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# The Evolution of Toronto's ICT Cluster: Breakthroughs and Challenges

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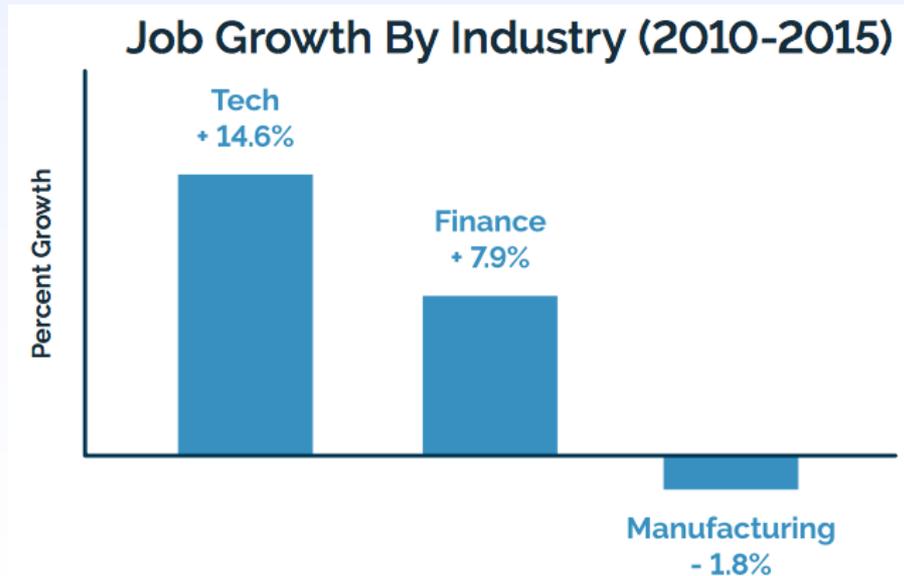
# Drivers of Toronto's ICT Sector

- GTA – 11,500 firms in the ICT sector in Toronto (2011)
- 605 manufacturing firms & 10,900 service firms
- More than 161,000 employees in Toronto ICT sector
  - Cluster is geographically dispersed from Markham to Oakville
  - Multiple, competing industry associations representing different segments & interests
- Key firms include headquarters of most major MNEs
  - foreign & Canadian
    - Autodesk, Celestica, CISCO, Constellation, IBM, HP, Microsoft, Xerox, Bell, Rogers, Telus, Microsoft,
    - 500 firms are active R&D performers with 6,600 researchers
    - IBM Software Solutions Lab – 2500 employees
    - Xerox Research Centre in Sheridan Park - 100 scientists

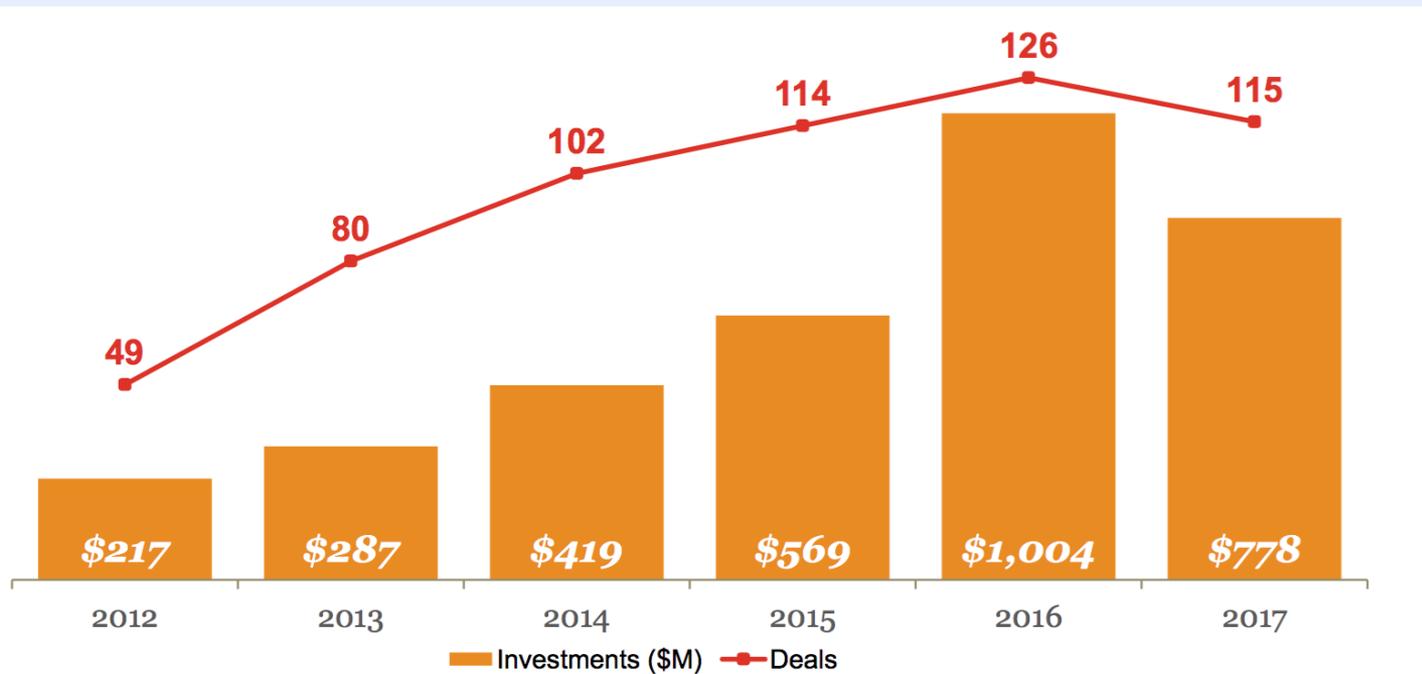
# Size of Tech Sector 2016

TechToronto, Munk School Innovation Policy Lab, & PWC

Toronto's Tech Sector (2015)



# Increased Investment



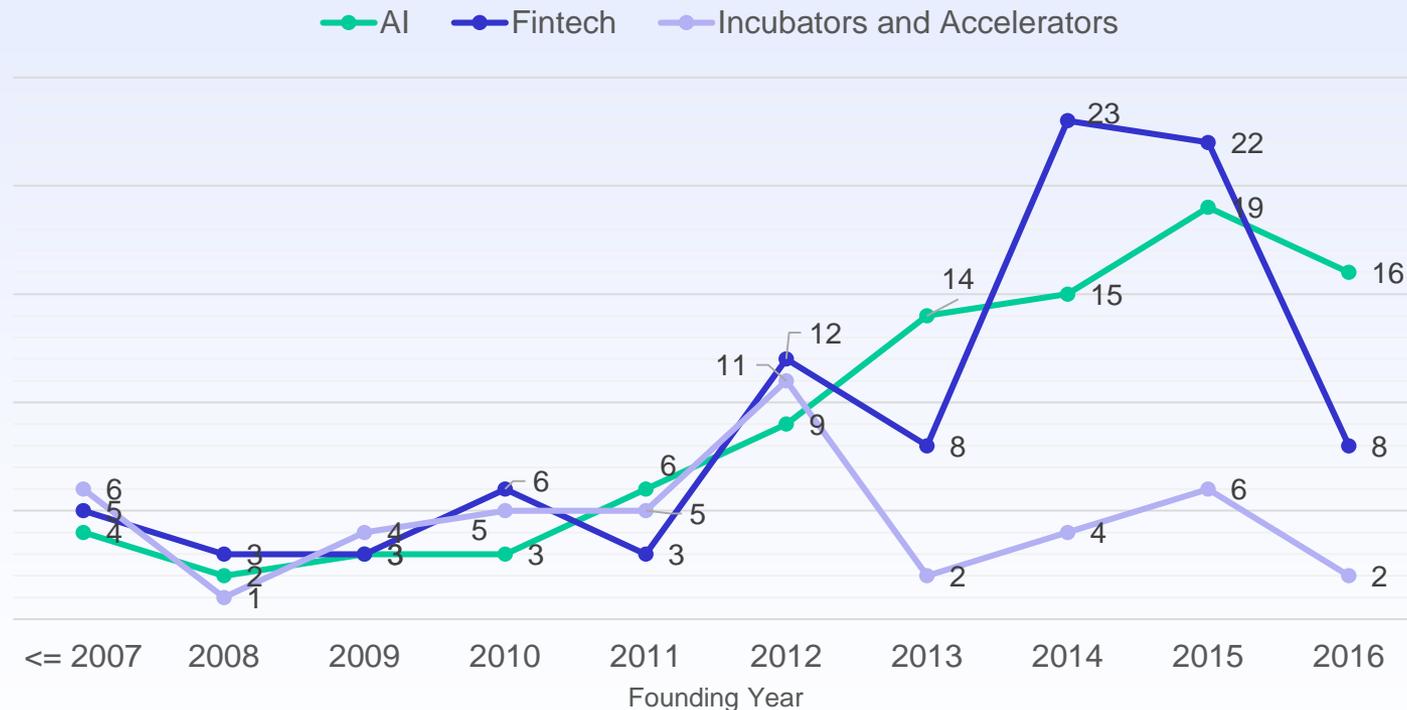
PwC | CB Insights MoneyTree™ Canada Report Q4 2017

All figures in USD

Sectors: Internet, Health, Mobile, Software, Computer services, Industrial, and other

# Emergence of Startup Ecosystem?

**Figure 2:** AI, Fintech Startups and Incubators & Accelerators In operation, Toronto City-region



**Data:** Compiled from multiple sources by IPL, Fall 2017.

# Puzzle: Transformation of the ICT Cluster

## Toronto ICT 1990s-2000s

- MNE headquarters and sales offices and few domestic large firms (Britton 2003; Creutzberg 2005)
- Hardware & Telecoms
- Minimal R&D from large MNCs; mostly sales offices

## Toronto ICT Today

- Dominated by startups, service firms; vast majority of firms in this sector have fewer than 50 employees (City of Toronto 2011; IPL 2017)
- Software firms & other innovation-based tech locating in TO (TechToronto 2016)
- MNCs coming to access local talent and innovation streams (Wolfe, DeFrancesco & Denney, *forthcoming*)

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# Core Research Question

- What are the factors driving the transformation of Toronto's ICT cluster from consisting mostly of MNE flagships into an increasingly dynamic ecosystem for local startups?

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# What factors explain the transformation?

- Feldman, Francis & Bercovitz (2005) define three distinct phases of **entrepreneurial-driven** cluster change:
  - **Phase 1:** talent base & research infrastructure
  - **Phase 2:** civic-capital building entrepreneurs
  - **Phase 3:** functioning entrepreneurial environment

Source: Feldman, Maryann, Johanna Francis and Janet Bercovitz. 2005. "Creating a cluster while building a firm: Entrepreneurs and the formation of industrial clusters." *Regional Studies*: 39(1): 129–141.

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# To what extent are these factors actually present in Toronto?

- Ecosystem interviews: Summer 2015 – Winter 2017
- 68 interviews (startups, SMEs, incubators, VCs, government)
- Probed questions related to ICT sector/cluster:
  - Local context and global flows (assets, detriments, etc.)
  - Talent development and labor resources
  - Associations and networks

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# Content Analysis: Findings

- **Talent and research**
  - Majority positive (55%); developed (?)
- **Civic capital**
  - Plurality positive (46%); rising
- **Ecosystem**
  - Plurality neutral (40%); mixed or ambivalent

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# Toronto's Phase 1: Talent Base and Research Infrastructure

- Strong technical talent base. Almost everyone agrees highly skilled can be found in the Toronto or the GTA. The university system in the 'innovation corridor' is certainly seen as an asset and does a good job training graduates.
- Highly competitive market for certain tech. specialists and sometimes even basic talent.
- Lack of experienced managers (mid- and high-level) hurts growth/scaling.
  - Regularly cited barrier to growth. Not captured particularly well by content analysis.

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# Toronto's Phase 2: Civic Capital

- Broad recognition of change to community and network dynamics for startups and innovation-based tech. firms.
  - Comparing the DemoCamp meetups to the current strength of the community, one interviewee notes how the city's transformation into a start-up location "was [driven by] a grassroots entrepreneurial start-up kind of thing."
  - Elan Yunusov (BetaKit) asserts that "arguably until about 2010, the [Toronto] community was still intermittent, turning on and off with each event." However "critical mass would come in the years to follow, as the city was hit by a wave of tech growth" (Yunosov 2017).

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# Phase 2: Civic Capital

- Toronto-based entrepreneurs are identified as recycling capital and advice to seed and support next generation of startups. Also, there is recognition of new networking/advocacy organizations.
  - One software development firm CEO notes: “We learn a whole lot from each other just by sitting down once a month and saying I do this with my policy or I do that [with this opportunity]. And just that idea exchange massively accelerates our success because I can take someone else's idea that might have taken a year or two years to figure out and suddenly I've got it instantly and we implement it immediately.”
- However, opinions are not resolutely positive. In fact, many are ambivalent or outright negative.

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# Phase 3: Functioning Entrepreneurial Environment

- Community of second or third generation startups being seeded by serial entrepreneur-investors, who actively share management advice, access to investment, and recommendations for hiring talent. Interviewees spoke to three main dimensions:
  1. RISE OF SERIAL ENTREPRENEURS.
  2. MENTORING (not just the networking infrastructure).
  3. ACCESS TO INVESTMENT.

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# Phase 3: Functioning Entrepreneurial Environment

- Pieces are all there, but...
- “Toronto has an amazing skills base due to its excellent quality of students and immigrants that makes up its work force. Five of the fortune 500 banks are all on one single street plus a whole host of [potential investors], but they do not move together unfortunately.” – Interviewee, VC

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# Back to Phase 1

## False positives? Talent mismatch and brain drain

BUSINESS

### Canadian Tech Sector Thrives, but Struggles to Keep Its Talent

Government seek to attract investment from big foreign players while stopping the brain drain

- David George-Cosh, WSJ, Feb. 8, 2018

# False positives?

## Talent mismatch and brain drain

- “We’re the Walmart of tech. workers in North America – cheapest prices ever.”  
– Canadian tech worker

Market	Average Annual Tech Wage Software Engineer (USD)
Vancouver, BC	\$60,107
Toronto, ON	\$62,365
Atlanta, GA	\$92,380
Boston, MA	\$103,979
Washington, DC	\$108,330
New York, NY	\$108,878
Seattle, WA	\$113,906

Source: US Bureau of Labor Statistics 2016; Statistics Canada 2017;  
CBRE Econometric Advisors, Axiometrics 2017

Chart included in Vancouver’s bid to host Amazon HQ2 (!).

Source: Douglas Quan, “Vancouver criticized for boasting about low pay of its tech workers in Amazon HQ bid,” *National Post*, Feb. 18, 2018.

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# False positives?

## Talent mismatch and brain drain

- *Great talent, but it doesn't stay!*
- “[The talent] gets dragged away and so we just don't see the productive output [that you do in the US or places in Europe]. It's not because we didn't have the right people. You look around the world at you know the great engineers that are working in all sorts of technology spaces or advanced manufacturing spaces, there's Canadians all over the place, it's just not happening here.” – interviewee, software development firm

# Challenges & Opportunities for Toronto's ICT Cluster

- Actor-driven cluster development models with more recent emphasis on entrepreneurial agency useful. Yields a more nuanced picture of entrepreneurial agency in driving cluster transformation.
- Toronto at  $t_1$  vs.  $t_2$  and Toronto vs. similar city-regions.
- Mobile/cloud platforms as triggers?
- What's missing? How to complete the phases entirely?
  - Limits to size of talent pool
  - Paradox of Amazon HQ2 bid
  - Superficial civic capital to substantive.
- Transition from start ups to scale ups

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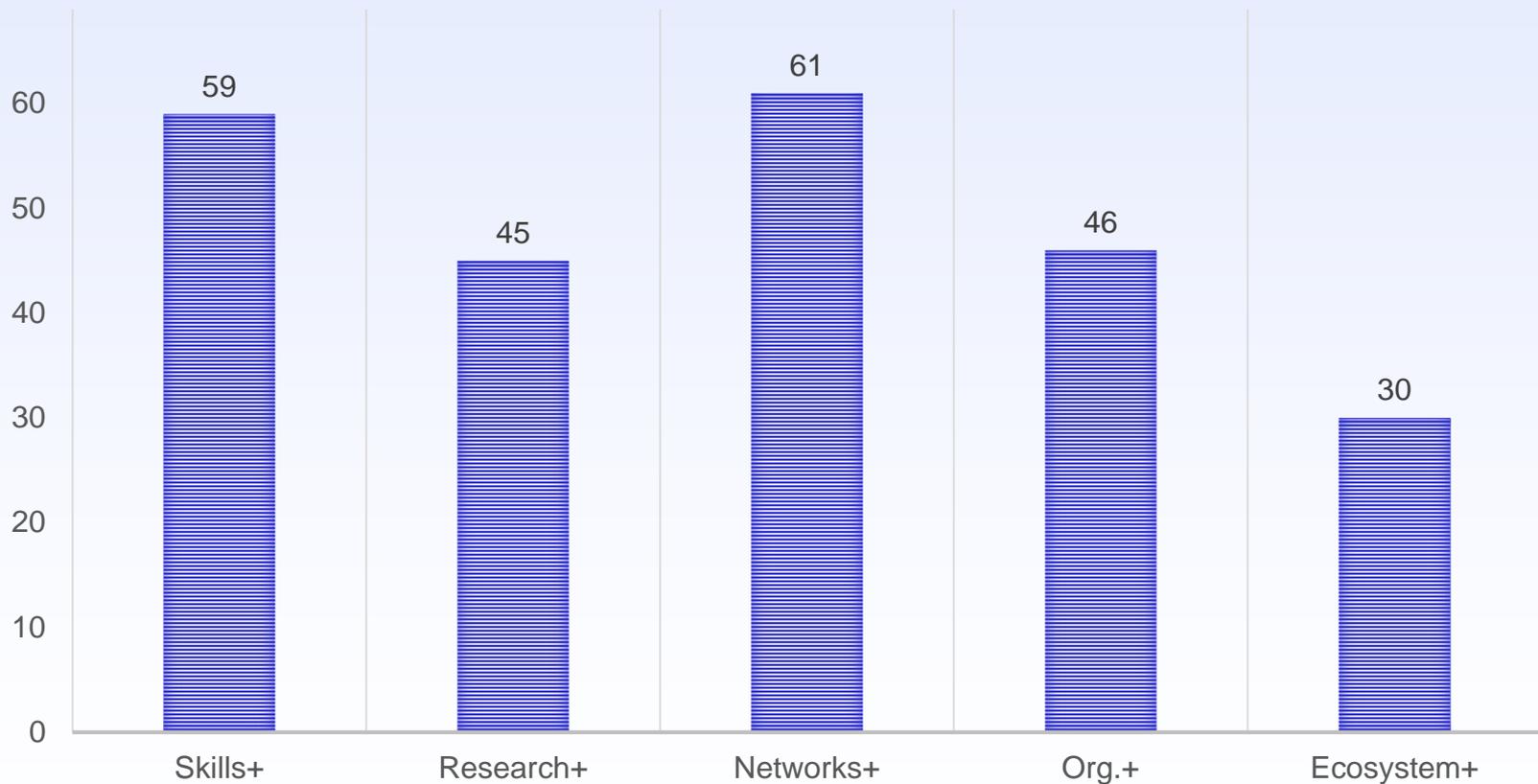
# Appendix

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# Coding

- Coding scheme overlaps with Feldman et al.'s three stages.
  1. Skills+ & Research+
  2. Networks+ & Networking orgs+
  3. Ecosystem+

# Unique hits per category (out of 68)



# Content Analysis

