Legislative Council Select Committee – Growing Tasmania's Economy

Submission by the University of Tasmania

Terms of Reference (TOR) 1:

The economic diversification for Tasmania as a region – by identifying opportunities to implement changes which will ultimately deliver a long term internationally competitive framework, which will grow Tasmania's performance in the tourism, hospitality, retail services and agriculture sectors of the State's economy

The University of Tasmania is deeply committed to its social mission, as well as being a partner, innovator and change catalyst within the Tasmanian economy. The University is working to ensure that the higher education system is a contributor to the best possible future for Tasmania, for the community who live and work here and the individuals who visit our shores.

Last year, the University released its *Impact Statement 2014*. This publication was designed to capture the institution's role as a key economic driver in the State. The value of our contribution to the State has been calculated as $1.7 billion. However, the social, intellectual and cultural impact of the University of Tasmania is much broader than monetary.

The TORs for this review focus on a number of traditional Tasmanian industries, without reference to higher education as a key component of the State's economy. Notably, education is Australia's third largest export[1] behind iron ore and coal. Separate identification of education and research in the TOR would have been a useful addition to the debate. Nevertheless, the University has strong connectivity to the tourism, hospitality, retail services and agricultural sectors.

A copy of the University of Tasmania's *Impact Statement 2014* is attached for reference. There will be an updated 2015 version available later this year.

The following contributions for TOR1 come from across the University in areas relevant to the matters under review. They are from:

a) the Tasmanian Institute of Agriculture;

b) Sensing Tasmania;

c) the Institute for Marine and Antarctic Studies;

d) Community Partnerships and Regional Development; and

e) the Faculty of Education.

a) Tasmanian Institute of Agriculture (TIA) - *Growing Tasmania's Food and Agriculture Sector*

TIA's vision is to contribute to the development of a prosperous, innovative and sustainable food and agriculture sector and strong rural communities through impact focused research, development and extension (RD&E) and education.

[1] http://dfat.gov.au/trade/resources/trade-at-a-glance/Pages/top-goods-services.aspx

Agriculture is a key driver of Tasmania's economy and this is reflected in the partnership between the Tasmanian Government and the University through TIA to create a centre of excellence in agricultural RD&E, education and training.

The direct farm gate contribution of agriculture to Tasmania is around five per cent of gross state product and six per cent of total state employment. When agriculture's post farm gate activity is added, the contribution to the economy increases to 16 per cent of gross state product and 20 per cent of state employment. The Tasmanian Government has committed to increasing the value of agricultural production across the state to $10 billion per year by 2050. TIA is playing a key role in achieving this goal by helping to drive productivity in agriculture with an emphasis on investment, innovation, research, skills development and sustainability both behind and beyond the farm gate. The Institute's work is not only relevant, but critical to achieving sustainable growth and, importantly, creating more jobs into the future.

TIA will play a leading role in the delivery of a range of these initiatives including:

- $800,000 for collaborative research to support growth within the rural sector;
- $600,000 to implement innovative extension services with private service providers, with a focus on increasing on-farm productivity; and
- $1.5 million to maximise the economic benefits and environmental sustainability of the State and Commonwealth investment in irrigation infrastructure.

All of the funds will be used to attract additional public and private investment in agricultural RD&E in collaboration with Tasmanian Irrigation, the Tasmanian Farmers and Graziers' Association (TFGA) and consultants. These new initiatives will ensure that TIA will continue to undertake its well-recognised world-class research, while ensuring that RD&E efforts deliver value to farmers and agribusiness.

TIA has a dynamic team of 130 scientists, educators and technical experts, many of whom are internationally renowned, with access to world-class facilities and equipment, and who work with farmers and the food processing industry to improve productivity and sustainability. TIA's Agricultural Science and Food Systems disciplines within the School of Land and Food are helping to educate the next generation of farmers, agronomists, export managers and policy-makers to build the state's economy.

TIA works across all of Tasmania's major agriculture industries – dairy, perennial horticulture, vegetables, and extensive agriculture. Beyond the farm gate, TIA is also working in supply chains, food innovation and food safety, which is helping Tasmania's agriculture industries develop profitable value-adding arms to their businesses. For example, under the Tasmanian Government's AgriVision strategy, TIA researchers are guiding the development of the State's craft cider industry, which is giving apple orchardists an alternative market for their fruit.

Attracting new investment through partnerships

TIA undertakes research, development and extension activities aligned with the needs of Tasmanian industry. In addition, to the $8.6 million invested by the State Government and the University annually, TIA attracts into Tasmania an additional $11 million from private industry and national competitive grants each year.

TIA has a mandate to support industry development through ensuring that research is practical and responsive to industry. Each of TIA's RD&E centres has an industry advisory board, which provides vital interaction and consultation. TIA also has developed and maintains relationships with peak

industry bodies and funding organisations, such as AusVeg, TFGA, TAPG, Horticulture Innovation Australia, MLA, GRDC, Dairy Australia, DairyTas, Cherry Growers Australia and RIRDC.

TIA has played a lead role in some of Australia's largest industries to advance industry development and innovation. For example, Dairy Australia and Dairy Tasmania have engaged TIA to deliver specific research, industry development and extension projects to Tasmania's rapidly expanding dairy industry. TIA was also called upon by the Tasmanian Government and industry to combat the new downy mildew disease threatening the state's $100 million poppy industry.

TIA is the major partner of the Tasmanian Government's $1.5 million Water for Profit program, which is helping farmers to maximise their return on investment in irrigation. This program is being delivered collaboratively by TIA, the Tasmanian Government's Department of Primary Industries, Water and Environment, TFGA and through partnerships with farmers. TIA is also the coordinator of the National Cherry Development Program and this past season helped provide growers with up-to-date recommended spray program and crop monitoring guides to assist them meet new export requirements. As a result, more than 40 cherry orchardists were registered to export cherries this season, which is the largest number of cherry exporters to ever be registered.

TIA plays a lead role in other horticulture industries, including through viticulture, the PIPS Orchard Productivity Program and the Integrated Management of Diseases of Pyrethrum Project with Horticulture Australia Limited. It partnered with Dairy Australia Limited in the Dairy Businesses for Future Climates Project and was the lead institution in developing forage systems to meet the challenge for cool temperate pasture-based dairy systems. TIA also delivered projects to optimise cropping practices in mixed farming systems and relating to food safety, including those around meat health.

Innovations to grow the Tasmanian economy

Innovation in agriculture can only come about by ensuring there are stronger partnerships between all parties. TIA is leading a $4.5 million research collaboration with Woolworths supermarkets and award-winning Houston's Farm through its successful bid for $2.1 million in funding from the Australian Research Council to develop a Research Training Centre in Innovative Horticultural Products. The Centre will develop innovative new products that are safe, convenient, affordable and healthy and aims to develop a culture of innovation in the industry, so as to increase industry productivity and expand markets for Tasmanian foods.

TIA's Centre for Food Innovation (CFI) is a ground-breaking collaborative agreement between the University, CSIRO and the Defence Scientific and Technology Organisation. The objective of the collaboration is to link Tasmania to national food research networks and initiate joint research projects, to foster innovation and excellence in research, and industry engagement in technology transfer. Based in Launceston, the CFI aims to help diversify Tasmania's economic base by growing exports of high-quality, nutritious, value-added food products. TIA's Food Safety Centre is also leading a five-year $10.1 million multidisciplinary research program investigating ways to capture and deliver information across the supply chain, and ultimately to increase the value of Tasmanian food products into domestic and overseas markets. The project is looking at the conditions under which food is produced, processed, transported, stored and sold – and that information will then be made available to consumers, producers and distributors in order to verify and improve the quality of food products.

b) Sensing Tasmania (Sense-T) - *Agriculture and beyond: support for the Tasmanian economy*

Sense-T is a data research project that collects and analyses data from a range of different public and private sources, particularly from sensors. Information can then be given back to businesses, governments, researchers and communities to allow them to make better decisions and find practical solutions to real-world problems.

Sense-T aims to help people to improve efficiency and productivity across the economy, and to develop new approaches to economic, environmental and social sustainability. After initially using sensors and data analysis to help solve problems in agriculture, Sense-T is now expanding its work to also include industries such as health, tourism and infrastructure, freight and logistics. Sense-T is a partnership between the University of Tasmania, CSIRO and the Tasmanian Government, and is also funded by the Australian Government.

In its Foundation Phase, Sense-T leveraged $20 million in government, research sector and industry investment for research and innovation to support economic development in Tasmania, particularly in agriculture. This work helped to value-add to emerging, high-quality products that are consistent with the Tasmanian brand, such as wine, beef and oysters. Sense-T's research in sensor technology and data analytics is also supporting innovation and adaptation in traditional Tasmanian industries, including dairy, vegetables and broad acre farming. This research will be broadened during Stage 2 to also support further economic growth and job creation in sectors such as tourism, forestry, irrigation and salmon.

Stage 1 Projects

Sense-T's four Stage 1 Projects were funded by the Australian and Tasmanian governments, through the Tasmanian Forests Intergovernmental Agreement, the University of Tasmania, CSIRO and industry partners. The initial projects focused on using sensors and data research to boost productivity and efficiency in agriculture (beef and dairy), viticulture, aquaculture and water management. Before the projects began, Sense-T consulted extensively with industry and farmers to identify the problems and challenges they wanted to address.

The Stage 1 Projects were carried out between July 2012 and June 2015 and involved researchers from the University of Tasmania, CSIRO and TIA. A number of outcomes of the Stage 1 projects are already supporting economic growth and jobs in Tasmania, including:

- an online pasture growth prediction tool, which tells farmers how much their pasture will grow in the coming weeks;
- helping irrigators in the Ringarooma and South Esk river catchments to better manage their water use, benefitting farmers, regulators and the environment;
- giving regulators and producers real time data about environmental conditions around shellfish farms; and
- developing tools to help vineyards avoid disease and make better management decisions.

Stage 2 Industry Research Projects

Sense-T's Industry Research Projects were selected in April 2015 after an Expression of Interest process which invited Tasmanian researchers and industry to submit proposals for a share of $6 million provided through the Federal Government's Tasmanian Jobs and Growth Plan. Fourteen projects were selected, with work commencing April 2015 and to be completed in December 2016. The projects were selected because of their potential to solve practical industry problems and

improve productivity and efficiency in key Tasmanian industries such as agriculture, aquaculture and tourism, and will include:

- tracking tourist routes to help planning in the tourism industry;
- enhancing the storage of potatoes and the drying of timber boards;
- boosting efficiency in irrigation and water management; and
- improving productivity in viticulture, pasture growth, oysters and salmon farming.

Sense-T's Stage 2 will also include ongoing work through:

- Pathways to Market, which is working with Tasmanian producers to improve food distribution and consumer information; and
- the Sense-T NICTA Logistics Lab, which is working with industry to identify ways of improving efficiency and productivity in transport logistics and freight.

c) Institute for Marine and Antarctic Studies (IMAS) - *Marine science and aquaculture research through sensing technology as an area of potential strength within the Tasmanian economy*

Capabilities and opportunities within IMAS include:

1. Aquatic (salt and fresh water) environmental sensors. Saltwater applications that we can best work with industry to develop include oyster farming, salmon farming and rock lobster farming (SE Asia). IMAS has the research capability and industry links to do proof-of-concept through to pre-commercial testing. Freshwater applications include water quality monitoring of, for example, algal blooms. Sense-T has recently approved a water quality project of Tasmanian lakes.

2. Salmon cages. Temperature, dissolved oxygen, dissolved carbon dioxide are critical measures for making management decisions such as feeding, harvesting and when to treat for amoebic gill disease. Environmental factors change with depth in cage, location at a site, and by site. Two aspects are sensors throughout cages and use of 'tagged' sentinel animals (as with oysters). Sense-T has recently approved a salmon cage project.

3. Rock lobster cages. Research is similar to that for salmon cages, but, to be feasible, the next generation of sensors must be disposable or almost so in order to bring down costs.

4. Oysters. Research on tagged sentinel animals has been underway for some time. Sense-T has recently approved an oyster project.

5. Use of technology in recirculation aquaculture systems. The new Experimental Aquaculture Facility at IMAS-Taroona will have capacity to test both systems and sentinel animals.

d) Community Partnerships and Regional Development - *Opportunities for economic diversification in the North West*

Agriculture/agrifood

The major opportunities in agriculture are in post farm gate innovation and value adding. The Centre for Food Innovation has, for example, developed a proposal to bring the Microwave Assisted Thermal Sterilisation (MATS) technology to the North of the State. MATS produces shelf-stable foods with no refrigeration or frozen storage needed.

Further development of the policy and planning environment can foster this type of innovation, supporting both the identification of new products and new markets.

Work done by the Institute for Regional Development suggests that we are facing changes in the most effective way to think about the agricultural sector for the future. For example, successful agriculture is not always broad acre; it happens at all physical scales. There are new types of farmers who are not necessarily full time but are definitely serious and need to be recognised as something more than hobby farmers. They develop diversified income streams and are often experimenting with high value produce. This type of change should be reflected in the policy and planning framework.

Tasmania, and the North West in particular, has a strong record in experimentation around new products. For example, Tasmania was first state in Australia to establish industries in poppies, truffles, wasabi and quinoa. We are just beginning to get data on these innovations, for example, in 2014, the Rural Industries Research and Development Corporation released data showing that the truffle industry in Australia is now worth over $5 million. It is important for the policy and planning framework to consider the needs of emerging industries with high value and growth potential.

Future frameworks around growing Tasmania's performance in the agricultural sector should also consider new and emerging business models, such as controlled climate agriculture (for example, capsicum growing in the North West). Future agriculture development should look at research and development at various scales, value adding, logistics and distribution, branding and marketing, the science behind the "clean and green" image, and understanding what constitutes viable food production capability at a variety of scales.

Tourism and Hospitality

Opportunities include:

- adventure tourism; and
- niche tourism business catering to interest groups such as bikers and birdwatchers.

One of the major issues for the Tasmanian hospitality industry is that of labour, in particular, access to qualified and seasonal labour (for example, chefs). One of the suggestions that emerged from a forum on the West Coast was to explore opportunities to develop a labour brokerage system with other States, so that skills could be matched to the different tourism peaks.

Advanced Manufacturing

Advanced manufacturing is expressed in clever industrial design and engineered solutions with high value-add.[2] In Tasmania, advanced manufacturing encompasses products and processes in transportation and automation (particularly maritime and mining equipment). Less traditional alignments are emerging with forestry, dairy, adventure sports and e-health.

A successful future for advanced manufacturing in Tasmania is likely to emerge out of five core strategies:

1. Skilling and education
2. Reframing the focus on design and new engineering work (NEW)
3. Constructing advantage by knowing our capabilities
4. Taking advantage of island assets, and

[2] 'Advanced Manufacturing: Beyond the production line', CEDA, April 2014, p.6. http://www.ceda.com.au/media/374060/ceda%20advanced%20manufacting%202014%20final.pdf?AdManu2014.

5. Investing in facilities.

Effective support for advanced manufacturing will be focused on supply chains. Most successful manufacturers combine well-honed in-house skills and capabilities with innovation to generate customised, value added and responsive solutions to the market.[3] Manufacturing is no longer just about production and assembly. The value chain – from concept and design to service – is more complex and interlinked. Comparative advantage is gained through specialisations along the value chains and expressed more and more as new kinds of engineering work. In looking to the future it is critical that these innovative capabilities are not cast as 'lightning in a bottle'.

Much can be achieved by targeting investment. Propping up old industries and employment for unskilled workers is not the future, and investment in innovation is crucial, as is getting the policy settings in place to support this innovation. It is only with a focus on low volume high value add production that Tasmania can effectively compete and overcome disincentives and barriers such as shipping costs, the high costs of labour and the high dollar.[4]

Engaged Learning and Pre-degree

The University has proven its ability to deliver alternative education pathways for those Tasmanians who are not degree-ready but are interested in developing further skills. By developing pathways into the University through lower-level qualifications, aspirations of Tasmanians can be raised, particularly in regional areas with traditionally low educational attainment.

The example that serves to illustrate this model arose from work undertaken in the North West[5] to map the supply chain network for manufacturing. This revealed both the gaps and the most strategic places to intervene. The University responded by developing purpose-built education and training pathways for initial delivery in the North West, and graduated 131 students through these courses in the first year (2014). The success of this program in 2014 has led to inquiries from across the State, with Petuna, Grange Resources, INCAT, BCC and Nyrstar all expressing interest in enrolling staff in 2015.

This model of pre-degree courses with embedded pathways into higher levels of learning has the potential to contribute to the economic and social well-being of Tasmania. Our ability to expand our existing work depends upon having the right regulatory and funding environment in place at both State and Federal levels.

e) Faculty of Education - *Agriculture: the concept of the 'Farm School' in our teaching curriculum*

The inclusion of the agriculture sector in the TOR is sensible, as it builds on a competitive advantage that Tasmania already possesses. However, an examination of the Tasmanian Education System shows little focus on this important area at the compulsory school level.

There exists a plausible initiative in the Education of Specialist Teachers for agriculture-based or 'farm' schools. The farm school is a hidden but important element of the education system in Tasmania. There are similarly focussed schools in other Australian states.

Teachers are typically appointed to teach in the Tasmanian farm schools with no particular experience or expertise in agriculture. The most relevant curriculum areas in the present national

[3] 'Advanced Manufacturing: Beyond the production line', CEDA, April 2014, p.15.
[4] 'Advanced Manufacturing: Beyond the production line', CEDA, April 2014, p.33.
[5] 'The Rise of New Manufacturing: Implications of Game Changing Approaches for Productivity, Skills and Education and Training,' Final Report, Janelle Allison, Dayna Broun, Justine Lacey, 2013.

curriculum are Food and Fibre; however, it is not an area that is highlighted in our present course offerings and it means farm schools do not enjoy the level of teacher expertise they might. In addition, this lack of school expertise often means that there is not a clear pathway for students from farm school to university to continue their study of agriculture.

The University is in a unique position to be able to value-add in this area. We know the State Government has spoken of the State becoming a 'Food Bowl', particularly for countries in our region. In this context we have the expertise of TIA, particularly in relation to Food Science and Food Safety, and the Faculty of Education to provide relevant courses not only locally but more widely.

Proposal: the University's Faculty of Education and TIA develop a set of appropriate curriculum units for the preparation of teachers for farm schools and for the upgrading of existing teachers and that these courses be offered nationally and, importantly, internationally through a combination of online and farm school-based experiences.

f) Tasmanian School of Business and Economics (TSBE) – *Tourism: tapping into relevant expertise*

TSBE has access to expert Tourism academic staff who would be willing to work with the State Government, through our Partnership Agreement, on ways to better leverage the benefits of this important sector of our economy.

TSBE also runs the Australian Innovation Research Centre (AIRC). Staff at the AIRC have expertise on innovation, ideas and small business. Current focuses include opportunities in relation to the wine and food industry that are linked to tourism.

TOR 2:

Any challenges associated with the referral of Tasmania's powers under the *Industrial Relations (Commonwealth Powers) Act 2009*

The University notes that the Tasmanian Government referred its industrial relations (IR) powers to the Commonwealth, effective 1 January 2010. In effect, the powers were referred to the Federal Fair Work Commission to deal with all employees except Tasmanian Government employees (who are still dealt with by the Tasmanian Industrial Commission). This referral has had no impact on the University or its employees as the institution, along with all other Australian universities, has always been in the federal jurisdiction.

Anecdotally, the University understands from its industrial relations network, that the referral has been received relatively positively in the business community, as the Federal Fair Work Act is generally regarded as reasonably balanced and modern. In relation to Tasmanian economy, it could be argued that it would be desirable for business in the State to have same IR laws as other states to reduce red tape and make the cost and ease of doing business across borders more efficient.

The issue of penalty rates for weekend and public holiday work is one that resonates closely with the University's more than 30,000 students. These students make up a reasonable percentage of the casual and part-time workforce within the State, often as a way to subsidise the cost of their studies. Such work is prevalent in hospitality, retail, tourism and agriculture, from fruit-pickers to sales assistants to coffee baristas. Any debate within the Tasmanian Parliament on the voracity of the IR laws needs to give a voice to this diverse workforce, as well as to the relevant businesses that employ them.

TOR 3

Any other matters incidental thereto

In discussions across the University, this Legislative Council review generated a range of views and ideas. Below are the issues raised:

a) The importance of interstate and international students

b) Business development

c) Technology-based infrastructure

d) How health contributes to the economic productivity of the State

e) Growing our economy through our Aboriginal engagement

f) Producing high quality legal graduates to contribute to economic growth

g) The concept of the Creative Exchange Institute

h) Tax and economic reform

a) The importance of interstate and international students

A report was commissioned by the University in 2011 from economic consultants IMC Link. Among other things, the report calculated that:

> 'There are currently 2,000 EFTSL[6] interstate students studying with UTAS, of these 1,190 students study within Tasmania and 810 study interstate. Interstate students studying at UTAS have a direct contribution to the Tasmanian economy of $21.18 million. The direct, indirect and induced impact of interstate students on the output of all Tasmanian industries is $36.69 million.
>
> There are currently 3,834 EFTSL international students studying through UTAS, of these 2,362 students study within Tasmania and 1,472 study offshore. International students studying at UTAS have a direct contribution to the Tasmanian economy of $110 million. The direct, indirect and induced impact of international students is $192 million added to the output of all Tasmanian industries.
>
> …
>
> For every 100 EFTSL, the UTAS contribution to the economy is as follows:
>
> - $7.68 million to the output of all Tasmanian industries
> - $4.33 million to real GSP
> - 42 new full-time jobs.'

The Impact Statement 2015, once produced, will update these figures. However, it should be noted that the number of interstate and international students has risen considerably since 2011. As at the end of 2014, there were 2332.3 EFTSL in interstate students studying at the University and 3538 EFTSL in international students (2558.3 onshore and 979.7 offshore).

[6] EFTSL stands for Effective Full Time Student Load. It is a lower number than the headcount number of students as it counts, for example, a part-time student undertaking a 50% course load as 0.5 EFTSL.

A curriculum relevant to international students, particularly those in South East and Northern Asia has been developed. This will lead to greater numbers of students and all of the obvious benefits to the economy and social fabric of Tasmania. This curriculum incorporates work integrated learning which will equip international students to be more work ready allowing more to stay in Tasmania once they graduate.

More generally, with the influx of students from interstate and overseas, there is significant potential for the state to build on its current population base, in turn leading to an increase of those people of working age who also contribute to Tasmania's economic performance through retail and other consumption.

As a condition of their study visa, international students are not allowed to hold full-time permanent jobs, which would require a separate working visa. The students are, however, allowed to work a total of 40 hours per fortnight and contribute to the economy through casual and seasonal work as a result.

Two way mobility (both students and staff) into strategically important regions such as the Asia Pacific also provides an avenue for information/knowledge, relationship transfer and trade. Australian government initiatives such as the New Colombo Plan (NCP) have recognized the potential that mobility into these regions holds for both state and federal economies and has allocated $100 million has committed to the NCP over next three years.

Whilst the economic benefits of international education (on-shore) to the state are relatively easy to identify, these international students provide the added value of significantly increasing Australia and Tasmania's levels of multiculturalism.

Finally, the on-flow of tourism from family visits to international students is another driver of the State's economy. The high proportion of International students from China based at the University of Tasmania assisted in the process of encouraging the Chinese Presidential visit of 2014, which in turn, generated significant investment, trade and tourism opportunities for the State.

b) Business Development - Business Development and Technology Transfer [7]

There are two themes relevant to this debate, as follows:

- Maximising our existing businesses; and
- Building up Tasmania's next generation businesses.

Maximising our Existing Businesses

Under traditional models, starting businesses is an expensive undertaking and the launch of new ventures has a historically high attrition rate. Consequently an investment in improving existing Tasmanian businesses, that have demonstrated viable business models, should be a cost-effective way to ensure long-term sustainability.

To be effective, traditional business-improvement methodologies rely on accurate information so that their business owners can make nimble evidence-based decisions in order to maximise yields, reduce wastage and respond to changing customer demands. Unfortunately, even if validated

[7] The Office of Business Development & Technology Transfer (BD&TT) at the University is responsible for the commercialisation of the University's intellectual property. The unit has experts on business development and leads IP and commercial negotiations with third parties on the University's behalf.

business-improvement methodologies exist, often businesses are unable in real time to access or analyse the vast amounts of data that need to be considered prior to making key commercial decisions. More often than not however, there are no appropriate processes or specific algorithms for a particular business' needs. As a result most ventures must resort to heuristic strategies, anecdotal evidence or simplified datasets to inform their decisions. Consequently, they are often unable to optimise their commercial outcomes, or find themselves uncompetitive in rapidly changing markets.

The burgeoning science of 'big data'[8] is progressively offering a solution, and Tasmania could opt to take an early adopter position and assist local businesses leverage the power of high density sensors and data analytics to allow businesses including those within tourism, hospitality, retail services and agriculture sectors, to dramatically improve their capacity to make real time business critical decisions accurately and cheaper than ever before. An example of the way that data can be collected across a range of industries, how that data can be analysed and used to improve business competitiveness is embodied in the University of Tasmania's, Sense-T[9] project, as outlined earlier in the University's submission.

Building up Tasmania's the Next Generation Businesses

In 2013, Australia ranked poorly in the OECD report card[10] on innovation, ranking second last out of 17 countries, and equal last out of 30 OECD countries, for engagement between research organisations and industry. Nationally, Tasmania consistently ranks[11] in the bottom two states on most economic measures.

While the remedy for this performance is likely to be complex, the University of Tasmania contends that the State could address this trend from at least two perspectives: (a) encourage and facilitate entrepreneurialism and; (b) incentivise businesses and the University to collaborate more frequently and on a longer term basis to improve our businesses' technical competitiveness.

Facilitating Entrepreneurism: The advent of the digital economy has meant that IT-based start-ups have never been easier to establish nor have the barriers to global penetration ever been lower. However, in Tasmania there is a dearth of opportunity for those seeking to understand the skills required to become successful entrepreneurs. There is no persistent and deep pool of capital available to back early stage high-risk businesses. The Tasmanian government could consider the merits of partnering with the University to help develop a cadre of graduates well versed in entrepreneurial skills and to help them via sponsored development programs and to provide seed capital to encourage local start-ups to establish here.

Facilitating Innovation: The State's relatively small local market size, coupled with our geographic isolation, means that Tasmanian Small to Medium size Enterprises (SME) must leverage any available advantages if they are to remain competitive nationally and internationally. Innovation and technology are typically important tools in the armoury of a SME to assist in maintaining that competitiveness. However, SME are often under resourced to retain the services of research organisations such as universities to fund such collaborations. The Tasmanian government could consider providing local businesses with funding or other incentives to encourage industry-led

[8] http://en.wikipedia.org/wiki/Big_data
[9] http://www.sense-t.org.au/
[10] Australian Innovation System Report 2013
[11] State of the States: July 2014 State & territory economic performance report.

collaborative research. The University of Tasmania would welcome the opportunity to discuss potential mechanisms to achieve that.

c) Technology-based infrastructure

The University is supportive of investment in the sort of infrastructure that enables both its mission and the aspirations of the broader Tasmanian economy. The University has had discussions with the Minister for Information Technology and Innovation, Michael Ferguson MHR, regarding the importance, and benefits of investing in the proposed APX-Central submarine cable that would bring true telecommunication diversity to Tasmania, greatly improve the quality of telecommunications services to Tasmania to enable global opportunities and, most importantly, provide a level of parity with mainland Australia.

From a research perspective, the University was the lead partner, with CSIRO, the Australian Antarctic Division and State Government, in securing both compute cloud and storage cloud nodes as part of both the National eResearch Collaboration Tools and Resources project and the Research Data Storage Infrastructure project. Investment in high capacity, high quality telecommunication infrastructure, that ensures high availability through having a diverse connection path, is essential for Tasmania to remain a recognised contributor in research. This will also enable global researchers access to our rich data collections and provide our researchers with better access to external collections.

To this end, nationally, Tasmanian based researchers and scientists have the fifth highest utilisation across all research compute cloud nodes nationally. To meet these increasing demands, the University is investing in a dedicated, environmentally sustainable, eResearch data centre facility. Alongside this investment, the University will be further supporting research outcomes through the planned upgrade of the Tasmanian Partnership for Advanced Computing high performance computer infrastructure to meet both local and national demand. Both investments will add to an increasing national and global reach and will position Tasmania as eResearch leaders, which in turn, will further attract eminent researchers to Tasmania.

From an educational perspective, the University has been the world leader in the Massive Open Online Course (MOOC) space devoted to dementia – with the Wicking Dementia MOOC attracting tens of thousands of 'virtual students' from over 30 countries to the free course offering. This has subsequently led to the creation of a new degree course, which has been heavily subscribed. MOOC's in Marine Science and Indigenous Studies are also available. Similar MOOCs are currently envisaged in the Antarctic research and agricultural science spaces.

Providing quality telecommunications infrastructure to enable better access to educational resources for students studying on campus, from home or studying from overseas further supports a knowledge economy. It will also make Tasmania more attractive to overseas students choosing to study in Australia.

The continued growth of a knowledge economy cannot be sustained without commitment to investment in infrastructure that ensures Tasmania has commensurate connectivity to the mainland States which delivers broader benefits into other sectors of the economy and access global opportunities and markets.

d) How health contributes to the economic productivity of the State - Faculty of Health

The contribution of the Faculty of Health (FoH) to the economic productivity of Tasmania is multifaceted:

1. The health of the community is a key driver of economic performance. The Tasmanian Health System (THS) and FoH share a mission to improve the health of all Tasmanians, therefore, have a mutual role in growing Tasmania's economy; and
2. In conjunction with its partners, particularly the Department of Health and Human Services (DHHS) and THS, the FoH is committed to transforming healthcare in Tasmania through workforce education and translational health and medical research.

FoH offers a suite of health science and health professional courses. In 2014 the Faculty graduated over 1500 health professionals at bachelor level or higher. The majority of THS entry level health professional graduates were Tasmanians; and nearly one third of Tasmanian doctors are graduates of the Faculty. There is strong evidence that local recruitment and clinical training of health professionals increases the likelihood of return of service and reduced staff turnover.

Research collaborations with clinicians across the state is fundamental to translating the Faculty's research findings into health and economic outcomes for the Tasmanian people. This is evidenced through the commitment of Health Service Innovation Tasmania (HSIT) to the ongoing improvement in the quality, effectiveness and safety of healthcare delivery through education, evaluation and strategic innovation. By partnering with THS, DHHS, and other key stakeholders, HSIT will embed evidence-based clinical redesign across the Tasmanian healthcare system to improve health service capacity and sustainability. The social and economic impact of programs such as this for Tasmania are significant.

The current health reforms provide an unprecedented opportunity to strengthen the relationship between our organisations to achieve mutual goals for Tasmania. FoH is enthusiastic to support the development of excellence in the THS through innovation in health professional education, research and joint planning.

e) Growing our economy through our Aboriginal engagement - Professor Maggie Walter, Pro Vice-Chancellor Aboriginal Research and Leadership, Professor of Sociology

The University of Tasmania contributes to the growing of Tasmanian's economy through its Aboriginal engagement. This is a two way contribution. First, by foregrounding our community, cultural and intellectual relationships with Aboriginal Tasmania as a valued and visible aspect of the life and culture of the University, we create a unique point of attraction for non-Indigenous students, especially international students. Within this context, we utilise our unique island setting and its deep Aboriginal history and culture to create a distinctive student experience, curricula and variety of teaching spaces.

Our research also contributes to the development of Aboriginal linked economic opportunities with the potential to do much more. A partnership with Aboriginal people in Tasmania to identify and grow the as yet largely untapped, tourism and hospitality ventures linked to Aboriginal culture/cultural practices, deep and contemporary history and sites, knowledge traditions and foods systems could yield significant economic and cultural opportunities. The second contribution is through our engagement with Aboriginal people as students. The nearly four percent of Tasmania's population who are Aboriginal remain heavily over-represented on measures of socio-economic disadvantage. For example, Aboriginal people in Tasmania: are more than twice as likely to be

unemployed; imprisoned at 3.6 times the rate; and have median weekly incomes less than 80 percent of those of non-Indigenous Tasmanians (ABS 2015; ABS 2013).

Higher education is a proven route away from disadvantage but young Aboriginal people are only one third as likely to participate in higher education as their non-Aboriginal peers. The University provides a variety of programs to support and grow Aboriginal participation. These include the Murina pre-tertiary qualifying program, student support through formal and informal tutoring and mentoring and newer programs that focus on raising achievement aspirations for our Aboriginal students and building the number of Aboriginal and Torres Strait Islander research higher degree candidates. Over the last decade the number of Aboriginal students enrolling at the University of Tasmania has steadily increased with 400 Aboriginal students enrolled in 2014.

f) Producing high quality legal graduates to contribute to economic growth - Faculty of Law

Responsible legal arrangements play a critical role in any framework that facilitates economic growth and minimises unnecessary bureaucracy and red tape. In some cases, law reform may be required and there is a potential role for the Tasmanian Law Reform Institute (embedded within the University's Law Faculty through a State Government and University partnership) to undertake a reference that examines opportunities for the economy from effective and efficient regulation.

Legal education that prepares graduates for a range of future career pathways also contributes to economic growth in the State. This means ensuring that tertiary legal education addresses non-practice pathways such as working for government, business, public service, and the not-for-profit sector, and a focus on upskilling to prepare law graduates for the new globalised environment.

g) The concept of the Creative Exchange Institute - Creative Exchange Institute and Academy of Creative Industries and Performing Arts

The direct contribution of composed, made and designed works by the creative and spatial disciplines at the University to the Tasmanian economy is clear. Research and practice at the Tasmanian College of the Arts with its Conservatorium of Music as well as the School of Architecture and Design have a significant impact on tourism, media, entertainment, festivals and the built environment, with concomitant flow-on economic effects from social and cultural wellbeing. There is also major funding from outside the State, including the Federal Government, for building and infrastructure development in the creative fields including a new complex for the creative industries and performing arts in Hobart.

However, the economic value of the creative industries at the University goes well beyond direct contributions to infrastructure, entertainment and tourism. The University is the only place in the State that can develop different modes of thinking and practice to face a world that is changing in ways in which traditional thought, engagement, decision-making and economic models are struggling to keep pace. Tasmania's most compelling problems and opportunities live between and across conventionally disconnected academic disciplines. The University enacts unique interdisciplinary research engagement and exchange between its fields through research that is innovative and creatively mediated by experimental approaches in the visual and performing arts, architecture and design.

Through its research institutes, including the new Creative Exchange Institute, the University produces research that demonstrates the impact of a 'creative experience economy' where the value of perceptual, behavioural and social change works through different economic models from

fiscal ones, transforming traditional ‘knowledge economies’ that have governed policies for the last few decades. Higher risk but always relevant and engaged research uses the tensions between new and old technologies, knowledge and experience, and existing and potential human capital, to stimulate new modes of living and citizenship. Positioned squarely at the forefront of a movement where professional innovation, social engagement and community participation form the basis of new thinking, the University produces research and undertakes practice that leads the cultural imagination, enhance community wellbeing for the local environment whilst influencing and interacting globally through leadership, partnerships and collaborations.

h) Tax and economic reform - Tasmanian School of Business and Economics (TSBE)

A challenge for the growth of the Tasmanian economy is having a serious discussion about tax reform with which to provide a basis for long-term sustainable investment in initiatives which provide the foundation for future growth.

Issues around the intergenerational distribution of resources should be tackled in a framework that encompasses both economic and eco-system sustainability, particularly given Tasmania's rich endowment of natural resources and its potential to deliver sustainable growth trajectories including employment opportunities for young Tasmanians. Investment in a highly skilled workforce to take advantage of these opportunities, and to innovate and build new opportunities, are critical to a strong future growth path. TSBE has expert economists in this area that are willing and able to contribute through the State Government Partnership Agreement.