Universities, Cities, & Prosperity
An Agenda for the Future

Big City, Big Ideas

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Thursday, September 18, 2014

Check against delivery.
Thank you for that kind introduction.

I am delighted to be here. I am grateful to Enid Slack and her fellow organizers and sponsors for inviting me to speak in this terrific series, and to address a topic that is very near and dear to my heart.

I am also delighted to welcome those of you from outside the University of Toronto – it’s wonderful to see such a great turnout! This series, and others like it at U of T, embody so well the role a great university should be playing in the life of the city, and the importance of opening up the university in service to the city.

**Executive Summary**

On 29 May of this year: I had the pleasure of speaking at TRBOT on ‘The University & the City’ to a full room of civic leaders. I made the case that a strong university helps build a strong city, and vice versa: a strong host city enables a university to excel nationally and internationally.

I also signaled as clearly as possible that the University of Toronto is embracing its role as a city-builder and welcomes opportunities to collaborate with other actors and organizations in the city-region to advance the quality of life here in the GTA. This is not just ‘the right thing to do’, I argued. It is enlightened self-interest.

I want to dig a little deeper into the same themes this afternoon.

Here is the executive summary of my basic argument:

1. Universities impart *dynamism and resilience* to the economies of urban regions, helping their host cities to reinvent themselves over time.

2. At the same time, universities are tremendously important *stabilizing* forces on urban economies, and on the local neighbourhoods they inhabit.

3. Universities *connect* their host regions to the world, and vice versa.

4. These processes and dynamics are very much present in this region. Indeed, the University of Toronto is a wonderful *exemplar*.

I would like to explore this relationship more fully in this afternoon’s talk. I will conclude by reflecting on ways forward: how we can nurture and build this relationship for the mutual benefit of the city and the university?
Let me begin with a story…

Figure 1: Bill Buxton

In 1975, a 26 year-old music graduate from Queen’s arrived at the University of Toronto, intent on designing his own digital musical instruments. Here he is in Figure 1 with one of his prototypes.

Bill Buxton graduated with an MSc in computer science (1978), joined the faculty, where he is still an adjunct professor, and in 2013 received an honorary degree from his alma mater.

In the intervening years, he and his colleagues in the Dynamic Graphics Project, based in U of T's Department of Computer Science, pioneered many innovations in human-computer interaction, including multi-touch screens. I would wager that just about everyone here this afternoon owns at least one device that employs this technology.

Recall that the human-computer interface paradigm at the time was dominated by punch cards and monochrome text displays. The lowly mouse had been invented, but remained in relative obscurity until 1984.
In 1994, Buxton joined Alias/Wavefront – now part of Autodesk – and helped lead a revolution in human-computer interfaces and digital graphics.

Alias/Autodesk was not a U of T startup, but it was and is a hotbed of innovation and entrepreneurial activity right here in Toronto, producing leading-edge software for 3D design, engineering, and entertainment.

Apart from disrupting and reinventing the way humans interact with computers, Buxton’s contributions at Alias/Autodesk helped earn the company three Academy Awards.
That's the company's then-president Doug Walker at the Academy Awards in Figure 3. The tech brains didn’t get as glamorous a photo...

![Autodesk](image)

Figure 4: A few of the Autodesk tech brains

That’s (Left to Right): George Fitzmaurice, Azam Khan, and Gord Kurtenbach; Bill Buxton was absent – though two of the three individuals pictured here were his students.

Since the days when Buxton first joined Alias/Autodesk, the firm has employed more than 100 graduates of the University of Toronto: 45 from DGP, most at the doctoral level, 20 graduates of other Computer Science programs, and 35 graduates of various other disciplines at the University of Toronto.

Over the years, there has been frequent movement of employees and faculty between the firm and the University – in both directions. And in 2011 U of T and Autodesk received a Synergy Award for Innovation from NSERC celebrating their remarkable, productive partnership.

It is a marvelous story, and I recounted it because it illustrates beautifully my main points about the symbiotic relationship between universities and cities. In particular, it clearly shows how vital universities can be for the prosperity of their host regions, and vice versa.

It is easy to see how the Buxton story fits the mold...
A. Dynamism and Resiliency

Recall that when Buxton and his colleagues were developing multi-touch screens at U of T, 1 in 4 of Ontario’s jobs were in manufacturing. Sectors such as automotive parts and final assembly dominated the Ontario economy. R&D in the Canadian automotive sector was chronically underdeveloped, and the recent decline of this sector since the 2008 recession underscores its long-term vulnerability to economic downturns/foreign competition. Nortel was Canada’s largest technology company by far, but would famously run into problems some years later.

Today the Toronto CMA is the 3rd largest technology hub in North America, comprising some 43% of Canada’s tech sector investment. And firms such as Alias/Autodesk have played a key role in maintaining Toronto’s standing in this regard.
B. Stability

Similarly, in addition to all of the recruitment Alias/Autodesk has done at U of T over the years, they have also provided so many internships for our students that, in the words of the colleagues at the Department of Computer Science "it is beyond our ability to count them".

It is also very important to emphasize that, when Silicon Graphics acquired Alias/Wavefront in 1995 (it became part of Autodesk some years later), it decided to keep this research and development group in Toronto. The symbiotic relationship with DGP/DCS at U of T was one of the primary motivations underlying this decision. Indeed, more than half of the full-time employees recruited from U of T are still working at Autodesk today, and virtually all of them are still in Canada. Several have returned to Computer Science at U of T, and several others have gone on to start new companies, including those with faculty positions in DCS.

So, in addition to helping drive the innovative dynamism of the Toronto (and indeed, world) economy, Autodesk – through its close partnership with our DCS – has also been a force of stability and prosperity generation over the long term. This helps U of T attract and retain talent in the form of faculty and grad students, who benefit from their close interaction with the research team at Autodesk. It is talent like this that has played a key role in enabling our CS department to attain its remarkably high world ranking (#10 in 2014 ARWU ranking by Shanghai Jiao Tong U)
C. International gateway

Let’s return to the Bill Buxton story…

Over the ensuing years, Buxton’s career took him to Utrecht, Holland; Cambridge, England; Palo Alto, California; Redmond, Washington; and, of course, Toronto. These were employment stops.

From 1981 to 1994, roughly during the years Buxton was principally located in U of T’s Department Computer Science, members of the department authored over 1,100 papers in collaboration with colleagues in more than 30 countries around the world.

This remarkable connection to the world has only grown. Here is the same map, extended to 2014:

During this period, members of the Department of Computer Science have collaborated with colleagues in over 60 countries on nearly 7,000 publications attracting nearly 70,000 citations.

In other words, Toronto’s computer scientists have connected our city to the world, and in so doing, have acted as a portal to global knowledge networks that enrich local science and entrepreneurial activity.
So, to draw the threads of the argument together, the Buxton story nicely illustrates the way universities like the University of Toronto contribute to the resiliency of the cities in which they are located, and in turn draw their sustenance from their host regions.

The story is also an excellent example of how universities contribute to regional stability – and, indeed, how dynamic regions help recruit and retain the best and brightest for their universities.

And finally, the Buxton story nicely demonstrates how universities can be gateways for their institutions – and for the city-regions in which they are situated.

Collaboration is connectivity. A recent piece in the Handbook of Creative Cities by Matthiessen, Schwarz, and Find puts the importance of this nicely:

“[W]ell connected research cities are likely to be important cities in the global economy; nodality in research often corresponds to nodality in other parts of the economy.” ['Research nodes and networks', in D. Andersson et al. (2011) Handbook of Creative Cities. (pp. 211-228). Cheltenham, UK: Edward Arnold]

This is certainly true of Toronto.

But there is one other way in which the story of Bill Buxton is emblematic of Toronto and its leading research-intensive university: Hardly anyone here knows it.

The Toronto region’s – and the University of Toronto’s – success as a centre for innovation is a well-kept secret.

So let me spend the next 15 or 20 minutes outlining 5 things hardly anyone here knows about the University of Toronto and its symbiotic relationship with the region of Toronto.

1. Rankings

U of T is among a handful of top universities in the world, and far and away, the top ranked university in Canada as you can see from Figure 10.

So, it would seem that our international peers know more about us than do many in our own back yard!
It is also interesting to see how actual global rankings performance compares to the ‘mythology’…

I guess some institutions are better at telling their stories than others

Figure 12 exhibits more evidence of how well the University of Toronto performs in many fields internationally – and how poorly we tell our story. Have a look at these publication productivity data:
Did anyone here know that the University of Toronto ranks second in research productivity and impact (citations) within North America, after Harvard?

And it is not just volume that Toronto has in its favour. It is astounding how much high-quality scholarly output comes from the Toronto Region...

This level of research excellence marks Toronto as an important node in the global flow of ideas.
2. Collaboration

This is a perfect segue to the second little-known fact about U of T, on the topic of collaboration.

Canada produces at most 5% of the world’s knowledge in any given year. Quite obviously, our present and future prosperity depend on our ability to access and use knowledge produced in other leading centres of research and innovation around the world.

This is where our very high global rankings come back into play – why they matter. It turns out that when the best universities in the world want to collaborate, they seek out other institutions of comparable quality as partners. As a 2012 study reported in Nature noted, “Exceptional research groups share ideas, resources and outcomes. … Excellence seeks excellence”.

Here are two striking cases in point:

- The most frequent international partners of the University of Cambridge (in terms of co-authored publications) are:
  - Max Planck Institutes (Germany)
  - MIT, Harvard, CalTech, UC Berkeley
  - University of Heidelberg, and
  - two U of Ts: Tokyo and Toronto

- Harvard’s most frequent international partners are:
  - Imperial College London, University College London
  - Max Planck Institutes, Karolinska Institute (Stockholm)
  - University of Cambridge, University of Geneva, and
  - University of Toronto

Indeed, U of T’s scholars are deeply embedded in global knowledge-producing networks and partnerships. These collaborations often lead to ideas that fuel local innovation, even as Toronto-led innovations flow into the global arena.

You recall the 1981-2014 map of Computer Science collaborations?

Figure 14 shows the same collaboration map for one year at the University of Toronto as a whole – mapping only collaborations that produce papers with 25 or more citations, and with a more fine-grained geography that shows the actual city-region of the collaborating author(s).
In 2012 alone, authors with a U of T affiliation produced over 14,000 publications in scholarly journals and collaborated with colleagues at over 8,000 institutions in hundreds of municipalities around the world.

If nodality in research corresponds to nodality in other parts of the economy – and there are compelling reasons to believe that it does – then Toronto’s economic future is indeed bright.

3. Education

The third underappreciated story about U of T concerns its role as an educator.

For all the attention these days that is directed to technology transfer, commercialization, spinoffs and the like, it is important to remember that educating human capital remains the University’s single biggest contribution to Toronto, Ontario, and Canada: our most important form of ‘technology transfer’.
16,500 students graduated from the University of Toronto this past year. Employers in this region clearly benefit from the supply of well-educated graduates flowing from its universities and colleges.

As we all know, successive waves of immigrants moving to Toronto for economic opportunities and social-political stability have helped create the world’s most multicultural region, where half of those living here were born outside of Canada.

Not surprisingly, this diverse multicultural composition of our city-region is reflected in the enrolment of its universities and colleges. Today, well over half of U of T’s students self-identify as a ‘visible minority’.

Importantly, nearly half of our students receive needs-based financial aid, and one in six is the first in their family to attend university. In fact, the University of Toronto has the strongest access guarantee in the country – and one of the strongest anywhere in the world:

‘No student admitted to U of T will be prevented from enrolling, or from completing their studies, for reasons relating to financial need.’

We spend upwards of $165M each year, above and beyond the government grants, loans and tax breaks our students (or their parents) receive, in order to make good on this pledge.

I submit to you that U of T is increasingly unique – not just locally, but globally – in the degree to which it is able to combine two very striking elements of its mission and identity:

1. We are (as I have just documented) one of the world’s leading research-intensive universities, and, at the same time...

2. With 83,000 students on our three campuses, and with such a strong commitment to student financial aid, we are also one of the world’s most accessible institutions.

Why does this matter? What does this mean for the GTA, and for Ontario and Canada? It underscores how U of T functions as a critically important portal of opportunity for all segments of our diverse population, helping this region more fully leverage the talent that is born here or arrives here from across Canada and around the world. This is a huge advantage in today’s knowledge economy, and has provided the wherewithal for our city to reinvent itself continually over time.
Toronto has benefited tremendously from the output of human capital from its universities and colleges, whose graduates have been the backbone of an educated, diversified, and highly creative workforce for years.

Indeed, as I argued at the TRBOT, Toronto has reinvented itself continually over the course of its history.

That’s Bay and Richmond, circa 1913. We’ve gone from trading post, textiles and tanning, to farm implements and food processing, and more recently to finance, pharma, film-making and artisanal foods – and, of course, the kind of digital technology innovations that Bill Buxton and colleagues in the Department of Computer Science and Alias/Autodesk have produced.

While we may take it for granted, Toronto’s uncommon degree of resilience over time is \textit{anything} but universal, and universities like this one play a key role in enabling this.

\section*{4. Innovation and entrepreneurship}

This leads nicely to my fourth observation. Toronto is at the heart of a burgeoning entrepreneurial ecosystem, and U of T’s three campuses – and its affiliated research hospitals – are playing an increasingly prominent role. Faculty and students have actively created companies, jobs, and even entirely new industries. Indeed, this is the very essence of resilience and reinvention.

The University of Toronto is spectacularly good at this.
From 2009 to 2012, our academic community (including our affiliated hospitals) created more startup companies than any other North American university. Ahead of MIT, Carnegie Mellon, Caltech, Harvard and others.

Certainly, much of this success is due to the remarkable students, faculty, and staff on our three campuses. But we must also give credit to the very special region in which we are situated.

The truth is that you cannot situate a university just anywhere and expect it to trigger the formation of a local innovation cluster. The Toronto region’s success as an emerging innovation and entrepreneurship powerhouse rests on the high quality of life we enjoy here, which plays a critical role in encouraging our highly educated graduates to remain in the city to build their careers – and their businesses.

They also benefit from the city-region’s unusually diverse economic base, which provides a powerful spark for innovation and entrepreneurship, drawing on a rich environment of specialized suppliers and services. New ventures depend heavily upon local strengths in marketing, design, advertising, IT services, product development and testing, IP lawyers, management, packaging, logistics … and more.

Toronto is Canada’s leader in all of these areas. This is one key reason for our region’s remarkable stability.

And that brings me to observation number five…
5. Integration and Partnership

Our city and our university are closely integrated in a wide range of partnerships.

First and most obviously, our sheer size generates substantial economic impact within the region. As I noted a few minutes ago, we host more than 83,000 students on three campuses – more than any other single university in Canada or the United States.

U of T is also a major employer in the city, with more than 16,000 employees.

![Figure 18: A Toronto Region employment powerhouse](image_url)

Indeed – another fact that made quite an impression at my TRBOT speech – U of T directly employs more people on its three campuses than Chrysler and GM employ in all of Canada – combined. I wonder how many local policy makers appreciate this. And we offer very good jobs: we win ‘Top Employer’ honours within the region year after year.

When you add up all the salaries and benefits paid to our faculty and staff (and the purchasing power they represent), as well as the expenditures of the University and our students, the U of T community contributes an economic stimulus of $12B annually to the province of Ontario, with most of that felt within the GTA – that’s about 20% more than the City’s entire annual operating budget.

At the neighbourhood level, the University has a deep and extensive root system. We are an ‘anchor tenant’ (to use a real estate analogy) that helps stabilize communities. Not only does the University’s presence generate substantial economic activity for nearby businesses of every description, but it
keeps local property markets buoyant, and it’s here for the long run – 187 years and counting – and it’s not likely to pick up and move anytime soon!

Moreover, our many students learn by working in partnership with community organizations in neighbourhoods across the region. Our dentistry students served 78,000 patient-visits in their clinics last year as part of their training – half of these patients were children or seniors and 87% were without insurance.

Our IMAGINE initiative – led by students in medicine, nursing, pharmacy, social work and other professions – provides free health care in downtown Toronto, for those experiencing homelessness or mental health issues, and new immigrants not covered by OHIP.

Students and faculty from UTSC are working in partnership with the amazing East Scarborough Storefront to address the needs of residents in the Kingston-Galloway Orton Park neighbourhood – one of Toronto’s most deprived priority neighbourhoods.

As often as our students and faculty go into the community, the community comes onto our campuses. Our Munk School of Global Affairs welcomes an astounding 33,000 visitors annually to its seminars, conferences, lectures and other public events – including events such as this one.
And every summer and March break, thousands of kids descend upon U of T: in 2012, the Junior Blues and Camp U of T had more than 8,500 participants between the ages of 4 and 17 – with another 1,500 on the waiting list!

The Future

These kids are an optimistic segue to thinking about the future. So what comes next? How would I like to see the University of Toronto’s role and relationship with other partners in the GTA evolve over the next few years?

Clearly, we have a remarkable partnership, and there are many aspects of the status quo that are unknown, invisible, or not well appreciated.

We have long been partnering with other post-secondary institutions in the region, including Seneca, George Brown, and Centennial, and I have recently initiated a conversation with the Presidents of York, Ryerson and OCADU to explore potential collaborations aimed at addressing the region’s most pressing challenges.

That said, we could – and should – be doing so much more.

We are committed to identifying, celebrating, and scaling up our most successful examples of community outreach and partnership. Indeed, I have announced this as one of my three highest strategic priorities for the University of Toronto. I’m about to embark on a university-wide conversation to elicit further great ideas about how we can build on our early successes and expand our institution’s role as a city-builder (figuratively and literally), as part of a larger conversation around my three big priorities.

Again, this is clearly a matter of enlightened self-interest on our part: the stronger we make this city-region, the stronger we make the University of Toronto.
But it takes two to tango. We need to engage with willing partners and find new ways to work together. Hence, to promote more partnership activity, I will soon be making a new appointment in President’s office: director of urban strategic initiatives. This individual will foster and broker closer relationships between U of T urban scholars and students on the one hand and our community partners on the other. I am hopeful that this will stimulate collaboration and stronger coherence across and within the vast and highly distributed urban research and teaching capacity at U of T – located on three campuses, and in many different faculties and departments.

An Important Partnership

The Toronto region is fortunate to have both a globally renowned research university and a world-class city-region right here in Toronto.

*Let’s work together.*

We have to help everyone understand the value of the remarkable resources we have in this region. And then we all have to work together to make the region – and all of those privileged to work, study, and play here – happier, healthier, and more prosperous.

Thank you for letting me get a start on this process this afternoon.