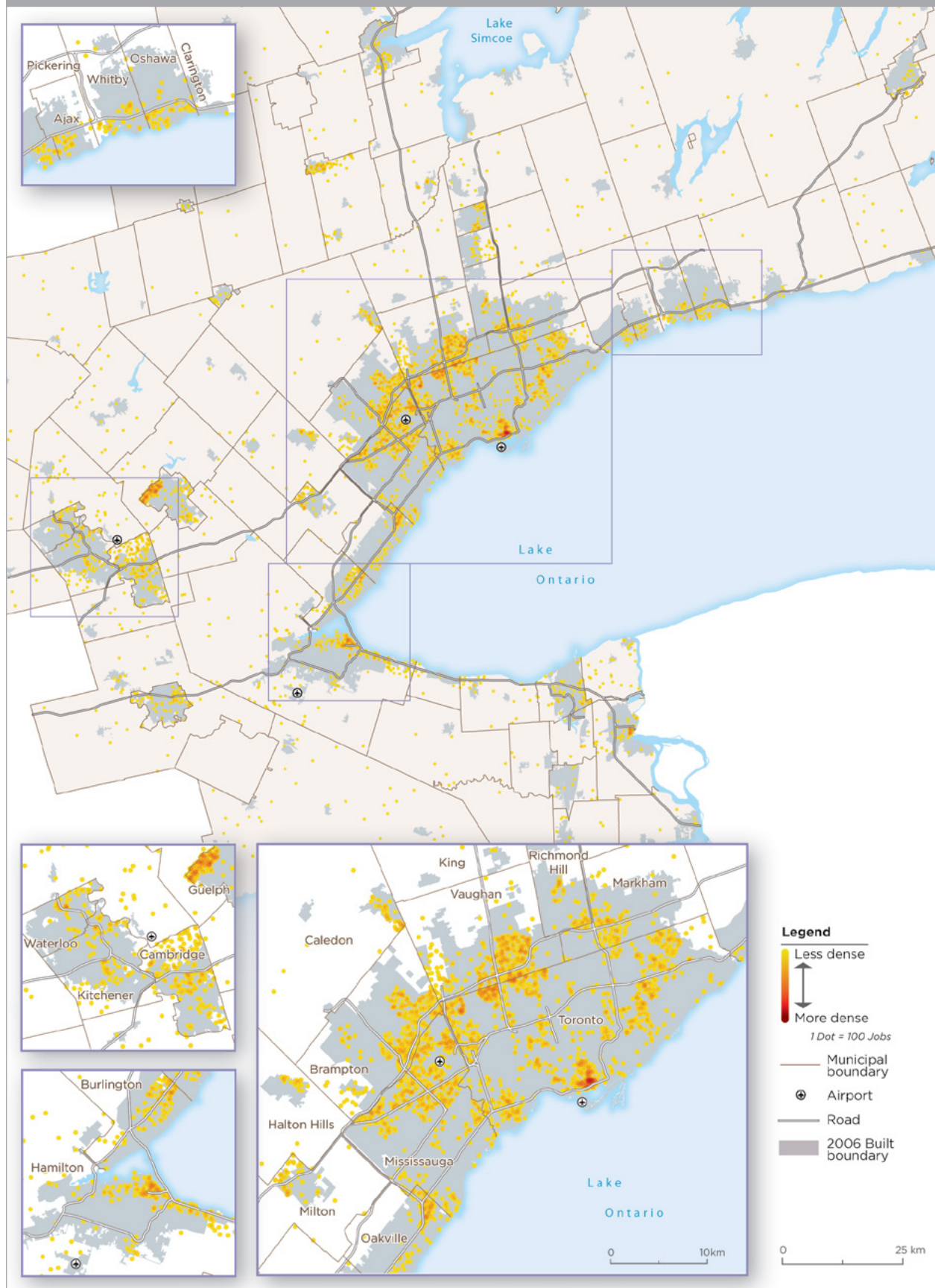
MAP 34: EMPLOYMENT IN INDUSTRIES WITH HIGHEST VULNERABILITY
TO AUTOMATION, RESTAURANTS, GGH, 2016

Legend

Less dense

More dense

1 Dot = 100 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary
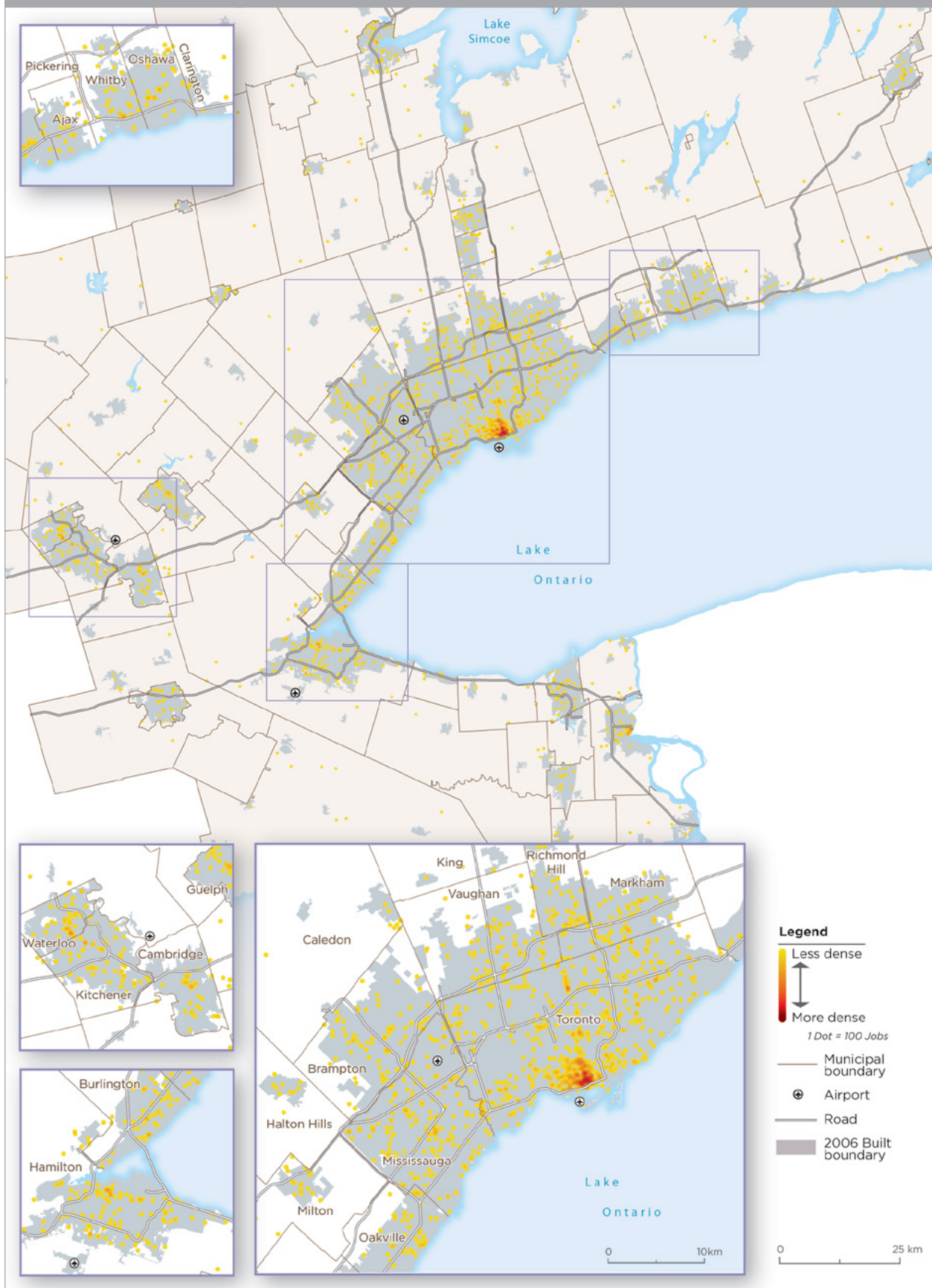
VULNERABILITY TO TRADE DISRUPTIONS

Trade disruptions represent a second area of potential vulnerability. The Canadian, Ontarian, and GGH economies have become increasingly integrated with those of other countries, including through negotiated trade agreements, global supply chain management, and e-commerce. Although Canada has entered into new trade agreements, most recently the United States Mexico Canada (USMCA) agreement,[106] an integrated, global economy remains vulnerable to disruptions and crises around the world. Threats include possible trade wars, industry-specific tariff increases, political instability, or disruptions to transportation due to major climate change events.

As with automation, the impacts of potential trade disruptions will be uneven on the economy and the GGH's economic landscape. Not only would trade disruptions directly affect traded goods and services, but there would also be knock-on effects in other sectors. For example, shifting trade patterns could cause realignments of the geography of supply chains, with implications for warehousing and logistics facilities. And as with automation, any potential upside has not been quantified – for example, increasing trade uncertainty may lead to the reshoring of manufacturing, as producers reduce uncertainty by locating production closer to final markets.

Method

We drew on a 2017 analysis by Daniel Schwanen and Aaron Jacobs of the C.D. Howe Institute, *The NAFTA constellation: Which Canadian industries are most vulnerable?* Their analysis identified industries that would be most affected by a collapse of Canada–United States free trade. The analysis assumes that the higher the current level of trade, the greater the potential impacts.

We used the same indicator that they did to identify the industries that are most trade-dependent and therefore most vulnerable to trade disruptions: the share of an industry's jobs that rely directly on exports. In our case, we considered global exports, not just exports to the U.S., as trade disruptions could occur with any trading partners. We applied this indicator to Ontario data to identify the most vulnerable industries in the province,[107] and then quantified and mapped employment in those industries in the GGH.

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106 At the time of publication (late October 2018), this agreement had not been ratified.
107 Data for this indicator not available sub-provincially or for the GGH.

Results

The industries identified as most vulnerable to trade disruptions, and their employ-ment levels in the GGH are presented in Table 23.[108] We used a cut-off of 50 percent, that is, selecting those industries in which the share of employment directly relying on exports was 50 percent or greater.[109] We then mapped employment in these industries (Map 35).

Total employment in the most vulnerable industries in the GGH amounts to almost 200,000 jobs. Many are in manufacturing industries, especially the auto sector. Other vulnerable sectors are advanced manufacturing industries producing semi-conductors, computers and communications devices, and aerospace equipment. Disruption to trade would impact some of our most advanced, productive industries. Of service sector employment, only office administration and lessors of non-financial intangible assets (such as holders of patents, trademarks, brand names, etc.) are included.

Because vulnerability strongly affects manufacturing, the geography of employment vulnerable to trade disruptions reflects the manufacturing districts in the GGH. Auto manufacturing locations figure prominently, such as those in Guelph, Oakville, Alliston, Cambridge, and Oshawa. The three megazones are also highlighted, along with areas in Burlington and Scarborough. Other concentrated areas appear in the Meadowvale SKID and in Downsview, with its concentration of aerospace employment.

108 In the Table, the share of jobs relying directly on exports is calculated based on Ontario data; these data are not available at the sub-provincial level. In some cases there is a single percentage number for a single or group of 3-digit industries; this is because the source data uses a different industry classification that treats these as one group and it is not possible to break out the shares at the 4-digit NAICS level. In some cases, the source data were available only at a 5-digit level equivalent, so we have aggregated to obtain a percentage value at the 4-digit level. This is the case for NAICS 3361 and 3363, but all of the 5-digit categories are captured in the 4-digit data. Employment figures are for the GGH.

109 The aim of both automation and trade vulnerability analyses was to identify the most vulnerable industries and jobs. We used a cut-off of 50 percent or more for trade, resulting in almost 200,000 jobs. Using a cut-off of 60 percent or more for automation resulted in close to 700,000 jobs identified. So the vulnerability scale differs between the two factors. Had we used a 50 percent cut-off for automation, we would be including over 300,000 additional jobs, for a total of in excess of 1,00,000; a total that would not highlight the most vulnerable jobs.

TABLE 23: EMPLOYMENT IN INDUSTRIES WITH THE HIGHEST SHARE OF JOBS RELYING DIRECTLY ON EXPORTS, GGH, 2016

Sorted from highest to lowest vulnerability, based on share of jobs directly relying on exports

NAICS 2012	Industry	Direct/all (%)	Employment 2016
3344	Semiconductor and other electronic component manufacturing	91.0	5,845
3341	Computer and peripheral equipment manufacturing	82.2	2,795
3342	Communications equipment manufacturing	80.9	4,145
3361	Motor vehicle manufacturing	80.7	31,985
3364	Aerospace product and parts manufacturing	79.1	13,150
315	Clothing manufacturing	77.5	7,530
316	Leather and allied product manufacturing		
3262	Rubber product manufacturing	76.1	2,700
3339	Other general-purpose machinery manufacturing	72.0	9,425
3314	Non-ferrous metal (except aluminum) production and processing	71.6	850
3343	Audio and video equipment manufacturing	71.0	6,910
3345	Navigational, measuring, medical, and control instruments manufacturing		
3346	Manufacturing and reproducing magnetic and optical media		
3399	Other miscellaneous manufacturing	65.6	4,280
3333	Commercial and service industry machinery manufacturing	65.0	3,610
3332	Industrial machinery manufacturing	63.2	4,280
3326	Spring and wire product manufacturing	62.7	885
3366	Ship and boat building	62.0	360
3256	Soap, cleaning compound, and toilet preparation manufacturing	61.2	5,430
313	Textile mills	60.9	4,115
314	Textile product mills		
3221	Pulp, paper and paperboard mills	58.5	1,765
3313	Alumina and aluminum production and processing	58.1	1,665
3352	Household appliance manufacturing	57.2	1,280
5611	Office administrative services	57.0	3,985
3252	Resin, synthetic rubber, artificial and synthetic fibres, and filaments manufacturing	55.8	845
3254	Pharmaceutical and medicine manufacturing	55.3	14,070
3362	Motor vehicle body and trailer manufacturing	54.2	2,295
3353	Electrical equipment manufacturing	54.2	5,325
1114	Greenhouse, nursery, and floriculture production	53.5	6,445
3363	Motor vehicle parts manufacturing	52.9	38,955
533	Lessors of non-financial intangible assets (except copyrighted works)	51.3	465
3336	Engine, turbine, and power transmission equipment manufacturing	50.4	1,595
3117	Seafood product preparation and packaging	50.3	370
	TOTAL OF ABOVE		197,355
	ALL GTA INDUSTRIES		3,710,915

Overall, vulnerable employment is distributed across the region. Some municipalities have higher concentrations of vulnerable industries, including Cambridge, Guelph, Milton, Oakville, Caledon, Newmarket, and Vaughan (see Table 24).

Some industries appear in both of the most-vulnerable lists, notably auto-related manufacturing and assembly. This industry also has a high level of employment in the GGH. Similarly, some municipalities are at the top of both lists, suggesting heightened vulnerability – including New Tecumseth, Cambridge, Guelph, Caledon, and Vaughan. In the following chapter we turn to land use strategies to address these vulnerabilities.
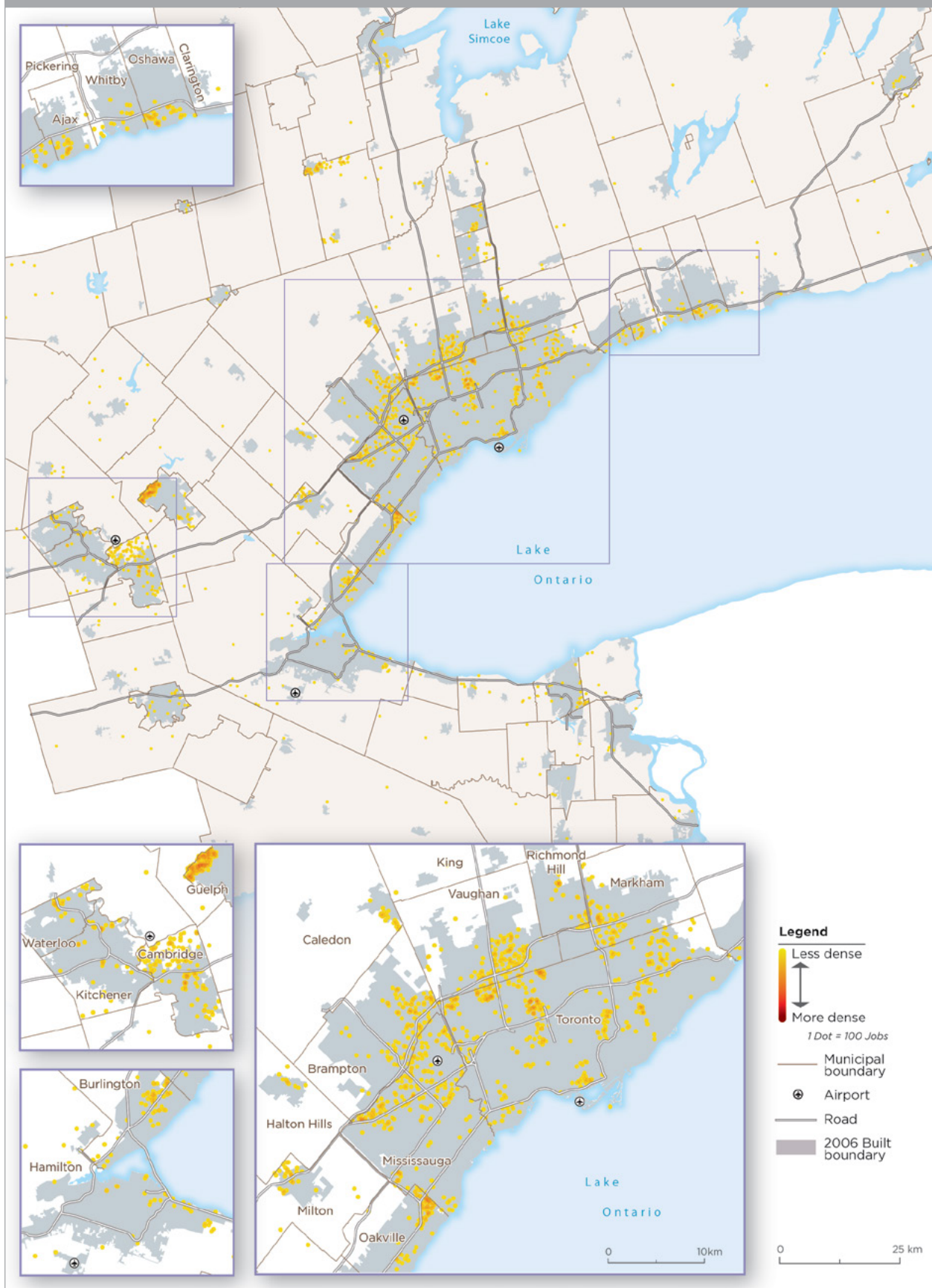
TABLE 24: EMPLOYMENT IN INDUSTRIES MOST VULNERABLE TO TRADE DISRUPTION AS A SHARE OF TOTAL INDUSTRY EMPLOYMENT, MUNICIPALITIES WITH OVER 10,000 JOBS, GGH, 2016

Employment in industries in which >50% of jobs rely directly on exports, sorted by share of employment at high risk, from highest to lowest

	Employment in Most Vulnerable Industries	Total Employment	Total Employment
Greater Golden Horseshoe	197,355	3,710,915	5.3
New Tecumseth	6,660	16,515	40.3
Cambridge	11,705	62,130	18.8
Guelph	12,770	69,670	18.3
Milton	3,180	30,490	10.4
Oakville	8,295	81,240	10.2
Caledon	1,910	19,770	9.7
Newmarket	2,915	35,220	8.3
Vaughan	12,845	158,280	8.1
Ajax	2,045	25,500	8.0
Burlington	5,865	78,665	7.5
Oshawa	3,465	48,340	7.2
Brampton	10,915	156,125	7.0
Woolwich	860	12,540	6.9
Halton Hills	1,205	17,845	6.8
Aurora	1,455	22,355	6.5
Markham	7,535	127,400	5.9
St. Catharines	2,970	51,275	5.8
Brantford	2,100	36,910	5.7
Brant	595	10,820	5.5
Mississauga	20,955	394,660	5.3
Whitby	1,900	37,060	5.1
Niagara-on-the-Lake	520	10,240	5.1
Pickering	1,475	29,515	5.0
Richmond Hill	2,620	54,890	4.8
Kitchener	3,345	83,365	4.0
Haldimand County	500	12,955	3.9
Waterloo	2,180	59,025	3.7
Peterborough	1,385	38,435	3.6
Clarington	715	20,295	3.5
Whitchurch-Stouffville	350	10,155	3.4
Hamilton	5,985	187,500	3.2
Barrie	1,660	56,110	3.0
Toronto	38,930	1,342,435	2.9
Welland	390	14,780	2.6
Kawartha Lakes	450	17,425	2.6
Orangeville	250	10,930	2.3
Niagara Falls	720	35,560	2.0
Orillia	270	15,015	1.8

MAP 35: EMPLOYMENT IN INDUSTRIES WITH HIGHEST VULNERABILITY
TO TRADE DISRUPTION, GGH, 2016

Legend

Less dense

More dense

1 Dot = 100 Jobs

Municipal boundary

⊕ Airport

Road

2006 Built boundary

CHAPTER 05
PLANNING THE NEXT GGH

The GGH is facing a new set of challenges, economic drivers and geography, raising important issues for planning. In this section, we recap our key findings, and identify potential planning responses to those challenges.

KEY FINDINGS

WHAT KINDS OF ECONOMIC ACTIVITIES ARE WE PLANNING FOR?

The answer to this question is found in an understanding of how the makeup of the GGH economy is changing. The region's economy has been undergoing a dramatic economic restructuring, driven by a transition to a knowledge economy, and underlying dynamics of globalization and technological change. This transition has been under way for some time (as noted in *Planning for Prosperity*).

However, the most recent years represent a substantive shift from past years, and a distinct new economic structure and landscape are emerging. This is not the linear continuation of a past trajectory. The regional economy and landscape have shifted into a new gear, with different economic characteristics and different demands of cities and urban environments.

This shift is challenging routine functions, work, firms, and industries, and fostering the growth of skilled, tech-related, and knowledge-intensive activities. Booming Archetypes include Soft Tech, Finance, High Order Business Services, Arts and Design, Higher Education, and Logistics. With few exceptions, manufacturing employment is in decline. The impacts of e-commerce are being felt in a loss of Other Wholesaling employment and automation in the loss of Back Office jobs.

Land use planning is facing a different mix of economic activities from that of the past and we should be planning proactively to accommodate this new mix in the GGH.

WHAT KINDS OF URBAN ENVIRONMENTS, AND WHERE, SHOULD WE BE PLANNING FOR BUSINESSES?

The new geography of growth

As the makeup of the economy transforms, so too does the economic geography of the region. Different types of economic activities demand different locations and urban environments. Recent years have been marked by an unprecedented level of concentrated employment growth. Geographic concentration of the economic activities that drive the regional economy is *the* defining characteristic of the new GGH.

Several key drivers together propel this new level of concentrated economic activity:
• The GGH economy is restructuring toward more knowledge-intensive activities, which benefit from co-location with other related firms, industries, and resources; more knowledge-intensive activities means more geographic concentration.
• Automation, which tends to concentrate employment in the larger urban areas, and within those urban areas in a few locations, is expanding in scope.
• Traded services, which tend to concentrate geographically, are growing.
• Capital is increasingly concentrated, as the globalization of markets means bigger firms, often achieved through consolidations, mergers, and acquisitions.
• The tendency toward geographic concentration is further reinforced by the decline or slower growth of more geographically dispersed activities, especially routine activities in manufacturing, wholesaling, and back-office uses.

Hyper-concentration in Downtown Toronto

A striking trend has been the level of growth of employment in and around Downtown Toronto. This trend is a reversal of the suburbanization of employment that dominated the 1980s, 1990s, and early 2000s. Some 67,000 new "core" jobs and 85,600 total jobs located in Downtown Toronto between 2006 and 2016, including jobs in the Soft Tech, Finance, High Order Business Services, Higher Education, and Science-Based Archetypes.

Over time, this growth may be tempered by the automation of some higher-skilled activities, but likely not enough to offset overall growth.

Firms in the downtown tend to be globally integrated or national corporations. They cluster with the high order business firms that serve them, smaller tech firms, and start-ups such as fintech enterprises. Firms, employment, and services co-exist at extremely high density, mostly in highrise towers.

Downtown Toronto is served by a high-order, fan-shaped regional transit system with Union Station as its focal point. This transit connectivity makes Downtown Toronto the *only* place in the GGH that can reliably access virtually the entire region's labour market, a critical locational factor for knowledge-intensive activities. As major roads and highways in the GGH become increasingly congested, making auto travel unpredictable and increasingly time-consuming, high-order transit provides more reliable access to jobs by workers and to workers by employers. Downtown's proximity to dense urban neighbourhoods also makes it accessible to workers who walk or cycle. The unparalleled access to labour is no doubt a major factor attracting knowledge-intensive firms to Downtown Toronto. Its attractiveness to workers is also enhanced by amenities such as shopping, restaurants, cafes, bars, and services.

The complex agglomeration economy of Downtown Toronto attracts economic activities and firms. This environment of dense, diverse firms, institutions, and workers allows for the formal and informal exchange of knowledge and ideas; fosters connections, networks, alliances, and deals; and helps get new ideas off the ground. Even a stalwart suburban company like Microsoft recently announced its relocation from suburban Mississauga to Downtown Toronto.[110]

Edges of Downtown

A few other locations in the GGH have seen concentrated employment growth, albeit at levels considerably lower than in Downtown Toronto. Employment in Arts and Design and Soft Tech, for example, have been attracted to the areas flanking Downtown Toronto to the east and west, which benefit from being close to the central agglomeration, but not in it. Firms in these areas tend to be smaller and may have links with downtown firms, but cannot pay downtown rents. In many cases, these smaller firms collaborate to form project-based production networks, and there is a high degree of home-based work.

These areas have older, repurposed industrial building stock, where work spaces are integrated with residential uses, and amenities such as shops and cafes, all highly accessible by transit, walking, or cycling.

110 Ali Raza, "Microsoft Canada leaving Mississauga for Toronto in 2020," *Mississauga News*, September 15, 2018.

The Suburban Knowledge-Intensive Districts (SKIDs)

The performance of the Suburban Knowledge-Intensive Districts in attracting employment has been patchier between 2006 and 2016 than it was in the period (2001–2011) documented in *Planning for Prosperity*. There is greater variation among the SKIDs. Only the Airport and Meadowvale SKIDs grew between 2006 and 2016, while the others either lost core employment or remained stable. Employment growth in the SKIDs was accounted for by the Soft Tech, Finance, Pharma, Telecoms, and Science-Based Archetypes, and to a lesser extent by Hard Tech.

The slowdown in SKID growth reflects the shift in GGH employment geography. Downtown Toronto is attracting not only existing development from suburban areas, but also new development that might have previously located in the SKIDs. Businesses in new and emerging sectors are attracted to the downtown. It has become a struggle for the SKIDs to compete. Despite some recent transit improvements (in Markham, Waterloo, and the Airport), SKIDs are still auto-oriented, which becomes an increasingly difficult proposition as highway congestion rises. Further congestion is predicted – even if the current Regional Transportation Plan is fully implemented.[111] Unlike Downtown Toronto, SKIDs cannot provide access to the full regional labour market by transit.

The urban environments of SKIDs tend not to attract employees. They lack a high-quality, walkable public realm, offer little in the way of employee services or amenities, and lack close physical integration with the transit available. Meadowvale, which has seen the most employment growth, still suffers from auto-dependency despite being the location of a GO station. Unfortunately, the Milton line, which serves the 36,000 core employment jobs in the Meadowvale SKID, is not prioritized for two-way all-day RER service under the Regional Transportation Plan.

Dispersed Growth

Areas of employment growth elsewhere in the GGH include the new urban edge along Highway 407, along with some Hard Tech growth in Burlington and North Guelph. Logistics employment has appeared in Brampton, Mississauga, Caledon, Vaughan, Pickering, Ajax, Cambridge, and Bradford, and along Highways 401, 407, and the QEW. Small amounts of new Back Office employment are scattered across the City of Toronto and surrounding municipalities. And Telecoms and Pharma exhibit small concentrations of employment growth in suburban areas outside the SKIDs.

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111 Analysis by Metrolinx for the Draft Regional Transportation Plan. Under the RTP, there will be 3 million more cars on the roads during this peak period every day – almost 50 per cent more than today. Congested travel during the peak is expected to increase 122 per cent. See also Pamela Blais and Marcy Burchfield, "Why a $45 billion transportation plan fails to increase transit ridership," *Toronto Star*, November 20, 2017.

THE LOSS-SCAPE

This spatial analysis of the GGH has shown significant areas of core employment loss – in southern Oshawa, across the inner suburbs of the City of Toronto, south of the QEW, in Hamilton city centre, and in Kitchener and Cambridge. Individual Archetypes also show specific spatial patterns of job loss.

The megazones were net losers of jobs between 2006 and 2016. In areas outside the SKIDs that they include, megazones sustained losses in Hard Tech, Other Manufacturing, and Other Wholesaling.

Many areas experiencing net loss are in well-situated, older industrial districts across the region. New growth, however, does not mirror the existing distribution of employment, even though declining employment areas imply vacancies and development potential.

THE GEOGRAPHY OF DISRUPTION

Automation is a long-term, transformative process that is well under way, while trade disruptions tend to occur as individual events. This analysis shows that areas across the whole GGH are vulnerable to both kinds of disruption, reflecting the dispersed nature of vulnerable industries. Some municipalities appear vulnerable to both types of disruption – such as Cambridge, Guelph, and Caledon.

ISSUES AND RESPONSES

The GGH has entered a new phase, with an economic landscape characterized by simultaneous growth, transition and loss; disruptive technologies and increased uncertainty; and a marked shift in spatial patterns. Land use planning needs to take this new geography and economic context into account.

FACTORING THE NEW ECONOMIC GEOGRAPHY OF THE GGH INTO PLANNING

It is hoped that the analysis presented here – a conceptual framework for understanding a changing economic landscape, Archetype profiles, and vulnerability mapping – is a useful **input to Growth Plan implementation,** including Municipal Comprehensive Reviews, Employment Strategies, and Land Needs Assessments. Municipal planners can draw on the analysis and outlooks for the Archetypes that are relevant within their own borders.

The analysis can be used to identify the kinds of economic activity to be planned for, in what locations, and the characteristics of urban environments that may be needed to support them. The analysis could also inform other aspects of Official Plan policy and Secondary Plans. As well, there are important implications for regional-scale planning, all described below.

At the regional level, the new geography of growth, transition, and loss shown on the maps has implications for the current allocation of 2041 employment growth to the upper- and single-tier municipalities in Schedule 3 of the Growth Plan. Our analysis suggests a much more concentrated pattern of employment growth than the current allocation represents. **Updated employment forecasts and allocations** that reflect the new dynamics and shifting employment geography are essential to effective planning. They also underpin regional economic competitiveness by ensuring that we are prepared for growth and do not under-designate the kinds of employment lands that are needed, while avoiding wasteful overdesignation.

THE NEW GEOGRAPHY SUGGESTS A MUCH MORE CONCENTRATED PATTERN OF EMPLOYMENT GROWTH THAN THE CURRENT ALLOCATION REPRESENTS.

ADDRESSING AN INCREASINGLY DOMINANT TORONTO CORE

Employment in downtown Toronto topped 500,000 in 2016. About 25 million square feet of office development in or near downtown is in the planning approvals pipeline.[112] Even assuming a higher-than-typical floorspace per worker of 250 square feet, that figure represents an additional 100,000 jobs. The City of Toronto projects growth of 250,000 to 315,000 jobs by 2041 in the downtown and flanking areas in South of Eastern and Liberty Village, bringing the total number of jobs there to as many as 915,000.[113] This growth represents a significant share of major office growth projected for the entire GGH under the Growth Plan forecasts.

The sustained concentration of growing knowledge-intensive employment in Archetypes like Finance and High Order Business Services raises several important questions. Can this level of growth in downtown Toronto be sustained? Are the walking, cycling, and transit networks needed to support future growth being planned and implemented in a timely manner? If not, growth may be deflected to other areas of the region or even other competing city-regions. As pressure on Downtown Toronto intensifies, at some point the agglomeration dis-benefits described in Chapter 2 may begin to outweigh agglomeration benefits.

CAN THIS LEVEL OF GROWTH BE SUSTAINED IN THE TORONTO CORE?

The hyper-concentration of employment growth in and around Downtown Toronto, the flagging of concentrated development elsewhere in the region (including the SKIDs that were, until recently, flag-bearers for concentrated employment growth outside Toronto), along with residential expansion at the edges of the urbanized area, raise questions about workers' access to jobs (especially for people living farther from Downtown Toronto or far from high-order transit), and employers' access to workers.

A REGION WITH A SINGLE DOMINANT EMPLOYMENT CONCENTRATION?

Given the increasing dominance of Downtown Toronto as an employment concentration, a strategic approach to support economic resilience would consider the need for **a second major downtown** for the region. Where could the Toronto region create its own version of La Défense (Paris) or Canary Wharf (London)? A critical criterion is access by high-order transit that captures the entire regional labour market and allows for shortened commutes. In addition, it should build upon an existing concentration of development and firms to support agglomeration economies, and offer the potential for a significant amount of dense, mixed-use development, including residential development. A second major downtown should be a strong focus for new development and investment, to counterbalance an increasingly dominant Downtown Toronto, and allow for some redundancy and therefore resilience in the region's structure.

112 City of Toronto, "How does the City grow?" April 2017, revised July 2018.
113 Staff report, "TOCore: Downtown Official Plan Amendment," April 17, 2018. Employment in the downtown was estimated at more than 500,000 jobs in 2016. Including those who work at home, those with no fixed place of work residing in the downtown, and employment in the two flanking areas brings the 2016 total to 600,000 jobs. The employment forecast used for the plan was for 850,000 to 915,000 by 2041.

PRIORITIZING NODES AND CORRIDORS

If the GGH continues to shift toward the consolidation of a single dominant centre, questions arise about the ability of the Urban Growth Centres (UGCs) designated in the Growth Plan (excluding Downtown Toronto and perhaps North York City Centre) to attract significant amounts of office development. The same consideration applies to the viability of Major Transit Station Areas (MTSAs) and other Strategic Growth Areas designated in Official Plans.

The reality is that the plethora of places in the GGH where official plans anticipate new office development outweighs the likely demand for such space. This mismatch becomes an important issue if expectations about attracting future office development underpin the creation of a vibrant centre or form the rationale to support transit investments.

THE PLETHORA OF PLACES WHERE OFFICIAL PLANS ANTICIPATE NEW OFFICE DEVELOPMENT OUTWEIGHS THE LIKELY DEMAND.

While it is unquestionably important to encourage intensification and densification in the right places, planning for UGCs, MTSAs, and other Strategic Growth Areas must be realistic about the amount of office growth that might be attracted to any given location. This understanding has implications for the Urban Structures of municipalities addressed in Municipal Comprehensive Reviews, as well as for the regional structure of UGCs identified in the Growth Plan. In both cases, a more strategic, focused approach to planning for centres, nodes, and corridors is wise. Municipal Official Plans and the Growth Plan could **prioritize** amongst these areas to focus new development, build on existing development and agglomeration economies, and ensure that growth is aligned with infrastructure investments.

PLANNING FOR GROWING ARCHETYPES

A key planning issue is: where will the GGH accommodate growing Archetypes? Where will, for example, Soft Tech or Arts and Design, which currently inhabit the edges of downtown Toronto, expand in future? Most former industrial or warehouse space at the edges of the core has already been repurposed. Are we – should we be – planning for employment densification on the edges of the core? Where else would meet the locational, access, and urban environment requirements of these growing Archetypes – early postwar (1950s–1960s) industrial areas? Planning the expansion of these activities must be integrated with planning for residential densification, a closer mixing of uses, flexible and affordable spaces, transit accessibility, and a high-quality, walkable public realm.

This kind of **forward thinking** is needed for each of the growing Archetypes, not just for successful planning, but also to ensure that the GGH can accommodate and support strategic economic sectors. The analysis presented here can help in developing more robust, nuanced planning policy regarding the kinds of activities, locations, and urban environments needed for different kinds of employment uses, and could feed into Municipal Comprehensive Reviews.

Logistics operations in particular have been growing and the continued expansion of e-commerce suggests that this growth is likely to continue. Logistics facilities require very large sites and bring heavy truck traffic. They have significant impacts on urban and natural environments, surrounding areas, and Growth Plan objectives, such as the efficient use of land. A regional approach to this Archetype in particular is needed.

A regional Logistics strategy could track key industry drivers and project regional space needs, create an inventory of existing and planned sites, ensuring that longer-term supply meets demand and avoiding over- or under-designation of lands, which might result from a fragmented municipality-by-municipality strategy. In addition, a regional strategy could identify the most appropriate locations in the GGH for these facilities; avoid or minimize conflicts with other uses, developments, or natural areas; and ensure proactive planning in relation to existing and planned investments in facilities such as intermodal terminals and airports.

WHERE CAN THE GGH ACCOMMODATE THE GROWING ARCHETYPES?

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114 City of Toronto, "ConsumersNext," secondary plan, approved March 26, 2018.

ATTRACTING GROWTH
OUTSIDE CENTRAL TORONTO

As knowledge-intensive activities hyper-concentrate in and around Downtown Toronto, the potential for other areas to attract significant amounts of compact, transit-supportive uses such as office development is called into question. This is true not only for the UGCs, MTSAs, and Strategic Growth Areas as noted above, but also for existing employment areas and office parks. Even well-located employment areas are having difficulty attracting new development. Analysis undertaken by the City of Toronto for the renewal of the Consumers Road office park suggests limited potential to attract new development,[114] even though development in this location would be significantly cheaper than in Downtown Toronto, the site is centrally located, and it has good transit service.

Can anything be done to attract growth to these areas? Some growing Archetypes may continue to be attracted to suburban settings, such as Science-based firms, Pharma, and Telecoms (included in the Special Archetype). Otherwise, similar to the factors attracting firms to downtown Toronto, the future of these areas will rely on excellent access to labour for firms, an environment attractive to workers, and supporting agglomeration economies.

Providing excellent transit service offers employers access to the widest possible pool of workers – a critical competitive asset. Attracting employees also means creating a high-quality urban environment – one that integrates transit, provides a walkable and cyclable public realm, and offers worker amenities and services, such as restaurants, cafes, shops, daycares, or recreational facilities.

Areas with an existing critical mass of firms, employees, and resources can build on this base to strengthen agglomeration economies and attract more firms. Many of these areas require **updated planning frameworks and urban environments**. Planning tools such as secondary plans and zoning can help by allowing a wider range of productive uses and building types as-of-right, identifying densification opportunities, improving the public realm, permitting land uses related to employee amenities, and anticipating future development – in short, creating flexible planning frameworks (see below).

Even with these measures, the new economic geography of the GGH suggests that attracting office-related employment in growing Archetypes to these areas in large numbers presents a challenge. This reality underscores the need for redevelopment and renewal efforts to be focused on key locations with high economic development potential and the highest levels of existing transit connectivity to the regional labour market, and for future transit investments to take into account the economic potential of employment areas.

ADDRESSING AREAS OF STAGNATION OR DECLINE

In the GGH, we are very good at planning for growth – quantifying the need for and designating new greenfields development areas. Planners use projected growth in major office employment or in "Employment Lands Employment" to develop land use plans. But an overall growth number can obscure the fact that some areas in the region or within a municipality are stagnating or experiencing a net loss of employment and economic activity.

The range of areas experiencing loss is wide: from older urban industrial areas to inner suburban office parks, megazones, and other industrial areas, suggesting that different, area-specific strategies will be required. Updated planning and urban design and more flexible planning frameworks may be helpful. In specific cases, these areas could also be considered for repurposing to address the growth of certain Archetypes: we've mentioned above the idea of redesigning 1950s- or 1960s-era industrial lands to accommodate growing Arts and Design, or Soft Tech, for example.

MANY TYPES OF AREAS IN THE GGH ARE EXPERIENCING A LOSS OF JOBS.

Planning for these areas would also benefit from integration with an economic development strategy. A **place-based economic development strategy** could identify measures such as particular investments – in shared space, incubators, training centres, municipal facilities, or start-up spaces, for example.

The development potential associated with these areas should also be factored in to Municipal Comprehensive Reviews and Land Needs Assessments.

FORWARD-LOOKING PLANNING

Close integration with global markets, production, and distribution networks exposes GGH firms and the regional economy as a whole to disruptions around the world. This vulnerability is heightened by the disruptive potential of ongoing, rapid technological change.

Built environments are long-lasting and relatively slow to change. Planning has historically been focused on creating certainty and predictable outcomes. These facts create a tension with the current environment of rapid change, disruption, and uncertainty, and a challenge to the region's economic resilience.

Planning can play a key role in regional preparedness for foreseen and unforeseen events and changes. Similar to planning for the natural environment, planners can identify the region's economic flood plains, that is, areas vulnerable to economic storms. Regardless of the specific geography of disruption, all municipalities can benefit from adopting strategies to improve economic resilience.

One of the ways in which we can improve the GGH's economic preparedness, resilience, and ability to deal with disruptions is for land use planning to adopt **a more anticipatory outlook**. Employment projections based on linear extrapolations of past growth patterns are inadequate in today's environment. While some may argue that it is risky to base land use planning on predictions for an uncertain future, there are risks attached to land use planning that looks in the rearview mirror. These risks include not having the right kinds of land supply, urban environments, and planning frameworks in place to accommodate growing businesses and address lagging areas. Land use planning that entrenches the past rather than looking forward to the future is too common in the GGH.

THERE ARE RISKS ATTACHED TO LAND USE PLANNING THAT LOOKS IN THE REARVIEW MIRROR.

More robust analytical approaches are needed, based on an understanding of the underlying dynamics of economic change at the regional and local scales. This report, which identifies key drivers shaping the geography of growth and decline in the GGH, and uses Archetypes as an analytical tool, is one example of such an approach.

The intelligence gained from a dynamics-driven, regional-level spatial analysis can be used to create more anticipatory regional and local planning frameworks, better suited to face potential challenges, address future land needs, and create the right kinds of urban environments and planning regimes.

FLEXIBLE PLANNING

Increasing flexibility in the use of land and buildings is probably the best way to deal with uncertainty and disruption and to support economic resilience. Greater flexibility allows businesses to respond to rapidly changing competitive pressures and new ways of working and producing, and would permit the diverse interactions that support innovation and production networks. This means **greater flexibility in permitted uses** in municipal Official Plans, secondary plans, and zoning.

There is growing demand for employment spaces and facilities that integrate different functions: innovation, research, institutions, worker training, startups, labs, office, co-working, and production space, for example. Businesses are collaborating with universities and community colleges, and these arrangements often require flexible land use permissions. Different uses could be integrated at the building level (as they are in MaRS, for example) or at the district level in the form of innovation parks or mixed-use areas. GGH municipalities, however, have been slow to adopt flexible land-use frameworks.

The lines between industries are becoming more and more blurred. Business functions are increasingly encompassing more than one type of activity.[115] For example, distribution often includes some production functions, such as packaging, as well as services to retail, such as on-site set-up and assembly. Bricks-and-mortar retailers fill online orders, or provide click-and-collect services. Manufacturing facilities may include retail outlets, as they do in breweries or bakeries.

The lines between services and manufacturing are also becoming blurred as more services are embedded in physical products, such as networked products like Nike smart runners or programmable lights and cars. Meanwhile, formerly physical products have been "dematerialized," such as music, video games, movies, books, magazines, and newspapers, so that production of these items no longer requires a manufacturing facility.

Land use policies and permissions that are based on restrictive, narrowly defined use categories are out of date relative to the ways in which many products are made, and how companies now operate.

DEALING WITH UNCERTAINTY AND DISRUPTION

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115 See, e.g. NAIOP 2016, CBRE 2017, Ronderos, 2010.

Businesses need to adjust their processes and products over time, and to expand or contract their operations and facilities as those processes change. Planning frameworks, such as secondary plans, therefore need to **build in flexibility and evolution**. Secondary plans can anticipate building expansions, densification, broader uses, and the integration of transit, for example, so that such changes can proceed without lengthy planning reviews.

Restrictive planning frameworks that require rezoning or other reviews for land use changes are costly and time-consuming. Performance-based zoning, which addresses potential impacts and mitigation directly rather than through the proxy of land use lists, is one approach. Another is district-based plans that anticipate changes in use, building expansions, densification, and other adaptations to change, while ensuring a high-quality urban environment. These flexible planning approaches would better support businesses and local economies in the event of significant disruptions.

SUPPORTING INNOVATION

Urban environments can promote innovation by supporting linkages among diverse actors such as firms, research labs, or institutions, and by allowing for formal and informal knowledge exchange. This means denser urban environments with a range of activities, amenities, meeting spaces, industries, and resources, all closely mixed, with walking, cycling, and good transit access, and buildings with flexible design layouts to accommodate new ways of working.

This mixed-use environment leverages public investments – in laboratories, or higher education or training facilities, for example – by promoting synergies with firms or other organizations. The flexible planning frameworks described above would foster these kinds of urban environments, which today are found in older urban areas, such as the edges of Downtown Toronto, and in some older city centres.

In Chapter 2 we also mentioned innovation processes that are more intrafirm in nature. These would be served by providing places for larger, multinational firms, such as the more corporate environment of suburban office parks, including SKIDs. Providing good transit service to these locations may be critical to their success, as firms need to attract skilled employees, and as highway congestion worsens. This calls for planning strategies to densify these areas in conjunction with transit investments that will support these types of firms.

CONVERTING EMPLOYMENT LANDS

One of the ongoing planning issues in the GGH is whether existing employment lands in some locations ought to be converted to other uses, particularly residential and retail. This is a complex and strategic issue, and the answers will depend on site characteristics, as well as region-wide and locality-specific considerations. However, the analysis presented above suggests some considerations relevant to the issue.

The demand for offices, flex uses, and employment spaces has been increasing in particular locations, spurred by growing Archetypes such as Soft Tech or Arts and Design. Accommodating growth for these and other Archetypes over the longer term may mean repurposing and renewing older, underused industrial areas.

Our analysis also suggests the need for urban industrial spaces in future. This includes space for medium-scale urban warehousing closer to consumer markets, light manufacturing closely linked to consumer markets (such as food and beverage production), and tech-related manufacturing, such as 3D printing.

Demand for suburban manufacturing and warehousing uses should also be considered in the context of the potential reshoring of manufacturing and the expansion of logistics and distribution facilities to support e-commerce. These changes suggest increasing demand for land and buildings in appropriate locations, with higher levels of automation and robotics, and fewer but higher-skilled employees.

More detailed future outlooks for all Archetypes could further inform the employment lands conversion question.

The conversion of employment lands issue would be best informed by **a regional perspective**. The economic landscape of the region can shift – as we have shown with the recent hyper-concentration of knowledge-intensive jobs in Downtown Toronto. Such a shift has implications both for the places that are attracting growth, and the places that are not. These shifts take place at the regional scale, across municipal boundaries.

The GGH is one integrated regional economy, one regional labour market. Making decisions about conversions on a municipal basis, without regard to the regional context, will result in suboptimal outcomes, such as under- or overestimating the need for certain types of employment lands in the long term. A certain type of site may be plentiful within a given municipality, for example, but relatively rare in a regional context.

Currently the GGH lacks a common regional perspective that could inform this issue. Some kind of regularly updated, long-term, **dynamics-driven GGH economic outlook** could provide a strategic, regional context for conversions. This could include more detailed future outlooks for each of the Archetypes. A complementary need is **an inventory of the employment lands and permitted uses across** the GGH, to understand the supply context.

These measures could help ensure that key sites, or those that may be needed in the long term for employment-related uses, are not lost, thereby ensuring good sites for the kinds of economic activities that drive the regional economy. A regional perspective could also identify locations of regional strategic economic importance. The current employment lands conversion process is missing this longer-term, strategic, regional economic context.

A REGIONAL ECONOMIC DEVELOPMENT STRATEGY

Unusually, for such an important regional economy, the GGH suffers from the lack of a **regional economic development strategy.** Aside from the economic advantages a regional strategy offers, it would also allow for the closer integration of economic and land use planning in the region and help identify the kinds of economic activities that are growing, stable, or declining in the GGH. Planning alone cannot resolve issues relating to the loss of employment in certain districts. Working in concert with economic initiatives that might be identified in a regional strategy, relating to skills development, incubators, or start-up space, for example, provides a more effective approach.

TRANSPORTATION PLANNING

The new geography of hyper-concentrated job growth, combined with slow growth or loss of employment in areas elsewhere in the GGH, has important implications for transportation planning.

On one hand, there is high growth pressure on Downtown Toronto and nearby areas, where transit access – especially by subway – is already under stress and must be addressed. On the other hand, areas outside Downtown Toronto and possibly North York City Centre, are faced with the prospect of limited transit-supportive, employment-related development, such as offices. Yet one of the few areas attracting relatively concentrated growth outside the downtown is the Meadowvale SKID. Despite its GO station, transit improvements to this area (which would also serve Mississauga Centre) are not prioritized in the current Regional Transportation Plan.

This omission suggests that regional transit planning does not pay sufficient attention to the economic role and potential of some areas. The economic role of particular areas – be they UGCs, MTSAs, other Strategic Growth Areas, SKIDs, or office parks – must figure into the planning and regional prioritization of transit projects.

THE ECONOMIC ROLE OF TRANSIT IN A KNOWLEDGE-BASED ECONOMY.

Nor perhaps has there been adequate recognition of the central role that transit plays in a knowledge-intensive economy. Transit is increasingly essential in attracting knowledge-intensive activities to an area. It is not a coincidence that many of the Archetypes that are growing and drive the economy are located in areas with high levels of transit service. Transit makes it possible to match skilled workers with jobs that best use their talents, thereby increasing regional productivity. At a broader level, the growth of these knowledge-intensive activities provides an important opportunity to support a modal shift.

If employment continues to concentrate centrally, and residential development continues at the edges of the region, there is also the possibility of worsening the existing mismatch between jobs and housing, extending commuting distances, making the provision of cost-effective transit service even more difficult, and increasing auto-dependency and congestion.

Metrolinx's Regional Transportation Plan and other **transit plans** in the GGH must take into account the critical role of transit in a knowledgebased economy, and the changing employment geography of the region. Transportation plans could leverage the role of transit in a knowledge economy, by aligning investments with economically significant places, recognizing the new employment geography, focusing on building on existing concentrations of development (especially outside Downtown Toronto), and investing strategically to support the regeneration and renewal of specific areas.

IT IS NOT A COINCIDENCE THAT MANY OF THE GROWING ARCHETYPES ARE LOCATED IN AREAS WITH HIGH LEVELS OF TRANSIT SERVICE.

A REGIONAL EVIDENCE BASE

Good planning policy requires good, ongoing **data and analysis** about the changing economic landscape of the GGH. At present, the sole source of GGH-wide data is the Census Place of Work data used in this report. Although it is a good source, more frequently updated data are needed. A regional initiative to expand, coordinate, and consolidate the annual employment surveys currently undertaken by different municipalities would be a good start.

In addition to the need for a regularly updated, regional economic outlook and an inventory of employment lands and permitted uses, research requirements include:
- more detailed examinations of the characteristics and drivers of each of the key Archetypes;
- an analysis of the potential effects of automation on the demand for industrial floorspace;
- an inventory of land within UGCs, MTSAs, and other designated Strategic Growth areas and employment lands, including an assessment of the potential supply of and demand for office development.

Better planning for the many diverse areas that contain employment is critical to the future of the Greater Golden Horseshoe. Areas catering to business play a key role in achieving fundamental planning objectives related to the efficient use of infrastructure, sustainable transportation, and a livable region. Also, the successful land use planning of these areas is critical to the continued economic competitiveness and prosperity of the GGH. Successful planning relies on integrating an understanding of the economic dynamics and new realities that we face in the Next GGH.

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