



MIT REAP
Regional Entrepreneurship
Acceleration Program

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Innovation Diplomats

Queensland

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Executive Summary

Throughout my time in Queensland, I conducted 13 interviews with various stakeholders, such as Chad Renando who works for Office of the Queensland Chief Entrepreneur, Ulric Ferner who is an investor at Right Click Capital, Tim Walmsley who is the founder and CEO of BenchOn, among others. I also visited Fishburners, a coworking space, to watch its Friday night pitch competition, Precinct which is the government's coworking space for the Health Tech Innovation Queensland Meetup, as well as Queensland University of Technology's Science and Engineering Centre for the Startup Grind event on the future of work. There has definitely been quite a huge emphasis on growing the startup ecosystem. The effort is mostly led by the government and key passionate stakeholders. However, more effort and resources are needed to help change the mindset of the Queenslanders and encourage more entrepreneurship activities.



Introduction

As part of the Kendall Square innovation ecosystem for the past two years, I must admit that I have never thought about the interactions among various stakeholders in this ecosystem. My internship in Queensland, Australia was thus filled with astonishment: it was the first time that I got to analyze an ecosystem and the essential role of each stakeholder in-depth.

Overall, I am quite optimistic that Australia as a country is moving in the right direction; the federal government fully understands the importance of innovation and entrepreneurship as new sources for future economy growth. The National Innovation and Science Agenda was established to encourage extraordinary technological change and has invested millions of dollars in initiatives, including inspiring all Australians in science, technology, engineering and mathematics, supporting innovation through visas, tax incentives for investors, among others (“The Agenda,” n.d.). On the state level, each state has set up a dedicated innovation program to support the transformation, such as Innovation NSW and LaunchVic. The Advance Queensland program in particular has a budget of \$650 million in total (“Advance Queensland initiative,” 2018). The Queensland government also created Office of the Queensland Chief Entrepreneur under the Advance Queensland program and named Steve Baxter, a famous entrepreneur and investor as its Chief Entrepreneur.

Despite the momentum, Queensland’s innovation ecosystem faces significant challenges, many of which will require time and resources to overcome. In this report, I summarized the five major problems I witnessed and my recommendations.

Methodology

Research:

I researched Innovation-Capacity and Entrepreneurial-Capacity and looked at inputs and outputs to the innovation ecosystem.

Innovation-Capacity Inputs

I-Cap Element	Description	Find the following data	Input data
Human Capital	Pool of skilled innovators Availability of quality education (technical, R&D)	Number of STEM graduates/year Quality of research institutions Quality of education institutions	<ul style="list-style-type: none"> • 16 per cent of graduates in Australia finish with STEM qualifications (source: ABC news) • There were 2.3 million people with STEM qualifications in Australia, and 5.7 million people with Non-STEM qualifications (source: Australian Government) • Total STEM population in Queensland is 437k; ranked 3rd in Australia (source: Australian Government) • University of Queensland and Queensland University of Technology are top universities in Australia (source: QS Top Universities)
Funding	Public and private funding for research Government incentive programs	Gross domestic expenditure on R&D Company spending on R&D	In 2014–15, the Queensland Government spent \$180.2 million in R&D in the Queensland region, Australian government spent \$60.3 million, and businesses spent \$28 million (source: Office of the Queensland Chief Scientist)
Infrastructure	Physical infrastructure (transportation, internet) Availability of specialized space (research labs)	Quality of overall infrastructure Quality of internet (bandwidth, servers) Internet adoption rates (subscribers or %) Internet access in schools	<ul style="list-style-type: none"> • 86.3% of the households are internet subscribers in 2015 (source: The Conversation) • An average of 1.59 Mbps download and 0.85 Mbps upload speeds across all mobile, tablet, and desktop devices (source: Bandwidth Place)
Demand	Public and private demand for innovative output	Firm-level technology absorption Availability of latest technologies Government procurement of technology	Availability of latest technologies in Australia rating 6.17 (source: weforum)
Culture & Incentives	Celebration of invention and innovation Rewards to innovation (tenure, prizes)	Influential inventors (list 3 names) Influential researchers (list 3 names)	<ul style="list-style-type: none"> • Influential inventors: James Harrison, Howard Florey, Dr David Warren (source: Study + Innovation)

			<ul style="list-style-type: none"> • Influential researchers: Elizabeth Blackburn, Isobel Bennett, Dorothy Hill (source: Famous Scientists)
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Innovation-Capacity Outputs

Description	Find the following data	Output data
Innovation Outputs	Number of patents filed/year Number of published papers/year Leading innovations from your region	<ul style="list-style-type: none"> • Queensland residents filed 21% of the total 28,394 patents in 2016 (source: Australian Intellectual Property Report 2017) • Leading innovation: value-add manufacturing (source: The Waste to Opportunity Enterprise)

Entrepreneurial-Capacity Inputs

E-Cap Element	Description	Find the following data	Input data
People	Pool of entrepreneurs Availability of entrepreneurial education	Entrepreneurial intention Quality of management schools Labor force with tertiary education	<ul style="list-style-type: none"> • Approximately 83+ startups and 450 employees in Queensland (source: Startup Ecosystem Report) • UQ Business School, University of Queensland is a top 10 management school in Australia (source: QS Top MBA)
Funding	Availability of entrepreneurial capital (equity, debt, grants)	Ease of access to loans Venture capital availability Domestic credit to private sector	<ul style="list-style-type: none"> • \$10.4 million raised by Queensland based startups from 2010 to July 2015 (source: Startup Ecosystem Report) • Queensland government injects a further \$6 million into regional startups (source: Smart Company)
Infrastructure	Physical infrastructure (space, transport) Availability of key services (internet, phone)	Quality of domestic transport network Overall logistic performance	6,500 bridges, 33,000 km state-controlled road network (source: Wikipedia)
Demand	Government, corporate and consumer demand for new products and services	Quality of demand conditions Buyer sophistication GDP per capita	<ul style="list-style-type: none"> • As of June 2017, Queensland's GDP per capita is \$66,956 AUD (source: CEIC). • As of 2016, average full time earning in Queensland is \$75,936 AUD (source: Living in Australia)

			<ul style="list-style-type: none"> • 3.99/7 Buyer sophistication for Australia (Source: The World Bank)
Culture & Incentives	Celebration of entrepreneurship Culture of entrepreneurship	Influential businesspeople (list 3 names) Influential young entrepreneurs (list 3 names) Media attention for entrepreneurship	<ul style="list-style-type: none"> • Influential businesspeople: Gina Rinehart, Frank Lowy, Harry Triguboff • Influential young entrepreneurs: Jess Hatzis, Bree Johnson, Chris King (source: Smart Company)

Entrepreneurial-Capacity Outputs

Description	Find the following data	Output data
Entrepreneurial Outputs	Total early stage entrepreneurial activity New businesses registered Nascent entrepreneurship rate Leading examples of entrepreneurship Most well-known innovation-driven enterprises	<ul style="list-style-type: none"> • In 2017, there were 250,897 new companies registered in Australia and 45,994 new companies registered in Queensland (source: ASIC) • 83+ startups in Queensland (source: Startup Ecosystem Report) • Well-known startups: Canva • Well-known innovation-driven enterprise: Atlassian

Interviews:

I interviewed 13 stakeholders from different groups including entrepreneur, risk capital, government, university, and corporate. These connections came from Massachusetts Institute of Technology and University of Michigan’s alumni networks as well as through individuals whom I met in networking events. Most of the interview questions were provided by the iDiplomats program management team, but I also asked questions from the interview guide provided by the MIT Reap Team Queensland.

Events:

I attended a few startup events to enhance my understanding of entrepreneurship and startup culture in Queensland. These include:

- Friday night pitch competition at Fishburners, a coworking space

- Health Tech Innovation Queensland Meetup at Precinct, the government's coworking space
- Startup Grind event on the Future of Work

Other online research:

Extensive online research was conducted and citations can be found in the appendix section.

Key Findings & Recommendations

Problem 1: *Queensland has not yet developed its niche in the Australian or worldwide startup ecosystem.*

The Queensland government and the MIT Reap team believe mining and resources (7.4% of Queensland's economy), tourism (4% of Queensland's economy), and agriculture (2.5% of Queensland's economy) are the major drivers of the region's economy and should be the areas of focus. However, when I interviewed entrepreneurs and other stakeholders, they gave me different answers as to what future disruptive industries would be. One responded autonomous vehicle, while another answered healthcare. By all means, I think it would be possible for a region to excel in many areas. However, a lack of focus will diversify resources, and at the end, Queensland may not have leveraged its strengths. This problem will impact multiple stakeholders, particularly entrepreneurs, government, and VCs.

Entrepreneurs will not be able to take advantage of the synergies in the area, the government does not know where to spend its funding, and VCs are reluctant to invest in companies that do not have major breakthroughs in technology.

Recommendations:

I believe all stakeholders can contribute in some ways to ensure Queensland develops its niche. The Queensland government should not merely outline its major industries of focus in its policies, but take concrete actions to enable these industries foster and innovate. For tourism, Brisbane Marketing, an

economic development agency, was established to partner with different tourism stakeholders to increase the number of domestic and international travelers. Brisbane has around seven million people stopping by the airport each year, but around six million people will transit to another city. This is a big loss of opportunity. Several reasons attribute to this problem; two main ones are: visitors prefer Sydney or Melbourne because they are more well-known internationally and Brisbane does not have enough attractions to keep tourists for more than two days. Hence, the government should be responsible to work with corporates and startups in the tourism sector to develop innovative solutions.

When I was in Avignon, France in May, I was amazed by the technology used in Palais des Papes, a historical palace for six popes. Upon entering, I was given a tablet and headset. Although the tablet looked ordinary, the software embedded was able to pinpoint my location and tell me histories and stories as I walked around. In addition, there were several mandatory stops where I was asked to scan a certain image using my tablet. Subsequently, the tablet would show what the interior looked like centuries ago. During my visit to Australia, I did not see any advanced technological innovation introduced to any tourist site. The government can definitely take an active role to invest in companies that are willing to make a change.

Universities, VCs, and corporates can collaborate to introduce innovations to the mining, agriculture, and tourism sectors as well. In fact, there are some hackathons in Australia related to mining and agriculture. Komatsu, a Japanese equipment manufacturer, hosted a hackathon in Brisbane in February to encourage the delivery of disruptive technologies to the mining sector (“Komatsu: Transform Mining,” n.d.). Western Australia’s Department of Primary Industries and Regional Development also hosted an AgHack in Perth to tackle agricultural challenges (“Big List of Hackathons in Australia,” n.d.). Universities can host hackathons to encourage students’ participation, as students are likely to be

creative and may have already developed some patents. Both VCs and corporates can sponsor the events and be given the opportunity to invest. In this way, most stakeholders can work hand in hand to ensure Queensland startup ecosystem develops its niche.

Problem 2: The government is expected to unite different stakeholders and take a lead.

One concept that keeps recurring is that America is a capitalist society whereas Australia leans toward a socialist society. In my conversation with Chad from Office of the Queensland Chief Entrepreneur, he mentioned that Australia has high taxation and more money to spend, so everyone expects the government to take an active role in fostering entrepreneurship. In fact, the government has already launched Advance Queensland rolling out various programs to facilitate growth. Hot DesQ is a program that attracts early stage startups from around the world to Queensland for a period of 6 months. It provides AUD \$100,000 equity-free grants, workspace free for 6 months, and access to mentors and advisors, and in exchange, these startups will relocate and experience Queensland (“Hot DesQ,” n.d.). On the other hand, Startup Catalyst hopes to bring groups of youths, startups, investors, corporates, and leaders to tech hubs, such as Silicon Valley, Israel, U.K., etc. The hope is that the global immersion will enable these future visionaries to better understand new technologies and culture differences, and build valuable networks around the world (“Startup Catalyst,” n.d.).

In the MIT Reap meetings, Queensland University of Technology (QUT) took a facilitator role because they applied for this program. However, I could sense that everyone expected the government to do something. In addition, even though ReyEye represents entrepreneurs, Rio Tinto represents corporates, Blue Sky represents VCs, and QUT represents universities, I do not think that they well represent voices of their groups. For example, QUT’s Australian Centre for Entrepreneurship Research works on the MIT Reap project; yet, it has minimal idea of QUT’s bluebox, an accelerator, or the entrepreneurship courses

taught at school. Rio Tinto is also an anomaly within the corporate stakeholders because it is the very few corporates that are concerned about entrepreneurship and innovation. Hence, I doubt the stakeholders in this ecosystem are all on the same page.

“Trust” was a topic that routinely came out of my conversations with individuals. Everyone trusts the government and expects the government to take good care of them. When something does not work as expected, they complain about the bureaucracy. Indeed, there are some red tapes within the government, such as lengthy procedures and not robust procurement processes, but the expectation is high. On the other hand, stakeholders within the system do not seem to trust each other. For example, startups are afraid to share their ideas because they worry another startup or corporate may steal the idea. The overreliance on government has negative effects on all stakeholders because when the government fails to accomplish a goal, every stakeholder will suffer tremendously.

Recommendations:

I believe the government will continue to take a lead because of political reasons. However, the government needs to help different stakeholders and stakeholders in the same category to engage with one another. Coworking space is a model that works extremely well in this context. The government wanted to foster the startup landscape, but it understood that it did not have the capability to run coworking spaces. Hence, it subsidized Fishburners and Little Tokyo Two, two coworking spaces in the downtown area, and had them work with startups directly. In the coworking spaces, startups are also able to connect with one another and build a close community. The government should continue to invest in coworking spaces and hopefully bring similar model to rural areas where a lot of people reside.

As to the rest of the stakeholders, the government can host separate events for VCs, universities, and corporates, as well as combined events for everybody. In these events, the government can ask about their concerns regarding innovation and entrepreneurship, and see what can be done to increase the level of engagement. Once they figure out an initiative, the government can take a part in planning, executing, as well as keeping track of the progress. Alternatively, if the MIT Reap program is successful, either the government or a separate, non-biased entity can be in charge of the program and start to involve more stakeholders and execute interventions on a larger scale. The MIT Reap program is the first attempt to bring all stakeholders together, but additional work is needed to ensure the program is inclusive and those representatives can speak for their respective groups.

Problem 3: Australians are risk-averse, affecting expenditure on research and development.

The Australian economy has experienced twenty-seven years of consecutive growth, so most people have no idea what a recession is like (Scutt, 2018). The economic success has created an extremely comfortable lifestyle, whereby most Australians believe they can keep doing what they have used to do and innovation is not essential. The problem worsens as a lot of large enterprises are monopolies associated with the government, and these companies have low incentive to invest in R&D. For example, the Australian financial system is dominated by four large banks, and from a bank's perspective, you only need to be as good as your peers.

Australia's business expenditure on R&D has been declining, and Queensland has experienced an even sharper decline. Although 20% of the businesses in Australia are located in Queensland, they only represent 12% of the business R&D spend. The data from 2016 indicates that business expenditure on R&D is approximately AUD \$2 billion (Mordocco & Riches, 2016). There are several reasons that can account for this lack of R&D. First, as mentioned previously, natural resources account for a big portion

of Queensland's GDP and the companies in this sector are not incentivized to invest in R&D projects. Most of these projects will take up to 20 years until they can be profitable, and because companies can keep generating revenues with the existing technology, innovation is not valued. In addition, implementing a new technology is risky and may have serious financial and environmental consequences. Most of these companies prefer to wait until one company successfully implements a technology before they follow. When every player wants to be an adopter, no innovator exists in this market.

Second, most Queenslanders lack digital skills, so businesses prefer to adopt a technology or an innovation. I attended Fishburners' Friday night pitch competition and witnessed similar ideas already implemented in the U.S. For example, one presentation was about developing an app combining different bank accounts, so the owner could better manage his or her finances. Anything that is app related is considered quite outdated in the U.S., but the idea seems to be quite receptive in the local market.

Finally, Queensland's economy is constituted of SMBs and innovation is probably the least that will come to these SMBs' attention because they just want to keep their businesses alive. I had an opportunity to speak with Robert Marshman who once owned Marshman Consulting, a firm that specialized in civil and structural projects. The construction business is extremely competitive, and cost, not innovation, usually determines whether or not a company gets a deal. He constantly struggled because he wanted to offer quality work but the market pressured him to act otherwise.

Tourism is another industry filled with SMBs. Queensland's famous Great Barrier Reef attracts approximately two million visitors each year from around the world. These tourists generate business

opportunities for local residents, but all the while, create damages to the environment. Over half of the living coral has been lost from 1986 to 2012 (Knowlton, 2018). If the trend continues, the Great Barrier Reef will be wiped out in the near future. No single factor contributes to the destruction of the reefs; however, human intervention definitely plays a role. Given that these tourism businesses just want to make quick money, there is a lack of incentive to do anything innovative to save the environment.

Recommendations:

To revitalize R&D, the government can work with corporates and SMBs and host international competitions focusing on a particular topic or industry. They can also host domestic and regional competitions; however, due to the lack of focus on innovation in the region, it may be difficult to see new ideas. Robert Perron, an Assistant Professor at QUT and an MIT alum, mentioned that MIT is making big progress in the research of the natural resources sector. If the Queensland government is able to bring in participants from around the world, it can certainly attract new R&D to fuel and foster the region. A successful example that came to mind was the Amazon Robotics Challenge. Amazon was keen on introducing robots to its fulfillment centers; yet, it was not enough to simply rely on its internal R&D. Through this challenge, it invited 16 teams from around the world to see who could enable robots to retrieve items and store them. If any promising technology was identified, Amazon would work with the team directly.

Corporates can also initiate collaboration with universities. Recent statistics indicated that Australia ranked the lowest on industry-research collaboration in OECD countries (“OECD Science, Technology and Industry Scoreboard 2013,” 2013). As most of the Australian researchers reside in universities, most businesses lack qualified researchers that are capable to translate research into commercial products (Mordocco & Riches, 2016). Hence, cross collaboration is the best way to bridge the gap between the

two stakeholders. I was fortunately to have a conversation with Paddy Krishnan, a Researcher at Oracle Labs, and learned about Oracle's involvement with universities. First, it collaborates with a professor through the Australian Research Council's grant. If the grant is successful, both the Australian Research Council and Oracle will make money available to the project to be done in academia. Second, a gift can happen when Oracle makes available money to a professor to work on a particular area of interest. The goal is to enhance knowledge and develop new techniques to be shared with the rest of the world. Oracle will not claim any intellectual property ownership. Finally, a grant can happen when Oracle makes available money to a professor to research into an area that both Oracle and the professor are interested in. Oracle will claim the ownership. Oracle is a great example of the industry-research collaboration that needs to happen more frequently.

Problem 4: Private investment is limited.

Multiple entrepreneurs whom I interacted with mentioned challenges of fund raising from VC firms. Tim Walmsley, founder and CEO of BenchOn, shared a story that he spent three months trying to convince an investor to put money on the table but the investor backed out at the end. He also mentioned that investors typically want to know where the money is going to be spent in advance. They will examine a series A startup like how investors in the U.S. evaluate a series B startup, meaning the startup should generate revenues, acquire some customers, among other criteria.

My conversation with Ulric Ferner, an investor at Right Click Capital and an MIT alum, was fascinating, as he shared the history of VC in Australia. Pension funds in Australia, also known as superannuation funds, went into the VC business in the late 1990s. People got excited about the internet, but when the dot-com bubble burst, they lost a lot of money. Hence, there was a lack of startup funding in the early 2000s. Starting 2012, there has been a resurgence in the number of VCs and the VC investment rose to

\$230 million in Q2 2017 (KPMG, 2017). However, the VC investment is quite low, accounting for 0.023% of GDP in Australia, a percentage below the OECD average (Schwab, 2015). These VC firms tend to be based in Sydney or Melbourne and fund local startups, rather than Brisbane startups. They also tend to invest in matured startups that have stable revenue streams. Chad Renando wrote an article called A map of the Australian Innovation Ecosystem where he compared the number of investment groups, which connect investors to startups and focus on early stage investment. Not surprisingly, Queensland has 17 investment groups, lagging behind New South Wales' 58 and Victoria's 30 (Renando, 2017).

On the corporate end, very few corporates are willing to invest in Queensland. The corporate headquarters are mostly located in Sydney or Melbourne, so naturally funds are distributed to these major cities. Even if Brisbane startups want to work with these corporates, they first have to build connection with headquarters that are far away. Companies sometimes set up branches or research centers in Brisbane, but these cases are far too few. For example, Springfield Land Corporation collaborated with Little Tokyo Two, a coworking space, to encourage entrepreneurial activity in Springfield. Johnson & Johnson established an innovation center at QUT aiming for knowledge exchange and sharing of regulatory and commercialization expertise with academics and entrepreneurs (Renando, 2017). I also had an opportunity to visit ST Solutions Australia, a Japanese conglomerate SoftBank Corporation's subsidiary, and witness how the company promoted the development of robotics in Queensland.

Recommendations:

To stimulate VC investments in early stage startups, the Australian government allows VC firms to set up Early Stage Venture Capital Limited Partnership (ESVCLP). It offers flow-through taxation treatment for venture capital partnerships as well as capital gains tax exemption for investors on profits made through

this entity (Australian Government, 2018). According to Amanda Price, head of KPMG Australia's High Growth Ventures, VCs have indeed shifted towards approaching pre- and post-series A startups, and investment in Australian startups grew to AUD \$698 million, an increase of 1.4 percent in 2017. However, the number of deals dropped from 185 in 2016 to 135 in 2017, indicating that VCs are still risk averse and prefer to invest in safe and sound startups (Baldassarre, 2018). I believe ESVCLP has its intended effect, and we will likely see a surge in investments in the near future. However, more restrictions may need to be placed, such as setting up a maximum investment per startup, to ensure other startups can be considered as well. The Queensland government can also go the extra mile by offering additional tax incentives to encourage VCs to invest in Queensland startups.

In fact, the Queensland government realized that startups are underfunded. It launched the Business Development Fund (BDF) to allow angel and VC firms to co-invest in innovative businesses in the emerging industries. The fund now has \$80 million worth of investment. To receive funding between \$125,000 and \$2.5 million, these businesses will have to commercialize an innovative idea, product or service and create employment opportunities for high-skilled workers (Queensland Government, 2018). Additionally, the Queensland government established the Business Growth Fund Program targeted at assisting SMBs with funding of up to \$50,000 to purchase equipment or services to seize the next phase of growth (Queensland Government, 2018). These programs demonstrate the government's commitment to alleviate the funding constraint encountered by entrepreneurs. Based on my conversations with entrepreneurs, however, many of them have not submitted an application because they are either not aware or not qualified to be considered. When I attempted to look for resources online, I also found it confusing as to the available programs. There is an opportunity for the government to reorganize its websites and better disseminate these resources.

Some corporates have set up their venture arms and are actively investing in startups. A few famous ones are Telstra's Telstra Ventures and MuruD accelerator, NAB's NAB Ventures and NAB Labs, and Westpac's Reinventure (Colless, 2016). At this point, there are only a handful of corporate venture arms because many industries have not experienced competitive pressure to innovate. It will be a controversial discussion, but I believe the Australian government should gradually encourage more competitions in the market, such as by loosening up regulations and opening up border for foreign entities. As the market transitions from monopoly to perfect competition, an increasing number of Australian corporates will be incentivized to invest in startups and their innovations.

In January 2018, the Australian Securities and Investment Commission granted licenses to equity crowdfunding opportunities, enabling retail investors to invest a maximum of \$10,000 per company over a year. The seven crowdfunding platforms included Big Start, Billfolda, Birchall Financial Services, Equitise, Global Funding Partners, IQX Investment Services, and On-Market Bookbuilds (Baldassarre, 2018). It is a great opportunity for ordinary investors to be involved in early stage ventures from the very start. It also enables more startups to receive funding to build product offerings. The federal government should continue to monitor the progress and may wish to open the market even further in years to come.

Finally, I wanted to highlight that universities are at a unique position because they offer sufficient funding but student entrepreneurs are not seizing the opportunity. QUT bluebox launched various initiatives, including The Go to Market Initiative, co-invested by industry partners to support late stage product commercialization, QUT Founders Fund, co-invested by early stage investors, and the QUT Accelerator, a 3 month program aiming to prep startups from ideas to commercialization and give funding of up to \$25,000 per team (QUT bluebox, n.d.). Yotam Rosenbaum, an Entrepreneur in

Residence at QUT bluebox, revealed a lack of applicants in all the funding programs. Australian students do not seem to be interested in entrepreneurship as much as students in other parts of the world. I believe the bluebox has done a phenomenal job, but more work is needed to promote entrepreneurship on campus. For example, the bluebox runs like a silo entity at the moment, so there are plenty of collaboration opportunities with professors from various disciplines on entrepreneurship related classes.

Problem 5: There is a lack of tech talents in Queensland.

Tim Walmsley mentioned that he was not able to find suitable talents in Queensland and had to set up his tech team in Sydney instead. Paddy Krishnan also pointed out that Oracle Labs employs 20 individuals, of whom 50% are in engineering and the rest of the 50% are in research. All researchers are PhDs and non-Australians, and some engineering staff are non-Australians. In fact, a study shows that STEM enrollments in Queensland have reduced, particularly in IT courses (Australian Government, 2017). This fact is particularly concerning especially because Queensland looks to transform into a digital economy. A further examination into the causes reveals that there are few STEM teachers and courses are not structured to encourage students to pursue science and engineering (Mordocco & Riches, 2016).

Recommendations:

One solution that can help increase the number of tech talents is to introduce various kinds of bootcamps and schools. A lot of programs are available in the U.S., but the idea seems quite novel in Queensland. Coder Academy and Fire Bootcamp seem to be the only two coding bootcamps available in Queensland. There are definitely opportunities to introduce other kinds of data analytics and product development training programs, such as Galvanize and Product School. Founded in 2012 in Denver, Galvanize makes web development and data science education accessible to entrepreneurs and learners. It currently has eight campuses in the U.S. and more than two thousand graduates (Galvanize,

n.d.). Product School offers product management training to 16 campuses located across the U.S., Canada, and U.K. Founded in 2014, it also has more than 5,000 alumni and continues to expand because classes are taught by top-tiered product managers working at companies such as Google and Facebook (Product School, n.d.).

Another strategy to increase the number of STEM talents is through visa and immigration policies. I am not here to advocate for visas and immigration, but they do have certain effect on a country's economy. In the U.S. for example, international undergraduate and graduate students are eligible to work for one year on optional practical training post-graduation. For students who study STEM related subjects, they are eligible for a three-year stay. This policy enables the U.S. to boost its tech industry with qualified candidates. Australia also has visa and immigration policies aiming to attract skilled workers. Close to 7,000 engineers were employed on temporary 457 visas in 2015. Moreover, migrant engineers more than doubled, increasing from 5,852 in 2008 to 13,265 in 2015 (Kaspura, 2017). I believe Australia can consider shaping its immigration policy and offering more visas to individuals with skills.

Conclusion

Queensland is at a very unique time in its history, whereby there is a lot of excitement for entrepreneurship and innovation. In my view, the ecosystem is pre-matured, but it will gradually grow over time. Many challenges lie ahead, but I am convinced that as long as the five stakeholders work together to address these issues, Queensland will progress to become a more innovation driven economy.

Appendix

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Interviewees:

- (1) Yotam Rosenbaum, Entrepreneur in Residence at QUTbluebox
- (2) Santiago Velasquez, student entrepreneur
- (3) Char-lee Moyle, Research Fellow in the Australian Centre for Entrepreneurship

- (4) Ulric Ferner, Investor at Right Click Capital
- (5) Vibhor Pandey, Market Research & Insights at Brisbane Marketing
- (6) Randall Austin, Cofounder of Setsomi
- (7) Robert Buehrig, Founder of Cogniom Solutions
- (8) Robert Marshman, Senior Civil Structural Projects Engineer at Downer Group
- (9) Justin Portillo, Content Analyst at Envato
- (10) Tim Walmsley, Founder and CEO of BenchOn
- (11) Marc Orchard, Brisbane City Manager at Fishburners
- (12) Paddy Krishnan, Researcher at Oracle Labs
- (13) Chad Renando, Office of the Queensland Chief Entrepreneur