Accelerating Australia's innovation ecosystem

Lessons from Boston and recommendations for a unique path forward

JoinedUpInnovation

Microsoft

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Welcome

Over the last two years, Microsoft has been on a mission to explore how Australia can become more innovative. For us, that means ensuring our country is more successful at commercialising its many great ideas and that we create an environment where start-ups and other entrepreneurial businesses can grow and flourish.

In 2014, we launched *Joined-Up Innovation: Making the right connections across Australia's innovation ecosystem to support our future growth and international competitiveness*. That report and campaign looked at the elements that make up Australia's innovation ecosystem, including researchers, start-ups, larger businesses, investors and governments. However, it also found many of these groups were operating in silos so there was a need to create better connections between them to support high-growth start-ups and other innovative ventures.

In early 2015, we published a second study focusing on the cultural side of innovation in Australia. We found that culture matters. Specifically, businesses are more likely to innovate if they consciously commit to trying new things, have dynamic or flat internal structures, and encourage employees to take risks rather than fear failure.

Our latest research takes us to the United States to learn from one of the world's innovation hotspots: Boston. What is it about that part of the world that has so consistently generated breakthrough advances in information technology, life sciences, robotics and other fields? How has the state of Massachusetts turned its economy around since the 2008 recession and addressed the decline of its traditional manufacturing sector? And most importantly, what can Australia learn from these successes?

This report, based on a visit by policymakers and influencers to the Boston region that Microsoft initiated in mid-2015, answers those questions. As you'll discover, there are many parallels between Boston and Australia's major cities. I'm also delighted to say that the trip has created many valuable new connections within our innovation ecosystem.

On behalf of Microsoft, I would like to thank the individuals who participated in the tour. We are also immensely grateful to the government and business leaders from the Boston area who so generously shared their time and insights, and to our colleagues within the Microsoft Technology and Civic Engagement team in Cambridge for the partnership.

What we saw in Boston confirmed our view that no one part of the ecosystem can drive innovation alone. Instead, success in innovation depends on a wide range of people making positive individual contributions but working together in a joined-up way.

I hope this report gives you valuable insights and a confident belief that Australia has the people and capacity to be a leader in tomorrow's innovation-driven global economy.

Pip Marlow
Managing Director
Microsoft Australia

Executive summary

For Australia to maintain its historically high standard of living in a fast-changing and increasingly technology-driven global economy, it urgently needs to innovate and create businesses and industries that will prosper well into the future. The question, of course, is how to achieve this at a time when many other nations are trying to do the same thing?

To help answer the question of how Australia can create innovative, globally competitive businesses, Microsoft recently coordinated a tour by 20 leading Australian politicians and businesspeople to Boston and Cambridge in Massachusetts. The group included the Australian Government's now Assistant Minister for Innovation, Wyatt Roy; the now Shadow Minister for Digital Innovation and Startups, Ed Husic; South Australian Ministers Gail Gago and Kyam Maher; and senior executives from government bodies, business associations, technology companies, business accelerators and research groups.

The group toured a range of key facilities and met leaders from across the Boston area innovation ecosystem, from political leaders to executives and teachers. The objective was to understand how Boston and Cambridge have stayed at the forefront of global innovation for so many years and how they have helped the state of Massachusetts generate per capita income one-third higher than Australia's largest state, New South Wales.

The tour revealed that far from resting on the laurels of being home to such world-famous institutions as Harvard University and Massachusetts Institute of Technology (MIT), Boston-area authorities have placed innovation at the core of their economic and social policies. They have also completed or commenced a range of large-scale urban regeneration projects aimed at creating an attractive environment for innovative companies.

Most importantly, the Boston area's 'secret sauce' is a mix of a shared sense of purpose and a culture of collaboration. This culture originates from the large number of academic institutions located in the region, the city's high proportion of younger and often aspirational residents (one-third of Bostonians are aged between 20 and 34[1]) and the history of the New England region. In short, Boston and Cambridge are smart towns that like to share ideas, time and other resources – and they're brimming with people who want to change the world.

This report explores just what Massachusetts is doing to capitalise on its strengths – and to overcome weaknesses such as extreme weather and a high cost of living – then plots out some lessons and potential actions for Australia. These include:

- making innovation a national economic priority, at a national, state and city level
- redoubling efforts to create innovation-heavy districts, especially within cities and by making appropriate spaces available within publicly and privately owned facilities, encouraging collaboration between all elements of Australia's innovation ecosystem
- reforming working visa arrangements.

The tour itself has also become a model of joined-up innovation in action, with a number of the individuals who visited Boston already partnering on initiatives to help further Australia's innovation industries – including Wyatt Roy and Ed Husic who, despite coming from different sides of politics, are united in seeking positive change.

[1] ONEin3 Council, see http://www.onein3boston.com/about-2/

Study tour participants and speakers

Australian delegation

Public sector

The Hon. Wyatt Roy, MP
Federal Assistant Minister for Innovation

The Hon. Ed Husic, MP
Federal Shadow Minister for Digital Innovation and Startups

The Hon. Gail Gago, MLC
South Australian Minister for Employment, Higher Education and Skills; Science and Information Economy; the Status of Women; and Business Services and Consumers

The Hon. Kyam Maher, MLC
South Australian Minister for Manufacturing and Innovation; Automotive Transformation; and Aboriginal Affairs and Reconciliation

Paul Heithersay
Deputy CEO, South Australian Department of State Development

Laki Kondylas
Trade & Investment Commissioner to the US, NSW Trade & Investment

Kelly Sims
Investment Commissioner, Austrade

Andrew Christie
Adviser, Office of the Hon. Kyam Maher, MLC, South Australia

Genevieve Lewis
Adviser, Office of the Hon. Gail Gago, MLC, South Australia

Private sector

Dr Kate Cornick
Managing Director, Rision

James Curran
Founder and Managing Director, Grok Learning

Sebastien Eckersley-Maslin
CEO and Founder, BlueChilli

Dr Jim Minifie
Productivity Growth Program Director, The Grattan Institute

Dr Sarah Pearson
CEO, CBR Innovation Network

Collins Rex
Head of Product Development, Export Council of Australia

Kerri Lee Sinclair
Senior VP, New Business, Aconex; Board Member, Springboard Enterprises

Stephen Tait
CEO, Chamber of Commerce & Industry, Queensland

Speakers from the Boston area

Jay Ash
Secretary of Housing and Economic Development, Commonwealth of Massachusetts

Damon Cox
Director of Economic Development and Entrepreneurship, The Boston Foundation

Rory Cuddyer
StartUp Manager at The City of Boston

Dr Christine Cunningham
Founder, Engineering is Elementary

Michael Evans
Program Director at Mayor's Office of New Urban Mechanics, City of Boston

Nicole Fichera
General Manager, District Hall, The Venture Café Foundation

Paul Fontaine
Vice President of Education, Museum of Science

Jascha Franklin-Hodge
CIO, City of Boston

Sharon Gillett
Principal Networking Policy Strategist, Microsoft Research

Tom Hopcroft
President and CEO, Mass Technology Leadership Council

Nigel Jacob
Co-founder, Mayor's Office of New Urban Mechanics, City of Boston

Alexandra Lee
Executive Director, Kendall Square Association

Mayor David Maher
City of Cambridge

Linda M. Noonan
Executive Director, Massachusetts Business Alliance for Education

Laura Perille
Executive Director, EdVestors

Tim Rowe
Founder and CEO, Cambridge Innovation Center; Partner, New Atlantic Ventures

Christopher Scranton
Senior Manager for Big Data & Technology Initiatives, Massachusetts Technology Collaborative

Kara Shurmantine
Director of Global Partnerships, MassChallenge

Kevin Wiant
Executive Director, The Venture Café Foundation

Innovation in motion

The City of Boston is home to just over 600,000 residents, while the greater Boston area has a population of around 5 million – placing it on par with Sydney or Melbourne. The total population of Massachusetts is approximately 6.7 million.[2]

The district of Cambridge and, increasingly, the concentration of facilities within the Kendall Square university and business district are the focus of innovation in Boston. Cambridge sits across the Charles River from the City of Boston, spans just 18.5 square kilometres and has a population of about 110,000 people. However, it is also home to Harvard and MIT, which are central to the Boston-area innovation story. In part due to those two institutions, Cambridge and the City of Boston are reputed to have produced more Nobel Laureates than any other place on Earth.[3]

[2] www.census.gov/schools/facts/massachusetts.html

High-tech momentum

Massachusetts has a population of about 6.7 million and its economy generates US$460 billion a year.[3] To put that in perspective, and to show the relative value of a heavily innovation-based economy, Australia's largest state, New South Wales, is home to 7.5 million people and generates approximately US$350 billion in economic activity each year.[4]

Massachusetts has strengths in a broad range of computing-centric technology fields including big data, cloud computing, health and life science–related systems, the Internet of Things, mobile communications, robotics, security, marketing software and more. Although the state is renowned for its leadership in life sciences and has a large pharmaceuticals sector, the computing-centric sector employs around four times as many individuals as the biopharma sector.[5] The state is also creating new technology-related jobs at a rapid pace.

As of 2013, Massachusetts had 214,600 people working in technology-related jobs, up from 175,000 in 2010.[6] Those employees earned an average of US$121,000 and their activities generated a further 418,700 indirect and induced[7] jobs.

The technology sector directly or indirectly employs 19.2 per cent of all workers in Massachusetts and generates US$160 billion a year in economic activity. The ambition of the Mass Technology Leadership Council is to see the state add 100,000 direct technology-related jobs between 2010 and 2020, on top of the jobs the state expects to maintain or grow in other innovative fields such as clean energy and biopharma.

Fuelling the growth of the technology sector is a unique combination of supportive government policies and initiatives; an injection of US$4.86 billion in venture capital into technology companies between 2011 and 2014 alone; and more than 40 commercial, university-based and philanthropic incubators and business accelerators working to help inventors and entrepreneurs turn their ideas into commercial realities.[8]

In addition, a number of global technology leaders are establishing facilities in the Boston area. They include Microsoft itself, which has grown its presence in Cambridge to around 1,000 people in the past seven years to access local research talent and tap into the area's innovation strength.

Microsoft is now one of the 20 largest employers in Cambridge, lining up alongside some major technology businesses that originated in the Boston area – such as networking leader Akamai, marketing software maker HubSpot, software and data analytics company Pegasystems and IT research house Forrester Research – and others that have established specialised research facilities, including Amazon.com and Google.[9]

The result of all this activity is that Massachusetts has been a standout performer in the post-recession US economy. It grew total employment by 5.1 per cent between 2009 and 2013, and increased the number of technology companies in the state by 18 per cent over the same period – the third-fastest pace after North Carolina and Washington.[10]

[3] US Department of Commerce, Bureau of Economic Analysis, http://www.bea.gov/regional/bearfacts/pdf.cfm?yearin=2008&fips=25000&areatype=25000

[4] http://www.industry.nsw.gov.au/invest-in-nsw/about-nsw/economic-growth/Size-of-NSW-economy

[5] Mass Technology Leadership Council, State of Technology Report, 2015.

[6] Mass Technology Leadership Council, State of Technology Report, 2015.

[7] Indirect jobs are those arising from the direct spending of employees in an area. Induced jobs refers to the further employment that arises from the economic activity of both directly employed people and those who gain income directly from them.

[8] Mass Technology Leadership Council, State of Technology Report, 2015.

[9] http://www.cambridgema.gov/CDD/factsandmaps/economicdata/top25employers

[10] Mass Technology Leadership Council, State of Technology Report, 2015.

Comparable challenges

Massachusetts and the Boston area in particular have some formidable advantages. But they also face challenges just as difficult as Australia's lack of economic scale, distance from foreign markets and small innovation investment sector.

For starters, Massachusetts is blanketed in snow for around one-third of every year, and winter temperatures regularly fall below –10ºC. The Boston area specifically suffers from ageing transport infrastructure, a high cost of living, relatively slow fixed-line broadband internet due to a lack of competition, skills shortages in some sectors, and high levels of public sector debt. Like Australia, it also needs to transition many manufacturing businesses from traditional techniques and markets into new areas.

Even Boston's position as part of the nearly US$18 trillion US economy is a mixed blessing. On one hand, its companies have a large local market for their wares. On the other, it is easy for entrepreneurs and professionals to move to other states with more favourable weather, housing, tax, business development and lifestyle offerings.

One of the most famous businesses that started in the Boston area but slipped away is Facebook, which emerged from the dorms of Harvard but grew to maturity in California. That said, in 2013 the company followed the lead of other tech giants and opened an engineering office in Cambridge's Kendall Square – a clear indication of Boston's new momentum.

Key points in the growth of Boston's innovation economy

1951
Wang founded in Cambridge, Massachusetts (MA)

1957
Digital Equipment Corporation founded in Maynard, MA

1968
Data General founded in Westborough, MA

1972
Prime Computer founded in Natick, MA

1978
Dan Bricklin invents the digital spreadsheet (VisiCalc) as a graduate student at Harvard Business School[11]

1998
Akamai incorporated after emerging from MIT

1999
Cambridge Innovation Center founded

2000
TripAdvisor founded. Headquartered in Needham, MA

2003
Google opens office in Boston city (since moved to Cambridge)

2004
Facebook founded in Cambridge

2006
HubSpot founded in Cambridge

2007
Microsoft opens Cambridge office

2010
1,000-acre Boston Innovation District opens in South Boston; MassChallenge founded in Boston Innovation District; Mayor's Office of New Urban Mechanics established at City Hall to foster public sector innovation

2012
Amazon.com opens engineering office in Cambridge

2012
Mass Big Data Initiative launched to focus industry effort on big data

2012
US$95 million Massachusetts Green High Performance Computing Center opens as JV between five universities

2013
District Hall opens at centre of Boston Innovation District

2014
Boston-based innovation companies raise US$4 billion[12] in venture capital, following several funds opening offices in the area over previous five years

[11] http://bricklin.com/history/saiidea.htm

[12] http://thenextweb.com/insider/2015/06/20/6-reasons-why-boston-is-americas-unlikely-tech-hub/

How Boston works

There's a lot going right in the state of Massachusetts, particularly in terms of its ability to spin novel ideas into successful businesses and non-profit enterprises able to offer new high-value jobs. So what's the secret?

Creating the right conditions

Many of the building blocks of Boston's innovation-led revolution were laid down by its former Mayor, the late Thomas Menino. One of Menino's largest initiatives was to transform 1,000 acres of underused industrial land around the Boston waterfront into an urban innovation hub that would foster innovation, collaboration and entrepreneurship.

The Boston Innovation District features office buildings, co-working spaces and new housing developments to allow people to both live and work in the area. The city estimates the area generated more than 5,000 new jobs in over 200 new companies since the initiative was launched in 2010. Around 30 per cent of those jobs were in technology companies, another 21 per cent were in creative industries such as design and advertising, and 16 per cent were in green technology and life sciences.[13]

One catalyst for the success of the area was the creation of a dedicated building called District Hall. This unique facility provides a centrally located space where individuals can work for free at public desks, rent low-cost meeting and presentation rooms, and attend innovation-related events. The developer that built the surrounding office buildings donated the space to the city – one of many examples of the city requiring developers to carve out innovation-friendly facilities in return for planning permits.

Today, District Hall is funded by public and private sector grants, usage fees and the contributions of a restaurant and café in the building. During 2014, its first full year of operation, it hosted 562 events and meetings and provided many hundreds of hours of free hot desk space to local residents. By mid-2015, it had hosted more than 400 events.

[13] www.innovationdistrict.org

Another key initiative was to find a home for MassChallenge, a non-profit organisation that promotes the growth of start-ups (see breakout box). A developer provided a floor of office space to MassChallenge for free for its first four years. The subsequent success and growth of MassChallenge helped attract entrepreneurs, related investors and service providers, such as lawyers, to the area, creating a momentum and establishing the innovation-centric character of the area.

The other key innovation district in the Boston area is Kendall Square in Cambridge. With about 80 per cent of the land controlled by just four landlords, the largest of which is MIT, the area is in a unique position to continue developing a dense business district optimised for the growth of research facilities and high-value, innovation-based businesses. For example, MIT is currently expanding its campus to include a mixed-use building that will feature space for researchers, start-ups, larger business tenants, affordable housing, shops, cafés and other amenities.

According to the Mayor of the City of Cambridge David Maher, the town has worked hard in recent years to support Kendall Square's commercial growth and liveability. "The area had a very suburban office park feel to it and we said that wasn't where we wanted to continue to go, the goal being that we create a place to gather," he says. "I think right now we don't have that sense in Kendall Square."

The volume of commercial and residential space available in the Kendall Square area may soon expand by more than 2 million square feet under plans to redevelop a large parcel of land called the Volpe site, currently owned by the US Government. If successful, this would be one of the largest land deals in the US and would further supercharge Cambridge's innovation economy.

Massachusetts and the City of Boston are also seeking to build on these successes by creating more commercial precincts in other inner-city and economically depressed areas. These include a major project to build a new town centre in the Boston suburb of Roxbury and to actively promote the area to start-ups and other innovation-based businesses.

The world's largest start-up accelerator

mass CHALLENGE

The MassChallenge accelerator is a not-for-profit organisation that provides office space and mentoring to support the growth of start-up businesses aiming to make a major economic or social impact, without taking equity in the businesses it helps. It encourages entrepreneurs with the potential for them to share in US$1 million in cash prizes.

In its first six years of competitions, from 2009, 835 start-ups participated in the program. According to metrics collected by MassChallenge, those businesses have since raised US$1.1 billion in venture funding, generated US$520 million in revenue and created 6,500 jobs. Some start-ups have been acquired and a minority have ceased operations.

In 2015, 128 start-up teams selected from 2,300 applications from around the world spent four months in the program, supported by around 600 volunteer mentors. In addition to gaining free office space (but no salaries) to work on their ventures, they received weekly seminars, attended networking events and had numerous opportunities to pitch their ideas – internally and to external groups including potential investors and partners.

Among the 24 start-ups that originated from outside the US is City Taps, which is using technology to make it cheaper and easier for the world's 750 million urban poor to access running water at home. Its founders include Chief Financial Officer Miranda Phua, who formerly worked at ANZ Bank in Melbourne. The group's participation in MassChallenge was supported by a Microsoft Civic Technology scholarship.

Another participant is Makers Empire from Adelaide, which had developed through the Microsoft Innovation Centre in that city. The business is developing a world-first 3D printing learning program for primary and junior high schools.

MassChallenge itself has expanded over the last five years, opening chapters in Israel and the United Kingdom, and forming other partnerships around the world. It has also announced plans to open in another 10 cities and on every continent by 2019. That means it's intent on opening at least one centre in Australia in the next few years.

Leading with a light touch

Large-scale public infrastructure and planning programs such as the South Boston Innovation District and Kendall Square have been largely driven by the public sector and are critical to the Boston area developing its recent momentum. Some legal changes in Massachusetts also made it possible for local researchers to gain a leading edge on research in controversial cutting-edge fields such as genomics.

However, political leaders at the state and city level have typically worked to create the right conditions for innovation rather than dictating that universities or businesses focus on specific areas for research or business development.

According to Jay Ash, the Commonwealth of Massachusetts Secretary of Economic Development, the current state administration – which came into power in January 2015 under new Governor Charlie Baker – has been intentionally slow to draw up a formal policy agenda. Instead, economic leaders such as Ash have been charged with consulting the state's business and research leaders to identify their key areas of concern.

"What we're trying to do is empower others," Ash told the Australian delegation that visited Boston in July 2015. "We don't believe the government needs to do everything. It needs to be a convener and a collaborator and,at times, it needs to be an instigator so that's what we're working on."

The administration is taking steps to cut red tape, promote advanced manufacturing as a career, use technology to solve skills shortages by matching candidates with employers, and encourage smart technologists to work in the public sector. In July 2015, Massachusetts also passed legislation supporting the introduction of an Innovative Communities program, which is designed to connect start-ups with government buyers and provide educational support.[14]

However, the power of the state and local governments to bring parties together appears to be one of the most effective tools at work in the Boston area. A recent example is the formation of the 8,360-square-metre, US$95 million Massachusetts Green High Performance Computing Center (MGHPCC) – a joint venture between Boston University, Harvard University, MIT, Northeastern University and the University of Massachusetts.

By working together in a process envisaged and supported by state and local authorities as well as the private sector, the universities were able to create a high-capacity facility that would have been beyond the reach of any one institution. The centre is now a key piece of research infrastructure for the universities and the state itself, as each seeks to maintain and build its position in the global innovation economy. Another benefit is that researchers from the consortium's elite private and state-owned universities are collaborating in unprecedented ways as a result of working side by side at the facility.

[14] http://karenspilka.com/2015/07/30/senate-passes-innovative-communities-bill-to-connect-startups-and-municipalities/

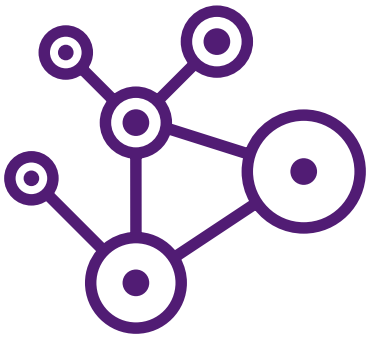
Focusing on cities to build critical mass and trust

In today's highly connected and global age, and especially in areas such as advanced science and technology, it's counterintuitive to think that physical places and personal interactions remain important. However, that is very much the message from Boston.

Alexandra Lee is the Executive Director of the Kendall Square Association, a non-profit organisation dedicated to promoting the development of the fast-growing Kendall Square area. "There is this sense of culture and place here," she says in describing how much of the area's success is driven by the collaborative attitude and goodwill among the local community.

Lee adds that another critical ingredient is the concentration of innovation-based research institutes and commercial organisations in a small area, which makes it easy for researchers, businesses, venture capitalists, service providers and government figures to meet physically – or what the locals call 'bumping and connecting'.

One location where members of the local innovation ecosystem can literally bump into each other is the overflowing offices of Kendall Square's Cambridge Innovation Center (CIC) – and in the associated non-profit Venture Café, where tenants, external entrepreneurs and others can mingle and learn. CIC was founded in 1999 as a commercial co-working space, and now houses about 850 companies. Many of those firms are technology and life sciences start-ups working alongside venture capitalists (representing funds with some US$7 billion in assets under management) and service providers such as accountants.



According to CIC founder Tim Rowe, physical proximity matters because people only really come to trust each other after they've met face to face on several occasions. "If you're going to put your idea and your time into a project, you have to trust the other people," he says. "Otherwise you're basically not going to do it because it's a big risk to your reputation and your finances."

Rowe believes that policymakers, businesses and others with an interest in innovation should think in terms of cities, which allow for the concentration of money, ideas and talent in areas small enough for individuals to meet and develop that crucial level of trust. Even within cities, he argues it's ideal to focus on individuals within smaller areas such as Kendall Square or even a single office tower, as he is doing with CIC.

"The easiest thing to do to build innovation in a city is to put all your strongest people together in one spot," he says. "It's like when you're lighting a fire. You don't spread the sticks around. You put them all together in a pile."

Being prepared to take risks

It's a truism of innovation that you have to take risks to break new ground. However, the Boston twist is that the government is actively embracing this notion to improve services and set a pro-innovation tone for the city.

The most striking example is a technology group within the City of Boston Mayor's office. Then Mayor, Thomas Menino, established the Mayor's Office of New Urban Mechanics (MONUM) in 2010 as a civic innovation incubator charged with running pilot projects ('experiments') that aim to improve public services in the areas of education, citizen engagement, the city's streetscape and economic development. MONUM collaborates with residents, academics, entrepreneurs, not-for-profit organisations and city staff in executing these experiments. Examples of MONUM projects that have become official services include Boston 311, a mobile phone app that makes it easy for residents to report issues such as graffiti and potholes, and the Where is My School Bus app for students and parents.

Co-founder Nigel Jacob believes MONUM is a significant and interesting model for a number of reasons. First, with a mandate to develop innovations that may transform the way governments interact with citizens and life in cities, it offers a higher purpose that attracts smart technologists who could otherwise work in the private sector.

Second, it offers an area within government where public servants can test ideas relatively quickly, cheaply and safely. By running experiments on behalf of groups within departments, MONUM reduces the risk that individuals will be seen as having failed if their ideas do not progress or if they generate controversy. "We're the Department of Failure!" Jacob says.

MONUM also plays a role in promoting a culture of innovation in the City of Boston by supporting creative design and architecture events, and producing curiosities such as the 'Twitter Tree' for Christmas 2014. This Christmas tree at Boston's City Hall was decked with lights that citizens could control by posting on the social media platform. Despite being a simple, light-hearted exercise, it engaged the community and reinforced the city's pro-innovation positioning.

Developing IP that matters

The amount of research and commercial value generated by Boston's innovation ecosystem is large and growing fast but it is still dwarfed by its primary rival: Silicon Valley. Even so, it distinguishes itself on two fronts.

The first is its superior 'density' (innovators per head of population on a state basis) compared with its West Coast competitor. The second is the notion that while companies in California work on 'light' consumer technology innovations such online shopping apps, Bostonians work on the 'heavy' science and engineering breakthroughs in computing, data science, robotics, life sciences and other areas that can truly change the world.

It's easy to find examples of deep science and consumer technology ventures from both locations to undermine this view, but the generalisation still points to an ethos captured by subway signs in Boston: "Code something that matters". This focus is attracting aspirational technologists to work in the Boston area rather than Silicon Valley or elsewhere. It is also part of a civic culture that sees many talented individuals donate time to helping build the city's innovation success.

For example, programmers from businesses including Microsoft regularly volunteer to help teach computer science in local schools. The city is also home to Code for Boston, which is part of Code for America, a self-described 'volunteer group of developers, designers, data geeks and citizen activists who use creative technology to solve civic and social problems'.

Having created the systems and attracted the talent necessary to develop groundbreaking intellectual property, universities such as Harvard and MIT have sophisticated systems in place to commercialise innovations. These include robust mechanisms for licensing new technologies to third-party companies that can help to build businesses around those ideas, and for working with investors and other groups. Tour delegate Dr Kate Cornick noted that many of these interactions appear to be driven by private sector entrepreneurs who connect with academic researchers through 'bridges' such as CIC.

There are also individuals in the Massachusetts Government, such as Assistant Secretary of Technology, Innovation and Entrepreneurship Katie Stebbins, who are responsible for supporting innovation and the growth of new businesses.

Training the next generation

Another key ingredient in Boston's innovation success is education. While Harvard and MIT have the biggest reputations in higher education, it's important to recognise that there are about 350 universities and vocational training colleges within a three-hour drive of the city. In addition, the state of Massachusetts ranks first in the US for high school performance.

The presence of so many educational facilities means that Massachusetts generates large numbers of graduates trained in critical science, technology, engineering and maths (STEM) subjects, who are needed to fuel a next-generation innovation-based economy. For instance, each year around 5,600 students graduate from Massachusetts-based universities and colleges with qualifications in the fast-growing field of data science.[15]

However, numerous bodies think the state could do better, especially in increasing the quality and scale of STEM-related education, and addressing inequalities between its public and private educational institutions. These include the Massachusetts Business Alliance for Education (MBAE), which predicts that by 2020 there will be 36,000 fewer STEM graduates than the state's tech-heavy economy requires.[16]

Other organisations such as the not-for-profit EdVestors and the Boston Museum of Science – both of which addressed the Australian delegation – are working hard to lift the quality and availability of formal and informal educational opportunities in the state. These efforts include the Museum's Engineering is Elementary (EiE) program, which provides curriculum materials, professional development services and research support to help schools teach engineering concepts to early-year primary school children. According to founder Dr Christine Cunningham, the program has reached 8 million children and 85,000 teachers since it started work in 2003.

[15] Massachusetts Technology Collaborative research, see http://massbigdata.org/initiative/

[16] Source: Henry Dinger, The New Opportunity to Lead: A vision for education in Massachusetts in the next 20 years, 2014. www.mbae.org/wp-content/uploads/2014/03/New-Opportunity-To-Lead.pdf

The clear message is that despite its leadership within the US and around the world, Massachusetts is far from happy with its results and is deeply concerned about its capacity to meet its future skills requirements. It is drawing on state and federal resources, deep-pocketed philanthropic organisations, the business community and the goodwill of residents to ensure it can maintain and extend its strength in STEM-related fields. This includes finding ways to keep more interstate and foreign graduates in Massachusetts after they finish their studies.

According to Linda Noonan, Executive Director of MBAE, building STEM skills in particular is a long-term and complex project that requires a high degree of collaboration between all relevant stakeholders. "If you're interested in STEM, then you have to be interested in the whole education system," she told the Australian delegation.

One of the key areas of focus for Massachusetts authorities and interested parties is enhancing the capacity of teachers to instruct students in the complex and fast-changing area of information technology. As in Australia and many other locations, this is seen as one of the biggest obstacles to overcome.

Massachusetts also wants to increase support to the more than 50 community colleges in the state, seeing the vocational training sector as critical to its ability to meet a looming shortfall in manufacturing workers (Jay Ash noted that 40 per cent of the state's workforce will retire in the next 10 years, many of whom work in manufacturing).

This focus on vocational education struck a chord with tour delegate Stephen Tait, CEO of the Chamber of Commerce and Industry Queensland (CCIQ). He believes that the opportunity to create new, innovation-based businesses should be open to all graduates and other individuals, not just those who have a university degree. Shortly after returning from the tour to Boston, CCIQ announced a three-year agreement with TAFE Queensland to encourage students to launch businesses and complete placements with small and medium-sized businesses across the state. "We want to inspire everyone to start a business," he says.

Towards a unique Australian model for innovation

After learning about the innovation ecosystem in the Boston area and the state of Massachusetts more broadly, the attending Australian political leaders, government representatives, businesspeople and policy experts came away with a wide range of observations and new ideas for improving Australia's innovation performance.

Focus and leadership

According to a 2014 report by Australia's Chief Scientist Ian Chubb, 65 per cent of Australia's economic growth per capita from 1964 to 2005 can be attributed to improvements in the country's use of capital, labour and technological innovation, which were largely made possible by science, technology, engineering and maths skills.[17]

One of the most striking aspects of Massachusetts is that political, business and academic leaders all agree that intellectual endeavour and technological innovation are critical to the state's prosperity in an increasingly competitive global economy. By contrast, there is still debate in Australia about the relative importance of innovation-based industries. In fact, Chubb says: "We are the only OECD country without a science or technology strategy. Other countries have realised that such an approach is essential to remaining competitive in a world reliant on science and science-trained people."[18]

"We have had a traditional reliance on agriculture and resources, and for their own reasons I think that is a great story for our country," says Australia's federal government MP Wyatt Roy. "But, inevitably, we can't rely on that forever. I think the value of our country isn't what we dig out of the ground or what we grow, it's the ideas about people."

Federal Opposition MP Ed Husic agrees. "They've [Bostonian leaders] established that innovation is a principal purpose and they are coalescing together to drive it," he says. "We do need to get serious about it and I don't think we are. We need to build up the fire to get people moving."

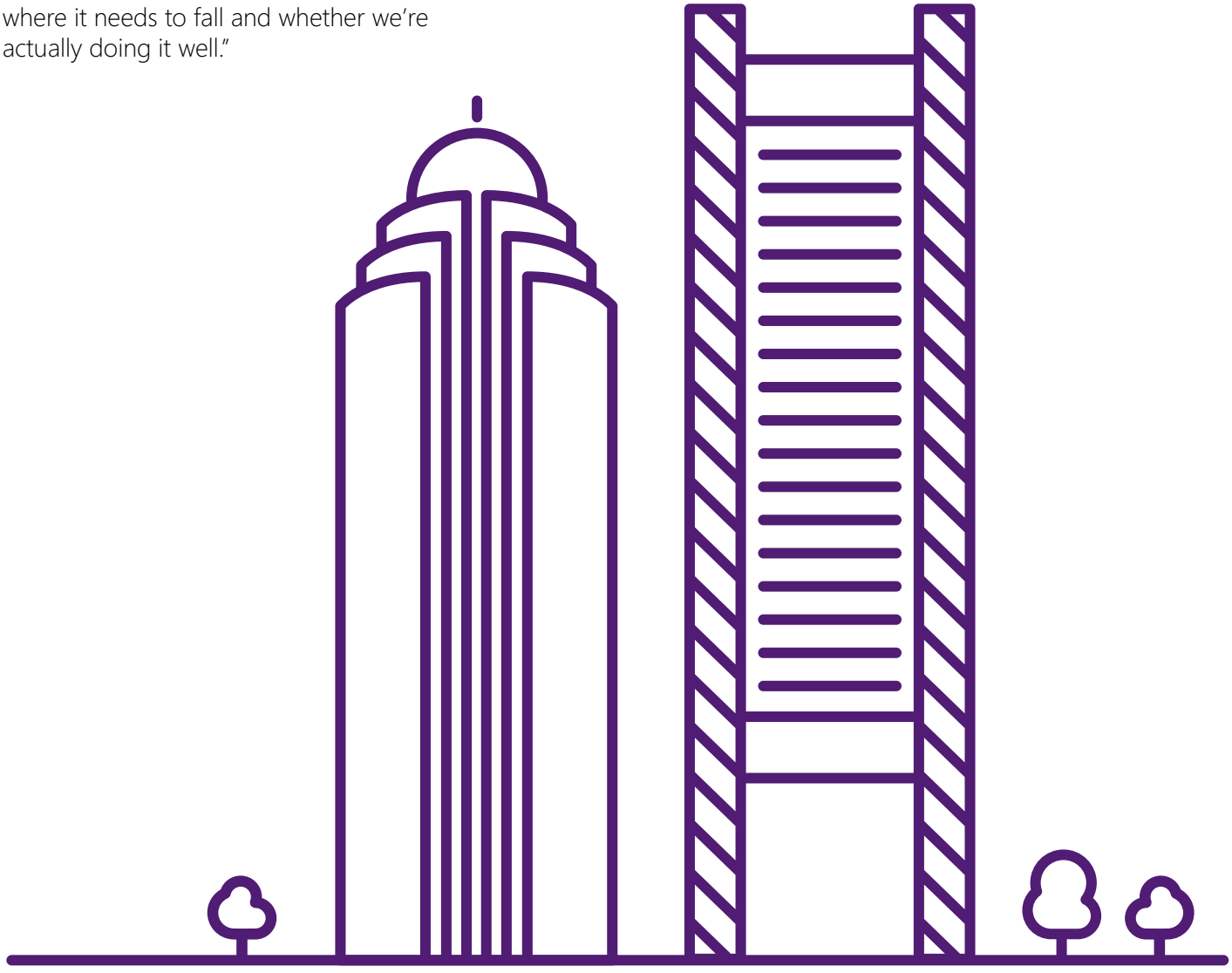
[17] Ian Chubb, Chief Scientist, *STEM: Australia's Future – Too Important to Leave to Chance*, Commonwealth of Australia, 2014.

[18] Ian Chubb, 2/9/14, media release, 'Professor Chubb Releases "Science, Technology, Engineering and Mathematics: Australia's Future"', http://www.chiefscientist.gov.au/2014/09/professor-chubb-releases-science-technology-engineering-and-mathematics-australias-future/

One Australian state that has already clearly identified innovation as critical to its future is South Australia. The decline of traditional manufacturing in the state – combined with the state's relative isolation and desire to provide attractive careers for new generations – has seen a major focus on expanding its innovation-based economy. However, South Australian representatives on the tour felt the whole of Australia needs to embrace this direction and to drive greater cooperation across the economy.

"One thing we're keen to look at is just that notion of leadership," says Paul Heithersay, Deputy CEO of South Australia's Department for State Development. "What they do seem to do well in Boston is set a tone. Someone needs to set a tone around this stuff in Australia, and have a sense of where it needs to fall and whether we're actually doing it well."

South Australian Minister Gail Gago believes Australia needs to develop a clear and common story around innovation and its importance to the country's future. "Across industry and across different sectors, we all need to be working within the same narrative," she says. "We all need to understand what the story is and where we need to go."



Place matters

Another key takeaway for the tour attendees was that places – physical spaces from university dorm rooms to office blocks and cities – are critical to innovation. In addition, one of the most important catalysts for innovation is the ability for inventors, entrepreneurs, investors and others in the innovation ecosystem to regularly meet in person.

"That importance of place and just how important it is to create the right spaces has certainly been one of the big takeaways for me," says Dr Sarah Pearson, CEO of the CBR Innovation Network.

Speaking to the Australian delegation, Stephen Gray from the urban design firm Sasaki Associates, said his firm focused on helping governments and developers to create 'moments' when people could come together to communicate and innovate. He added that it was important for authorities and developers to listen to citizens rather than try to direct these initiatives. As an example, he pointed to a Go Boston 2030 campaign Sasaki was running to help design Boston's future transport system, which had already gained input from 5,000 citizens.

Australian decision makers need to create – or continue to build on – areas that foster connectivity within the innovation ecosystem. These might be formal innovation precincts (see box) or simply a greater concentration of innovation economy–related individuals located within existing urban centres.

Among the strategies the Australian delegates to Boston discussed were:

• governments making innovation a key area of focus during urban planning by creating innovation precincts or just increasing the amount of affordable housing in key areas

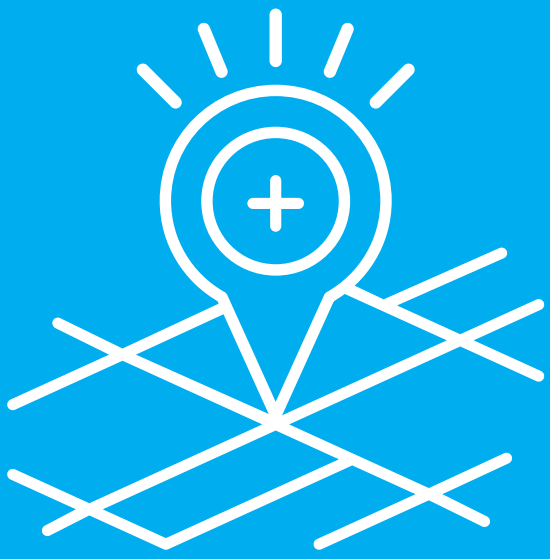
• public and private sector organisations considering how they currently use real estate and land assets and whether these assets could be reconfigured or repurposed

• encouraging the growth of facilities – including cafés and public meeting spaces – that make it easy for innovators to connect

• supporting the growth of facilities – such as live music venues – that make areas more fun and creative for the younger professionals who often drive innovation.

Australian innovation districts

Australia has been developing innovation precincts for some time, including the following major centres and districts within cities around the country.



Australian Technology Park, Sydney

The Australian Technology Park (ATP) houses high-tech start-ups and leading university, training and government organisations. Established in 1995, ATP offers an inspiring environment for collaboration, exchanging ideas and knowledge-sharing, and is at the forefront of Australian technology growth and innovation. www.atp.com.au

CBR Innovation Network, Canberra

Established as a collaboration between the Australian Capital Territory (ACT) Government, five education and research organisations and the ACT's innovation community, CBR Innovation Network (CBRIN) was set up to diversify the ACT economy through innovation and entrepreneurship. CBRIN provides space for co-working, programs to grow entrepreneurial capability, the Inspiring Australia program, plus acceleration and incubation to support the growth of start-ups. It links businesses and entrepreneurs to services, facilities and stakeholders to accelerate their innovation and growth, and maximise wealth creation for the ACT economy. It also hosts a range of events, programs and seminars aimed at building a community of entrepreneurs and innovators. www.cbrin.com.au

Brisbane Technology Park

Comprising over 110,000 square metres of office, laboratory and technical space, the Brisbane Technology Park was set up more than 20 years ago to help technology and research companies grow and become global leaders in innovation. Today, it has evolved into Queensland's premier business park, and is home to more than 150 companies across various industries, including biotechnology, health and medical, and software development. www.brisbanetechnologypark.com.au

Technology Park Bentley, Perth

Regarded as Western Australia's premier location for technology-driven and innovative companies, Technology Park Bentley is a cluster of more than 100 organisations representing industry, research and development, academia, government and support services. For instance, the Innovation Centre of Western Australia, a government-funded facility located at the park, helps businesses and innovators commercialise their ideas, build networks and develop their business activities. www.techparkwa.com.au

Carlton Connect, Melbourne

Carlton Connect – a University of Melbourne initiative – is a sustainable technology research and development precinct located adjacent to the university's Parkville campus. It brings together academics, industry players, venture capitalists and government agencies to conduct research in areas such as energy, food security, water and climate change, providing a hub for innovative ideas and collaborations. www.carltonconnect.com.au

Tonsley Park, Adelaide

A centre for high-value, innovative advanced manufacturing companies, Tonsley Park provides the facilities, infrastructure and opportunities for creative collaboration between industry, education, training and research to develop cutting edge medical devices and assisted-living technologies. Key tenants include Flinders University, Hills Limited, TAFE, Siemens and Innovyz. www.tonsley.com

Small things add up

It is tempting for governments and individuals in leadership positions to try to set master plans for innovation. However, delegates observed that even though the Government of Massachusetts and cities such as Boston and Cambridge have set a tone and some direction, the state's success so far is due to mostly complementary contributions from (and experiments by) a wide range of individuals and organisations.

Wyatt Roy says, "A great lesson is that when we look at the reform task, we shouldn't say, 'How do we come up with the most comprehensive reform package?', and try to achieve that all at once. Instead, we should say 'What can we do? What works? What can we do as soon as possible to get some runs on the board?' and build that."

"The view is to actually do and then measure, rather than set the measurements up and then go back and spend effort on validation," adds Ed Husic. "There is very much a focus in Boston on just getting it done."

Delegates felt that some quick wins Australia could pursue include changing its visa system to make it easier for globally mobile entrepreneurs to work and build their businesses in Australia. Other solutions could include adjusting capital-raising rules so it's easier for entrepreneurs to crowdsource funds for their ventures, and doing more to encourage private organisations to develop and commercialise innovations.

Individuals who supported large numbers of Australian businesses and exporters – such as Collins Rex, Head of Product Development, Export Council of Australia – felt that Australia could also make significant gains by better educating existing Australian businesses about technology and the many global, innovation-based opportunities available to them.

Innovation extends beyond high-tech industries

The Boston area is famous for its global breakthroughs in life sciences, computing and engineering, but the tour revealed that much of the innovation occurring in Massachusetts often involve more traditional sectors such as consumer goods. For example, Massachusetts-based shoemaker New Balance continues to manufacture more than 4 million pairs of athletic footwear annually in the US, and many of those in its home state.[19]

For the Australian delegates, this highlights the need to take a broad view of innovation and to focus on how advances in one area, such as robotics or data science, could increase the competitiveness of existing sectors – especially those areas where Australia has natural strengths, such as agribusiness, mining, tourism and exporting services to Asia.

"I've certainly come to the view that saying innovation is simply about technology is wrong," says Husic. "It's not about having the tablet or whatever; it's about the way you find better ways of doing things – being smarter, more efficient, quicker and more responsive."

"When we talk about start-ups, it's not all tech start-ups," adds Paul Heithersay. "In South Australia, we've got a big competitive advantage around food and food manufacturing, for example, but nobody talks about food start-ups."

[19] http://www.newbalance.com/made-in-usa-1/

Australia has the ingredients

While the Australian delegation gained many new ideas and insights from getting a deeper understanding of the Boston area, the tour also highlighted how many pieces of the innovation puzzle Australia already has in place.

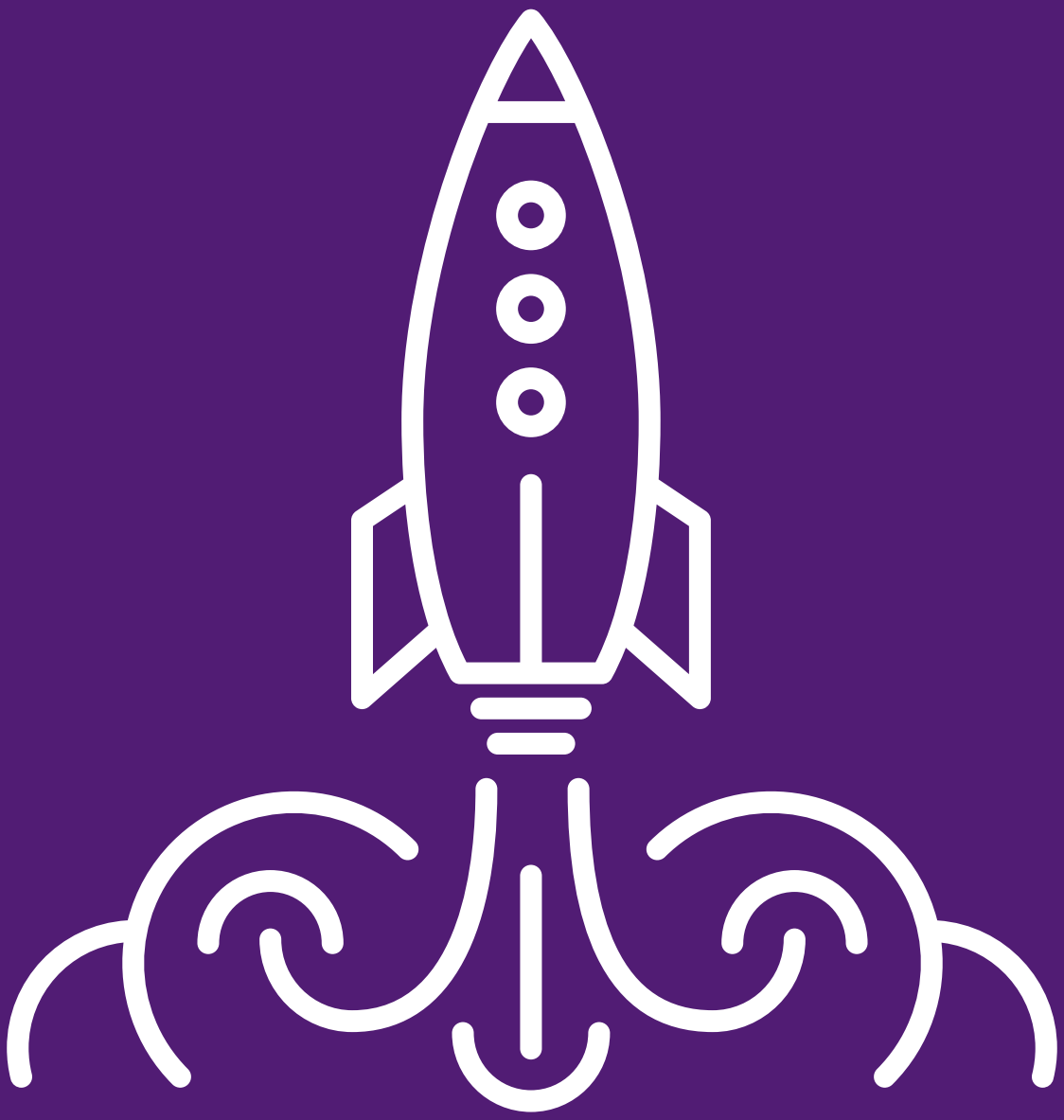
These pieces include an increasingly dynamic university sector that is producing world-class research; tax incentives for private sector research and development, and other schemes; numerous innovation districts and business accelerators; increasingly experienced venture capitalists; a growing interest in entrepreneurialism among students; and a more commercially oriented Commonwealth Scientific and Industrial Research Organisation, which is merging with National ICT Australia to form the digital research group Data61. On top of these elements, Australia's cities boast an outstanding quality of life.

"I'm certainly leaving feeling a level of reassurance that we are on track," said Minister Gago. "We have got a number of really essential components in place. Some of them are better developed than others, but we've got the baselines and we just need to grow, develop and enhance, and perhaps target and focus our energies and efforts."

As Microsoft has argued throughout its Joined-Up Innovation campaign, Australia's future success will largely depend on making the right connections between the many elements of its national innovation infrastructure. The tour reinforced this view; the delegates noting that many of the public, private and not-for-profit groups in Boston focus on bringing together the right parties to resolve weak links within their innovation ecosystem. Some also suggest Australia should develop a better map of its own innovation ecosystem.

Finally, there is simply a need for Australia to better promote its own capabilities and existing innovation successes. As Sebastien Eckersley-Maslin, CEO and Founder of the start-up incubation business BlueChilli, tells his companies and told the tour group: "The best thing we can do is be awesome and tell everyone about it."

Joined-Up Innovation in action



One of the central elements of Microsoft's Joined-Up Innovation vision is that great ideas and commercial opportunities arise from making the right connections between individuals. The tour of Boston supercharged this process by bringing together leading political, business and policy experts from around Australia and the US. The following items are just some of the initiatives that have already been put into action by tour delegates and groups in Boston.

Federal government

• Ministers Wyatt Roy and Ed Husic co-authored an article titled 'Embracing innovation is the key to our future economic growth' in *The Australian* newspaper on 28 August 2015. Inspired and informed by the tour to Boston, the article called on Australia to take a bipartisan approach to improving innovation policy (see excerpt below).

• Husic announced that the Australian Labor Party (ALP) will create an entrepreneurial council to give innovators and entrepreneurs a presence on economic advisory boards and panels. He was also central to the ALP's September announcement of a $17.8 million plan to introduce a 'start-up year' at universities that will allow final-year and post-graduate students to develop their innovations, launch two new visa classes to attract foreign entrepreneurs and engage the public in national policy problems through an initiative similar to Challenge.gov in the US.

• As the newly appointed Assistant Minister for Innovation, Roy ran the PolicyHack event at BlueChilli's offices in Sydney in October to identify and develop innovative ideas to support future innovation-based industries in Australia. Earlier, in September, Roy also visited the CBR Innovation Network in Canberra September to see a collaborative innovation and entrepreneurship ecosystem in action.

State government

• The ACT Government has begun discussions with the Boston Mayor's Office of New Urban Mechanics to participate in a new procurement program, the Small Business Innovation Partnerships program, and its digital transformation activity.

• Urban developers in Canberra have connected with the not-for-profit Boston Foundation to discuss how to encourage entrepreneurial activity in low socioeconomic areas. The ACT Government has also connected with the Foundation to discuss support for underprivileged members of society.

• The South Australian Government has expressed its interest in hosting Australian chapters of MassChallenge and The Venture Café in Adelaide.

Business community

• The Chamber of Commerce and Industry Queensland (CCIQ) plan to commission BlueChilli to provide education and services to start-up businesses in Queensland through CCIQ's new network of Regional Innovation Centres.

• Stephen Tait from CCIQ met individual South Australians to discuss how CCIQ could use the QAssure procurement platform developed in Queensland to make it easier for government and others to buy from ICT businesses in South Australia.

Embracing innovation – the key to future growth

Excerpt from an article by Wyatt Roy and Ed Husic in The Australian*, 28 August 2015*

The mix of factors at play in Boston is not exclusive; Australia can learn from the Commonwealth of Massachusetts. But, to do this, we think several things need to occur. Although conventional thinking would dictate otherwise, we believe it is our obligation to the next generation of Australians to move away from kneejerk political partisanship towards a longer view that embraces opportunities for collaborative policymaking.

It can and must start now, to ensure we extend a remarkable quarter-century of uninterrupted economic growth by nurturing a start-up ecosystem that allows new enterprises to emerge and drive new opportunity.

As a nation, our potential is limitless. Australia boasts an abundance of young, smart individuals and a lifestyle the envy of the world. We have an ever-deepening relationship with our neighbours in the powerhouse Asian economies around which the future of regional economic prosperity will be shaped.

As two innovation advocates from opposite sides of the parliament, we recognise this will require national leadership: across parliament, business, in science and higher education communities, and the media.

We agree new policies are required to change our culture, some of which we've started to see emerge. At their philosophical heart, these should acknowledge that risk and failure are not attributes to be mitigated against but essential to developing entrepreneurial spirit and culture.

We need new approaches to help attract significant capital to enable Australian start-up businesses turn far-fetched ideas into economic and commercial reality.

We need to enhance our own skills base so the next generation of Australians has every opportunity to fully participate in and benefit from the changing economy.

And we should actively reach out to the best and brightest from across the globe, "on-shoring" entrepreneurial talent to team with local talent in developing and promoting our next big ideas.

Finally, we must generate greater co-operation between research, business and government on commercialisation — with the measure of success moving beyond just research for research's sake to the high-water mark of transforming ideas into reality.

Learn more

joinedupinnovation.com

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