

# Leading Locally, Competing Globally:

*Measuring the University of Wollongong's Contribution to Economic and Social Prosperity in the Illawarra and beyond*

**2016**

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### **Abstract**

The University of Wollongong continues to play a leading role in the higher education sector in Australia and globally. This report provides the second comprehensive assessment of UOW's economic and social contribution to the regional economy and the Australian community more generally. It details the findings of a three-month study undertaken by a research team from the SMART Infrastructure Facility, the Faculty of Business, and Cadence Economics, which sought to describe the overall influence of the University of Wollongong (UOW) on economic and social prosperity in Australia, and in particular, the Illawarra region. After a brief background on the University's operations and its home region of Wollongong (defined by the local government areas of Wollongong, Shellharbour and Kiama), the report looks at the direct, indirect and induced impacts of the University's operations, student expenditure (excluding expenditure on UOW tuition already included in the first item), visitor expenditure and capital expenditure. The estimates are reported at the regional, state and national levels, using the 2015 calendar year as the basis for this analysis. This analysis is followed by an assessment of UOW's broader role in developing human capital. Finally, looking beyond the purely economic benefits of UOW, the report provides a descriptive overview of the various non-pecuniary social and cultural contributions UOW makes to the communities that it engages with, including reporting on the voluntary work undertaken by staff and students. This study highlights UOW's strong contribution to Australia's knowledge infrastructure and its enabling role across many areas of economic, social and cultural life.

### **Keywords**

economic, contribution, higher, education, Wollongong, university, social, research

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# **Leading Locally, Competing Globally:**

*Measuring the University of Wollongong's Contribution to Economic  
and Social Prosperity in the Illawarra and beyond – 2016 Update*

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**Verification Notice:**

The methodology, analysis and findings of the economic contribution study in Part II of this report have been independently peer reviewed and verified by Cadence Economics.

**Disclaimer:**

The estimates provided in this report represent the research team's best efforts to provide a comprehensive and reliable overview of UOW's economic and social contribution, based on the data and resources available. Estimates and subsequent views or opinions expressed in this document are those of the authors and do not necessarily represent that of UOW.

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**EXECUTIVE**

**SUMMARY**

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# Executive Summary

## E.1 Background

The contribution of a university is multidimensional in nature, encompassing both economic and broader cultural impacts. In the new knowledge driven economy, innovation, creativity, new technologies and ‘knowledge workers’ have become critical sources of competitiveness, economic growth and employment generation. Much of this activity takes place in a local or regional economic context. Here, regional universities have a pivotal role to play as regional sources of knowledge and innovation, and in training future generations of knowledge workers. Unlike increasingly footloose businesses, regional universities are immobile. Although they may extend their activities to other regional campuses and offshore, their core activities remain local. Hence a better understanding of the economic and social contribution that regional universities make to the local economies and communities in which they are based is highly pertinent.

The University of Wollongong (UOW) commissioned research into the economic and social contribution of its operations and activities to the Illawarra region in 2012. This report updates these results.

## E.2 The University of Wollongong

UOW is a relatively new university, having been incorporated in 1975. UOW has expanded rapidly since its establishment, and offers more than 400 undergraduate and postgraduate course and research degrees within five broad faculties – business, engineering and information sciences, law, humanities and the arts, science, medicine and health, and social sciences, across nine campuses in Australia and overseas. During its relatively brief history the university has achieved an enviable international reputation for world-class research and exceptional teaching quality and is in the top two per cent of universities worldwide.

UOW’s footprint is significant and extends well beyond its main campus and technology park. Located just 80km south of Sydney’s CBD, UOW has access to world-class transport and logistical infrastructure.

UOW student numbers have grown strongly over the past fifteen years, driven in part by significant growth in international student numbers. In 2015, student enrolment totalled 32,302. Of these students, 18,888 were domestically enrolled (on-shore) at one of the university’s nine campuses in Australia and a further 13,414 were enrolled at UOW’s offshore locations, mainly in Dubai and Singapore. The UOW student population is diverse, consisting of some 143 nationalities. Students who travel from Asian countries to study at UOW account for 85 per cent of international students. China, in particular, accounts for a large proportion of students from Asian countries, as do India, Nepal and Vietnam.

### E.3 UOW's economic contribution to the Illawarra region

UOW's economic contribution to the Illawarra region encompasses 'direct' impacts, for instance, in terms of the salaries paid to university employees, but also 'indirect' and 'induced' impacts that are generated in other sectors of the economy, including as a result of flow-on effects. Thus UOW's indirect contribution arises because the university purchases intermediate inputs from other sectors of the economy, while induced impacts pick-up the corresponding increase in consumption or expenditure as they flow through the economy.

UOW's direct, indirect and induced contributions were determined for four key indicators – gross output and value added, as well as income and employment (Table E-1):

- The broadest measure of UOW's economic activity is gross output, which includes all direct, indirect and induced expenditure related to UOW activities. UOW's gross output was \$2.2 billion in 2015.
- Value added is a key measure of economic activity. Subject to adjustments that need to be made to ensure that valuations are internally consistent, the sum of value added across all sectors in a country, state or region equals gross domestic product (GDP), gross state product (GSP), or gross regional product (GRP). UOW's direct value added in the Illawarra region totalled \$573 million in 2015. UOW's total value-added, which includes flow-on economic activity across Australia totalled \$1.2 billion in 2015.
- In terms of jobs and wages, UOW either directly paid or supported \$778 million in labour income and employed or indirectly supported 10,169 jobs across Australia in 2015.

**Table E-1: Economic Contribution of UOW, 2015 (\$ 2015)**

UOW Impact - Australia	Direct (\$m)	Indirect (\$m)	Induced (\$m)	Total (\$m)
Gross Output	\$902	\$588	\$671	\$2,161
Value Added	\$573	\$265	\$371	\$1,210
Labour Income	\$457	\$154	\$167	\$778
Employment (FTE)	5,224	2,272	2,673	10,169

Source: UOW and Cadence Economics analysis.

In real terms, the direct economic contribution of UOW in value-added terms increased by 7.7 per cent from \$532 million in 2011 to \$573 million in 2015. This reflects the continued significance of UOW in the Illawarra and Australia more broadly. The total (direct, indirect and induced) economic contribution has also increased from \$1.191 billion in 2011 to \$1.210 billion in 2015, or by 1.6 per cent. The smaller growth rate in the total contribution reflects a shift in spending on UOW related activities towards the Illawarra region, driven by the significant increase in direct labour income generated by the university.

## E.4 Knowledge impacts

Most individuals and the broader community receive both financial and non-financial benefits as a result of an individual undertaking university studies (Universities Australia 2016). This study updated the 2012 Study by assessing both of these types of benefits within the context of gaining a UOW degree.

Individuals incur some costs in gaining a degree – in terms of the earnings foregone while studying, but benefit subsequently by earning a ‘lifetime graduate earnings premium’ – the gross income differential between Year 12 qualified and UOW degree qualified workers. By the same token, the government incurs expenditures to finance universities but earns a ‘return’ in terms of higher subsequent tax payments from university graduates. Translating these costs into an internal rate of return (IRR), the results of the analysis undertaken suggest that (Table E-2):

- The private IRR decreased from 12 per cent to 9 per cent for females, from 20 per cent to 15 per cent for males, and from 16 per cent to 12 per cent overall per person. This reflects the fact that the costs of a UOW degree increased by 20 per cent since 2011, while wage rates and consequently, the benefits of a degree did not change significantly.
- We also estimate that it will take 9 years for females, 6 years for males and 7 years per person overall to recover the total cost of their education.
- Using the public costs and benefits from investing in UOW, also, we estimated the public rate of return of 15 per cent per person with the payback period of 6 years.

**Table E-1: Private and public rates of return to a three-year UOW degree**

	Female		Male		Person	
	2011	2015	2011	2015	2011	2015
<b>Private</b>						
Private rate of return	12 per cent	9 per cent	20 per cent	15 per cent	16 per cent	12 per cent
Approximate payback period	9 years	9 years	5 years	6 years	N/a	7
<b>Public</b>						
Public (Federal Government) rate of return	10 per cent	12 per cent	17 per cent	17 per cent	14 per cent	15 per cent
Approximate payback period	10	7	6	5	N/a	6

## **E.5 UOW's broader contribution**

The University of Wollongong has been, and will continue to be, a source of strength and centre of learning that anchors the Illawarra's economy. Generally, the success of local economies is enhanced by the presence of universities as a source of skilled workers and new ideas. In this regard, the University's economic and broader contributions assist Wollongong's transition from a 'steel city' towards a more diverse, highly skilled and globally competitive region.

There are many contributions that are made by UOW that are difficult to quantify in purely financial or economic terms. UOW makes a positive contribution throughout the region with students, staff and alumni serving as volunteers both within the university and throughout the broader community. In addition, numerous UOW initiatives support innovation and the spread of new ideas and technologies, including by contributing to:

- research and innovation activities;
- promoting enterprise, business development and growth;
- human capital development; and
- enhancing the social and cultural life of the region.

## **E.6 Conclusions**

The Illawarra region within which UOW is based is undergoing a significant structural transformation from traditional manufacturing activity to more knowledge driven (automated) manufacturing, service and IT sectors. In this context, UOW has a critical role to play as a key generator of new ideas, technology and providing the knowledge workers that are needed for these new knowledge sectors. UOW's role in this regard has been recognised through its international rankings and the numerous research and teaching awards the university has received. While the university alone cannot meet all the needs of a rapidly changing and restructuring local economy, it is apparent that its contribution and leadership role remains vital from a number of perspectives both economic and non-economic as identified in this report.

The university's international reputation for quality research and teaching, its strong links to the global economy in terms of international students, international research collaborations and offshore campuses as well as its contribution to the IT sector and entrepreneurship development through the Innovation Campus make it an exemplar for the region as a whole and for other regional universities in Australia and globally.

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**PART I:**

**INTRODUCTION AND CONTEXT**

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# 1 Introduction

The contribution of a university is multidimensional in nature, compassing both economic and broader cultural impacts. In the new knowledge driven economy, innovation, creativity, new technologies and 'knowledge workers' have become critical sources of competitiveness, economic growth and employment generation. Much of this activity takes place in a local or regional economic context. Here, regional universities have a pivotal role to play as regional sources of knowledge and innovation, and in training future generations of knowledge workers. Unlike increasingly footloose businesses, regional universities are immobile. Although they may extend their activities to other regional campuses and offshore, their core activities remain local. Hence a better understanding of the economic and social contribution that regional universities make to the local economies and communities in which they are based is highly pertinent.

## 1.1 The role of the University of Wollongong

In 2012, the University of Wollongong (UOW) engaged the Centre for Small Business and Regional Research (CSBRR, now the Faculty of Business) to develop a wide-ranging but primarily economic assessment of its role in the Illawarra region and beyond, the results from which were subsequently published (Braithwaite *et al.*, 2013). The aim of the study – referred to as the '2012 Study' in this report – was to provide UOW and its stakeholders with a reliable picture of the breadth and depth of its effects – ranging from individuals to society at large. The result was a comprehensive assessment report that signified a landmark moment in the history of the University of Wollongong. For the first time a holistic statement of the contribution UOW makes to the economic, social, cultural and scientific fabric of society had been provided. A summary of the key economic findings from the 2012 study are summarized in Table 1-1.

**Table 1-1: Summary of four key indicators of UOW-related economic activity \***

Indicator	Total effects (Direct + indirect + induced)		
	Wollongong	NSW	Australia
Gross Output (\$m)	\$1,374	\$1,662	\$2,061
Value Added (\$m)	\$659	\$882	\$1,116
Income (\$m)	\$395	\$509	\$607
Employment (FTEs)	4,825	6,272	7,979

Notes: \* Aggregate of direct, indirect and induced effects of operational, capital, student and visitor expenditure.

Source: Braithwaite et al. 2013.

UOW was found to contribute total (direct + indirect + induced) gross output in excess of \$2.06 billion, value added of \$1.1 billion, and nearly 8,000 full time equivalent jobs throughout the Australian economy:

- in terms of the gross output contribution, about two-thirds was generated in the local economy, equivalent to around 8 per cent of the gross regional product (GRP) of the Illawarra region;
- almost 60 per cent of value added came from the local economy (equivalent to about 5 per cent of local economy gross regional product); and
- 60 per cent of total employment from UOW activity was in the local economy.

These were not inconsiderable contributions for the Illawarra region, a region that is going through an economic transition arising from a decline in traditional primary and manufacturing sector activity towards the services sector, and knowledge and skill intensive manufacturing activity. The 2012 Study provided stakeholders and policy makers with compelling evidence as to the benefits to the Illawarra region of Wollongong being a university city.

## 1.2 Study aims

The present study aims to update and refresh the results of the 2012 Study. Specifically, the aims of the present study are to deliver the following outcomes:

- (1) to update the 2012 study results, and to evaluate UOW's return on public and private investment<sup>1</sup>;
- (2) to improve the previously utilised economic model used in 2012;
- (3) to assist UOW in planning and prioritising future resource allocation; and
- (4) to capture, where possible, the value of the less tangible and difficult to measure (in monetary terms) contributions UOW makes to society in 2016.

## 1.3 Report structure

This report has three parts:

- Part I sets out the broader context for the study. It describes, in turn:
  - the broader societal contribution of universities (Section 2);
  - the structure of UOW, including in terms of its academic offering and achievements (Section 3); and

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<sup>1</sup> The 2012 study was based on 2011 calendar year data. The 2016 study is based on 2015 calendar year data.

- the Illawarra region and the socio-economic challenges faced by the region (Section 4).
- Part II describes the analysis that was undertaken to update the results of the 2012 Study:
  - Section 5 describes the methodology that was applied to determine the economic contribution of UOW;
  - Section 6 sets out the results of the economic analysis; and
  - Section 7 describes the estimated knowledge impacts of UOW, in terms of the net benefits to degree students and the Government.
- Part III, finally looks more broadly at UOW's contribution to businesses and the community, both in the Illawarra region and beyond. Section 8 accordingly describes a broad range of initiatives undertaken by UOW staff and students to support the dissemination of innovation, learning and the knowledge economy.

## 2 Contribution of universities

Universities such as UOW play a central role in creating and disseminating the innovation and knowledge that is key to economic growth and the progress of societies more generally. This section explores the role of universities, focusing specifically on their role in supporting innovation and the transformation of the local economy.

### 2.1 Universities, innovation and the competitiveness of local economies

*“In [the] new economy, knowledge and ideas are a critical component of economic advantage, with intellectual capital being a pivotal resource. Taken in the context of this broader economic transformation, it stands to reason that the university’s role is becoming increasingly important as an economic and social institution.” (Florida and Cohen, 1999, p.589)*

Globalisation has fundamentally altered the way in which both national and local economies operate. The economic reforms undertaken in Australia since the 1980s opened our economy to world markets, and provided regional economies with almost unlimited opportunities to participate in the global economy. Of course, globalisation has also brought increased competition, driving down production costs and improving price, quality and choice for consumers.

In the 21<sup>st</sup> century, competition based purely on resource abundance and labour cost has given way to competition driven also by knowledge generation, creativity and innovation. An interesting phenomenon with globalisation has been the rise in importance of local or regional economies, based around clusters of internationally competitive firms (many of which being small and medium sized enterprises (SMEs)) in an industry sector located reasonably closely to major international gateways (such as Sydney international airport).

Hence national competitiveness has become critically linked to the development of globally competitive regions and their capabilities for knowledge generation and innovation, and ability to translate these capabilities into commercially viable products and services. Successful regions are also engaged with the global economy through their ability to attract international capital flows, generate and attract human capital, generate and exploit new ideas and creativity, develop and attract new technology, and have the capacity to effectively utilise all its local physical and social infrastructure with these objectives in mind.

While knowledge is global, learning is local (Williams, 2002). By their very nature, universities are on the front line as institutions of learning and knowledge generation. In knowledge driven economies, the survival and success of local economies is being increasingly drawn to local

universities as the source of the two most valuable assets in such an economy – an educated and skilled workforce and new ideas.

The vibrancy of local economies and firms is strongly linked to their capacity to adapt to rapidly changing markets and technologies, and to provide commercially viable products, services and production processes. As suggested by Lester (2005), however, not all local economies are equally endowed with the same capacities to respond to these challenges. Outcomes will be strongly influenced by factors such as local endowments of physical and social infrastructure, local firm and institution capabilities and human capital (workforce and entrepreneurs). In this context the contribution and role of local universities as a key institution in its own right as well as in the building of local capabilities is now vital.

## **2.2 Universities as engines of regional and national growth and innovation**

The importance of innovation, technology and human capital to the long-term prosperity and growth of local economies has generated considerable interest in the contribution of local universities. Universities are a primary institutional source of the most valuable assets in the knowledge economy: highly educated people, technology, new ideas and innovation. Local universities have considerable appeal from a local perspective not only as generators of new knowledge, ideas, technology and human capital, but also because they, unlike many other globally focused and mobile institutions and firms, are largely immobile.<sup>2</sup> A university, in its physical form, and comprising all of its activities, is necessarily committed to its region for the long term and is a critical part of its region's physical and social infrastructure.

Not surprisingly, governments, both national and local, in many countries are seeking ways in which to harness and strengthen the role of universities as agents of local and regional development and as facilitators of economic and social transition. Local companies have been looking at university research as contributing to their own research and product development activities and are increasingly interested in the growing commercial relevance of university research in important fields such as nanotechnology and bioengineering. Consequently, universities are becoming increasingly economically engaged, not only with local firms, but also those outside their region and internationally.

## **2.3 The multi-dimensional contribution of universities**

University engagement with their local community, state, nationally and internationally is multidimensional in nature.<sup>3</sup> For the purposes of this report these are categorised broadly into economic and non-economic (see Figure 2-1). There are numerous contributions to the local

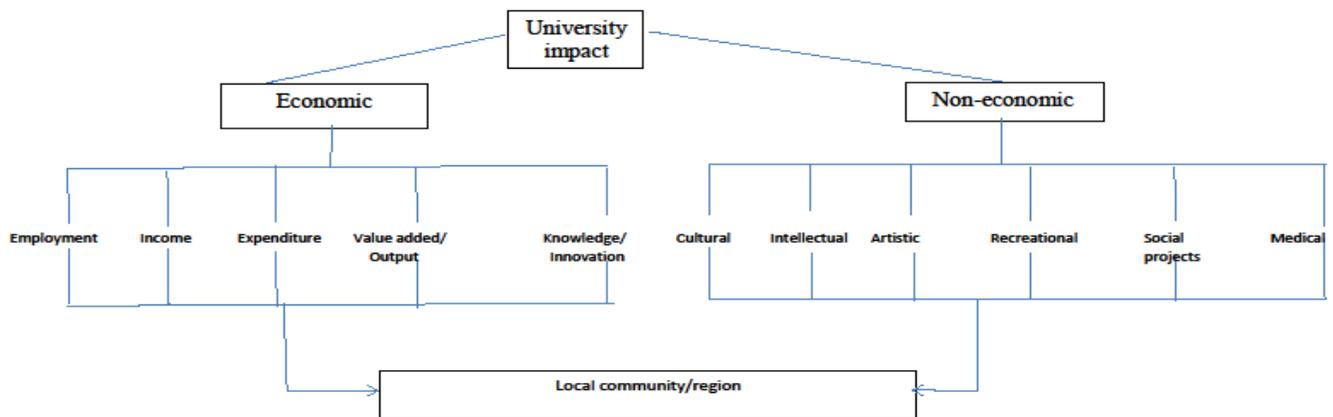
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<sup>2</sup> This, of course, does not prevent more out of region or offshore activity by local universities, but their primary focus and responsibility lies with the local community in which it is located.

<sup>3</sup> This report focuses primarily on measuring the economic effects of UOW on the local region, the State and national economies. The international contributions, while likely to be significant, are beyond the scope of the present study.

community in the economic domain in the form of direct and indirect employment generation, direct and indirect income generation, student fees (international and domestic but from outside the local region), direct spending on local products and services (both current and capital spending) by the university, as well as spending on local products and services by students from outside the region. A university also contributes to the local innovation process through multiple channels – education and training, contribution to the stock of codified knowledge, increasing the local capacity for scientific and technological problem solving and being a conduit for open-ended conversations about industry development pathways and new technological and market opportunities (Lester, 2005).

**Figure 2-1: University contributions to local and regional economies**



Of course, the impact of these activities extend beyond the university’s own local community to other regions in the domestic economy and nationally, and, as internationally embedded knowledge generating institutions, they contribute internationally to: educating students from around the world, the international research literature, interacting and collaborating with firms and governments from many countries, employing and collaborating in their faculties with internationally recognised intellectual leaders from around the world, and providing a pathway for integration of the local economy with the international economy.

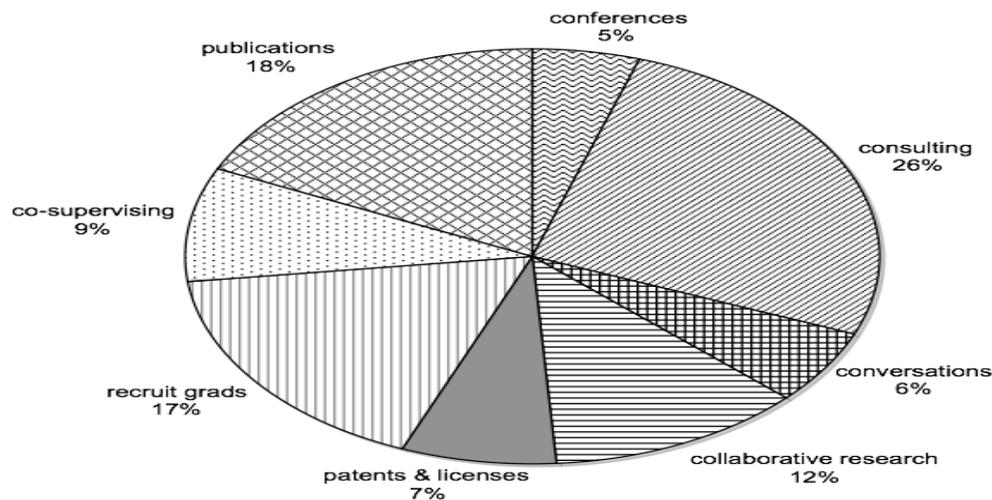
## 2.4 The role of universities in local innovation processes

The traditional model of the contribution of universities to local innovation processes is one that emphasises technology transfer (Lester, 2005). Here, discoveries or new ideas by university researchers proceed to disclosure by their inventors, patenting by the university or the inventor and the licensing of the technology, then to possible start-up or early stage technology based enterprises founded by the inventors themselves. Lester (2005), however, argues that this ‘one size fits all’ approach by universities to regional economic growth and development is no longer relevant and should, instead, be replaced with a more comprehensive and differentiated view

of the university's role. Patenting and licensing is only one of a number of pathways for the transfer of knowledge from universities to industry and may, in fact, not be the most important (see, for example, Cohen *et al.* 2002).

Knowledge transfer from universities can take numerous forms. Based on information provided by staff at the Massachusetts Institute of Technology (MIT) on the most important means of knowledge transfer, Agarwal and Henderson (2002) found that faculty consulting, publications and student recruitment were the most important (see Figure 1.2).

**Figure 2-2: Knowledge transfer mechanisms from university**



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Source: Agarwal and Henderson (2002).

The available evidence on the contribution of universities to local innovation processes suggests that such processes are multi-dimensional in nature involving (Lester, 2005):

- technology transfer;
- the patenting and licensing of intellectual property to local firms;
- attracting human resources/capital from elsewhere;
- adapting knowledge originating from elsewhere to local conditions;
- integrating previously separate areas of technology activity;
- unlocking and redirecting knowledge that is already present in the region but not being put to productive use;
- providing appropriate education and training; and
- providing a public space for ongoing local conversations.

In addition to these processes, universities can also stimulate and encourage entrepreneurial activity relating to the market opportunities arising from university innovation activity.

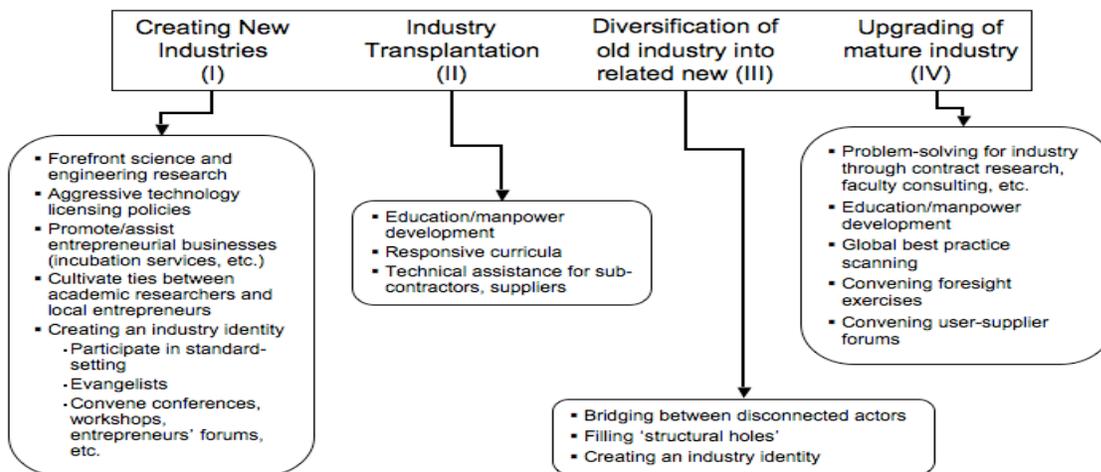
All of the above emphasises the need to take cognisance of a broader view of a university's role in local economies – as creators, receptors, and interpreters of innovation and ideas; as sources of human capital; and as key components of social infrastructure and social capital.

## 2.5 University participation in the economic transformation of the local economy

A university's role in local innovation processes will vary by region as different industrial transition pathways will be followed by different local economies. Figure 2-3 shows patterns of university activity associated with different types of local industrial transformation process, which can range from:

- new industry formation;
- industry transplantation;
- industry diversification; to
- industry upgrading.

**Figure 2-3: University roles in alternative regional innovation-led growth pathways**



Source: Lester, 2005, p.28.

A different pattern of technology take-up will be required depending upon which pathway is adopted and hence require a different set of university contributions (Lester, 2005). This framework suggests the need for a broader more differentiated role for universities in regional innovation that requires universities to align their innovation contribution with local and regional priorities. This outcome will not be the same for every university as different regions

have different transformation pathways, but it suggests a more strategic approach to the economic development role played by the university itself. This strategic approach to implementing a local economic development role is compatible with the pursuit of excellence in the university's traditional primary missions in education and research.

## 3 University of Wollongong

This section provides the context for this study, and describes UOW's location, operational structure, international reputation and awards, student population, student living expenditure, alumni and staff profile.

### 3.1 Location

UOW's main campus (Figure 3-1) and its technology park (the 'Innovation Campus', Figure 3-2) are located in the coastal city of Wollongong, 80km south of the Sydney CBD. UOW has access to world-class transport and logistical infrastructure. Wollongong's proximity to Sydney, however, has also meant that UOW is not classified as a regional university, despite Greater Wollongong (Illawarra) being a largely self-contained region. Within the context of Federal government regional higher education funding initiatives (such as the current Collaborative Research Networks program) this has left UOW at a disadvantage relative to other regionally-based universities in Australia.

**Figure 3-1: University of Wollongong – Main campus**



**Figure 3-2: University of Wollongong – Innovation campus**



## 3.2 Operational context

UOW is a relatively new university, having been incorporated in 1975. In an Australian higher education sector that consists of many institutions that have existed for more than 100 years, UOW has expanded rapidly since its establishment. UOW now offers over 400 undergraduate (bachelor) and postgraduate coursework and research degrees within five broad faculties – business, engineering and information sciences, law, humanities and the arts, science, medicine and health, and social sciences, across nine campuses within Australia and overseas. During its relatively brief history the university has achieved an enviable international reputation for world class research and exceptional teaching quality and is in the top 2 per cent of universities world-wide.

The University of Wollongong has a strong commitment to explore, develop and use human and technological capacity for the economic and social benefit of its region, the nation and also the international community.

## 3.3 Awards and ranking

UOW has received numerous awards and recognition for the quality of its teaching and learning environment as well as its internationally recognised research. A selective summary of these can be found in Table 3-1.

**Table 3-1: University of Wollongong - World Rankings**

Ranking System	Australian Rank	World Rank (year)
Overall	12 (2015) 9 (2016)	-
Quacquarelli Symonds world ranking system (QS)	11	243 (2015/16) 218 (2016)
Times Higher Education world university ranking system (THE)	10=	251-300 (2015/16)
Academic Rankings World Universities rankings system (AWRU)	15-21	301-400 (2016)
US News world university ranking system	11=	346 (2015)
Centre for World University Rankings (CWUR)	10	455

Ranking System	Australian Rank	World Rank (year)
Times Higher Education best world universities under 50 years of age (Times Under 50)	4	37 (2016)
Quacquarelli Symonds universities under 50 years old ranking system (QS Under 50)	2	17 (2015)

Source: Australian Education Network (AEN), downloaded from <http://www.australianuniversities.com.au/rankings/>, August 2016.

UOW is the 12<sup>th</sup> ranked Australian university overall based on world university ranking systems (AEN, 2016). It is ranked number 243 in the world based on the Quacquarelli Symonds (QS) world ranking system and number 11 in Australia. The Times Higher Education (THE) world university ranking system puts UOW in the 251-300 band and equal 10<sup>th</sup> in Australia. UOW is ranked in the 301-400 band based on the ARWU world university ranking system and between 15-21 in Australia. UOW is ranked 346<sup>th</sup> equal on the US News world university ranking system making it 11<sup>th</sup> equal in Australia while it is ranked 455<sup>th</sup> on the CWUR (Centre for World University Rankings) system and 10<sup>th</sup> in Australia. UOW is ranked 37<sup>th</sup> on the THE best world universities under 50 years of age and is number 4 in Australia. UOW ranked 17<sup>th</sup> on the Quacquarelli Symonds (QS) universities under 50 years old ranking system making it number 2 in Australia. All of these rankings indicate that UOW is one of the best modern universities in the world.

Excellence in Research Australia (ERA) ranked UOW at number 9 on the domestic ERA ranking system in 2012, and the Australian Education Network rated UOW as a 4 Star university using its 5 Star ranking system. Along with this recognition the Quality Indicators for Learning and Teaching (QILT) ranked UOW as the number 1 university in New South Wales in 2016 (QILT, 2016) in 9 study areas and first in NSW/ACT for Learning resources, overall satisfaction and skills scale.<sup>4</sup> The 2016 Good Universities Guide gave UOW the highest number of star ratings,<sup>5</sup> and the university was awarded the 2015 Australian Financial Review Higher Education Award for graduate employability.

All of the above indicate the important contribution that UOW is making to the regional, state and national economies in the form of high quality education and learning, research, technology, human capital development and graduate employability, aimed at meeting the needs of an increasingly knowledge and innovation driven society.

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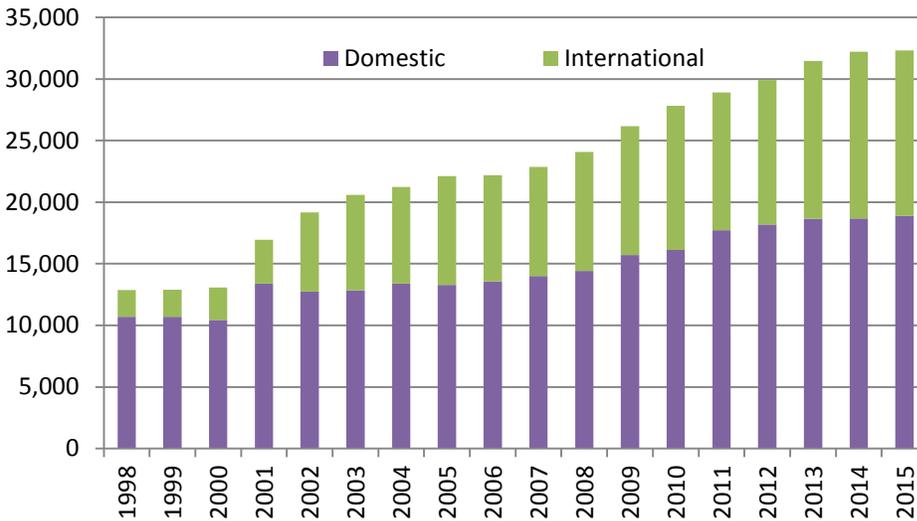
<sup>4</sup> The Quality Indicators for Learning and Teaching (QILT) is funded by the Australian Government Department of Education and Training. See <https://www.qilt.edu.au/>.

<sup>5</sup> This was also the 15<sup>th</sup> year in a row that UOW received five stars for graduates getting a full time job.

### 3.4 Student population

In 2015, UOW had 32,302 students enrolled, of which 18,888 were domestically enrolled (on-shore) at one of the university’s nine campuses in Australia,<sup>6</sup> and a further 13,414 were enrolled at one of the university’s offshore locations.<sup>7</sup> UOW student numbers have grown strongly over the past fifteen years and particularly after 2006 (see Figure 3-3), driven by growth in both domestic student numbers and, in particular, very significant growth in international student numbers. For example, in 1992 UOW had just over 1,000 international students but by 2015 this had increased to 13,414 international students. Many of these international students are based ‘on-shore’ and, thereby, contribute significantly to export earnings for the economy at the regional, state and national levels. Their spending on accommodation, food, transport and entertainment provide a major boost to local businesses and residents.

**Figure 3-3: UOW Student Numbers (1998-2015)**



Source: UOW Performance Indicators Unit, 2016.

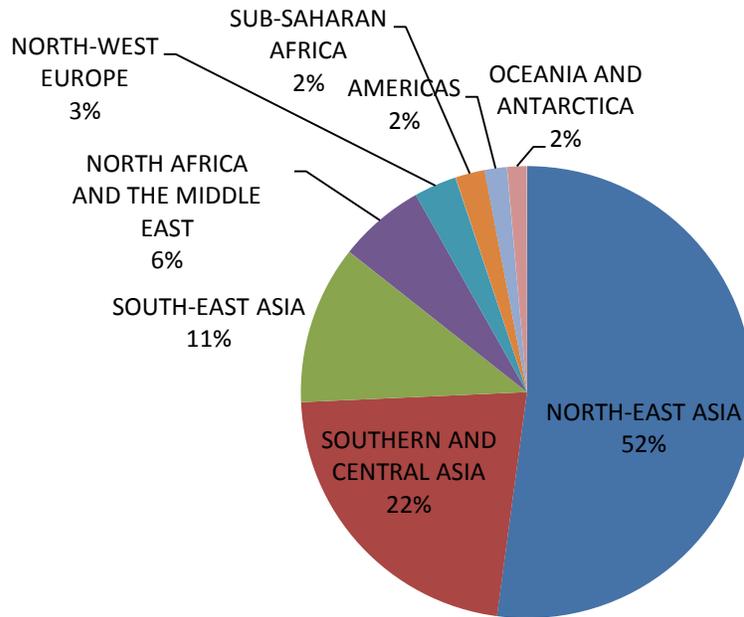
The UOW student population is diverse, consisting of some 143 nationalities. Despite a broad cross-section of nationalities, as Figure 3-4 shows, the international student population is dominated by Asian countries which account for 85 per cent of international students at UOW.

<sup>6</sup> UOW has nine domestic campuses - Wollongong main campus, Innovation campus, Southern Sydney, Bega, Batemans Bay, Shoalhaven, Southern Highlands, Sydney Business School and South Western Sydney. The South Western campus, based in Liverpool, will open in 2017.

<sup>7</sup> UOW programs are delivered at the UOW Dubai campus in the United Arab Emirates. UOW has stewardship of the Community College of City University, in Hong Kong and UOW has partnerships with established international education providers where programs are delivered at INTI Laureate (Malaysia), IRI, Hong Kong (Sino Education), PSB Academy, Singapore and the Singapore Institute of Management.

China, in particular, provides a large proportion of students from Asian countries as well as India, Nepal and Vietnam.

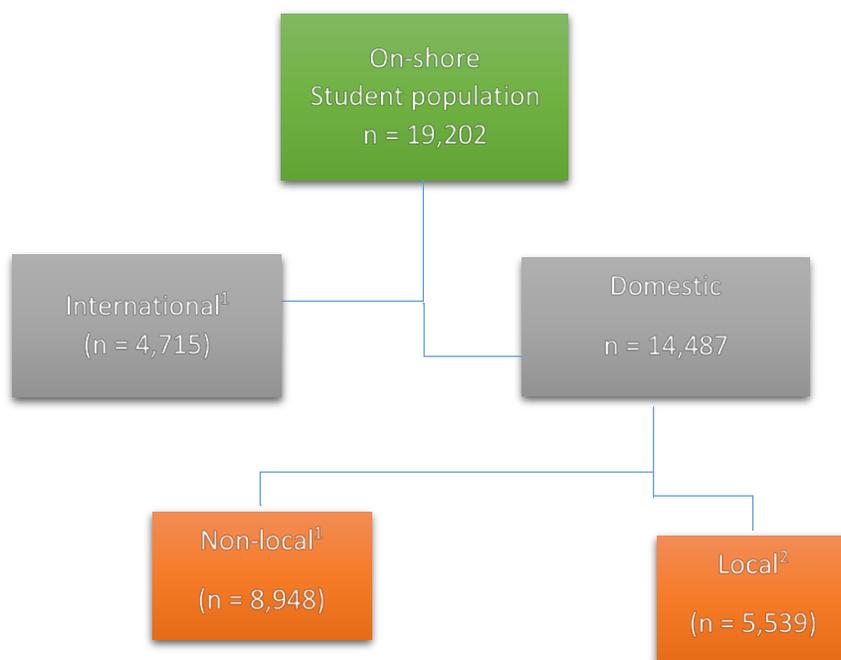
**Figure 3-4: UOW International student origin – on-shore (2015)**



Source: UOW Performance Indicators Cube, 2016.

The population of UOW students can be classified as ‘on-shore’ (i.e. domestic and international students at Wollongong and other Australian campuses) and ‘off-shore’ (i.e. students at overseas campuses undertaking UOW degrees). Figure 3-5 provides a breakdown of the on-shore student population, which is a focus of this study, in terms of Equivalent full-time student load (EFTSL). As shown in Figure 3-5, 5,539 students attending UOW are ‘local’, 8,948 are ‘non-local’; together these groups make up the numbers of UOW domestic students.

**Figure 3-5: 2016 UOW On-Shore Student Breakdown (EFTSL)**



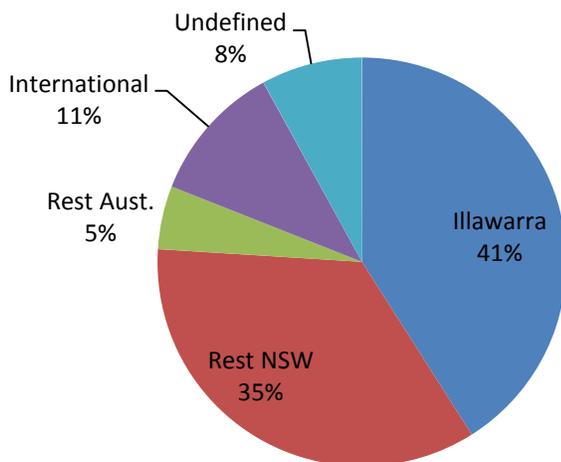
Source: UOW Performance Indicators Cube, 2016.

### 3.5 Alumni

UOW has established a strong Alumni network. Since its foundation, the total number of alumni who have graduated from a UOW campus located in Australia is 100,068.<sup>8</sup> As Figure 3-6 shows, 41 per cent of UOW graduates reside in the Illawarra region, 35 per cent reside elsewhere within the state (mainly Sydney), 5 per cent reside elsewhere in Australia, 11 per cent live overseas, and some 8 per cent are undefined. The 81 per cent of UOW graduates identified as living within Australia make an ongoing contribution to the nation's skilled labour force, income, productivity and innovation.

<sup>8</sup> This number does not include the Teachers College or Wollongong Institute of Education, and represents the number of individual graduates (who may have received more than 1 award or degree) but not the number of awards conferred.

**Figure 3-6: UOW Alumni location**



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Source: UOW Office of Advancement, 2016.

Although outside the scope of the current study, the economic and social contributions of UOW graduates (alumni) residing in other countries should also not be overlooked.

### 3.6 Employment

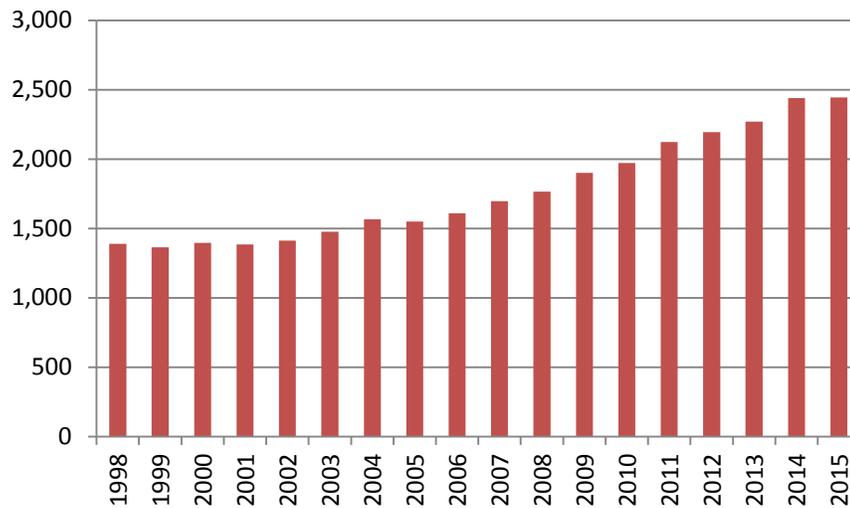
UOW has experienced growth in staff numbers as its student body has expanded (Figure 3-7). With almost 2,500 employees, UOW is amongst the top five employers within the Greater Wollongong/Illawarra region. It is worth noting that UOW has managed to maintain an efficient operating model. Figure 3-8 shows a scatterplot of full-time equivalent staff versus total students (equivalent full-time student load) for all higher education institutions in Australia. It indicates that UOW is operating at a staff to student ratio substantially lower than the Group of Eight universities.<sup>9</sup> Figure 3-9, which shows the student to all staff ratios for all Australian universities confirms this finding. Despite its low staff to student ratio, and highlighted previously, UOW has maintained the highest rating for teaching and learning quality and is ranked ninth amongst all Australian universities for the quality of its research outcomes.<sup>10</sup>

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<sup>9</sup> The Group of Eight is the formal network of Australia's leading universities and includes ANU, UWA, UNSW, USyd, Monash, UMel, Adelaide, UQ.

<sup>10</sup> Based on the 2012 Excellence in Research institutional rankings.

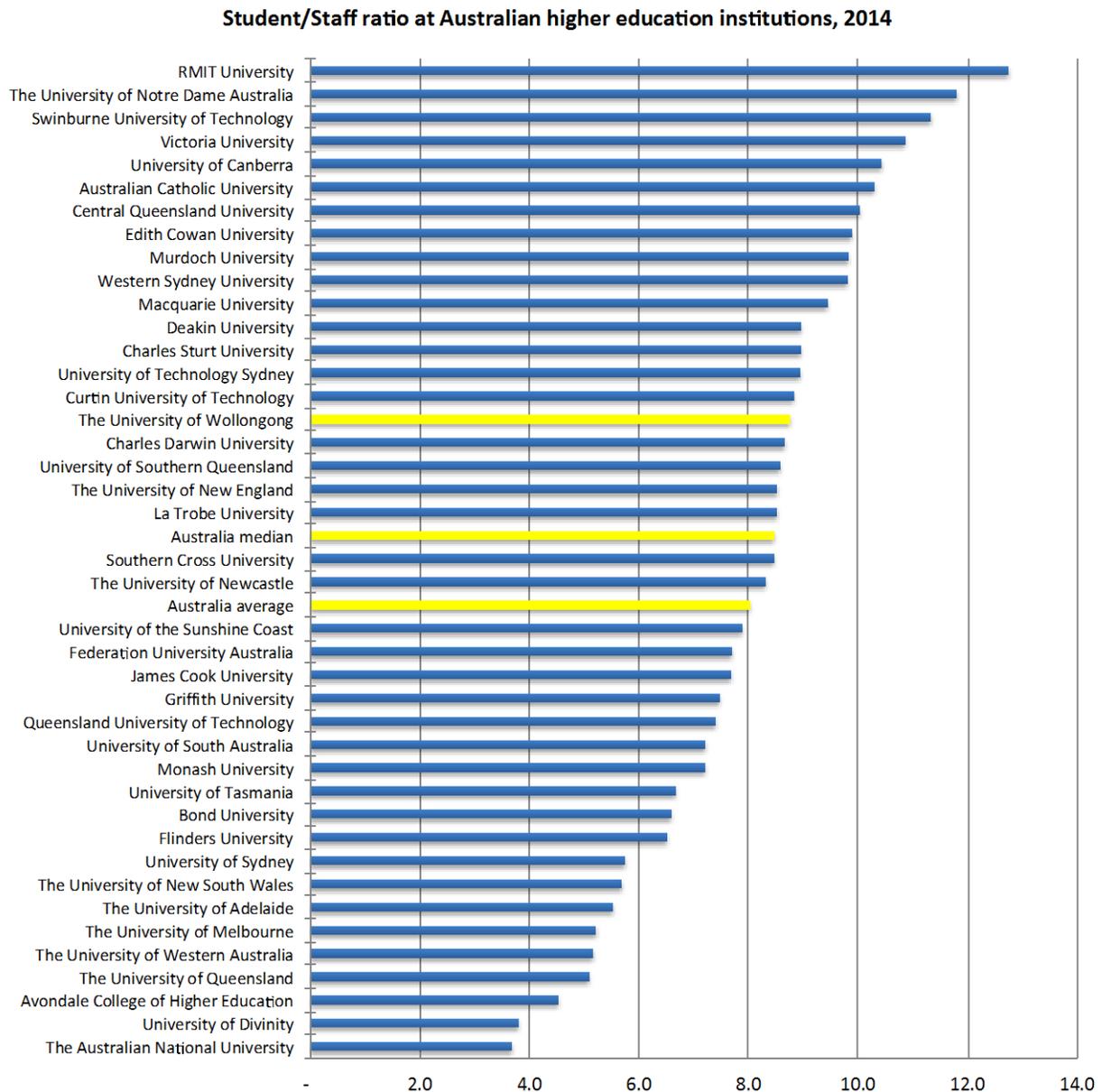
**Figure 3-7: UOW Staff Numbers (1998-2015), full time equivalent**



Notes: Excludes casual employees. Data provided by UOW Vice Chancellery.

The University of Wollongong compares well to other Australian higher education institutions in terms of student/staff ratios. In 2014, there were 8.8 students (EFTSL) per staff member (FTE) at UOW, which is marginally above the median for Australia of 8.5 students per staff member. Some institutions, which have a more intensive research focus (such as ANU at 3.7 students per staff member) impact on the average ration (which is 8.0).

**Figure 3-8: Total staff (FTE) vs. Total students (EFTSL) at Australian Universities (2014)**



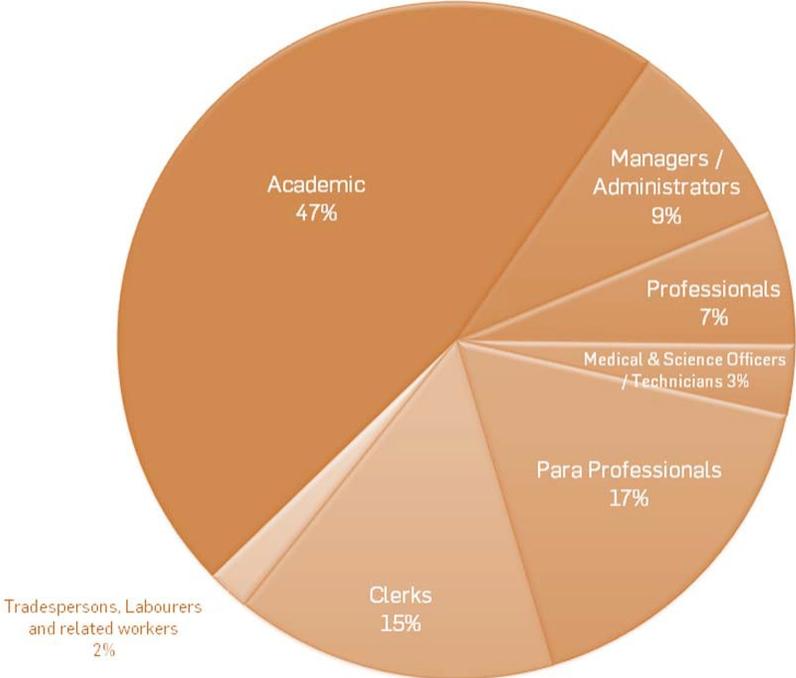
Note: Staff FTEs include both academic and general staff. Counts relate to on-shore operations only.

Source: DEEWR, uCube; at <http://www.highereducationstatistics.deewr.gov.au/>.

UOW's employees provide a major economic stimulus to the region through their spending. Figure 3-10 provides a breakdown of UOW employees by occupation and highlights the large proportion of knowledge workers employed by UOW. Knowledge workers such as academics, professionals, technicians, managers and administrators, which account for about two-thirds of UOW employees, receive wages well above the regional average. These higher incomes create

more wealth due to substantial flow-on effects (spending) within the regional economy as well as contributing to the region’s human capital stock and innovation potential.

**Figure 3-9: UOW staff occupational profile**



Source: UOW Performance Indicators Cube.

## 4 Regional context – Illawarra region

This section provides a profile of the Illawarra region, with Wollongong as its economic hub. While the region is rich in resources and benefits from its proximity to Sydney and key transport hubs, the Illawarra region faces a number of economic challenges, including a transition from traditional heavy industry to new knowledge-intensive industries, an unemployment rate that is consistently above the state and national average<sup>11</sup>, a low labour force participation rate and low productivity.

### 4.1 Location

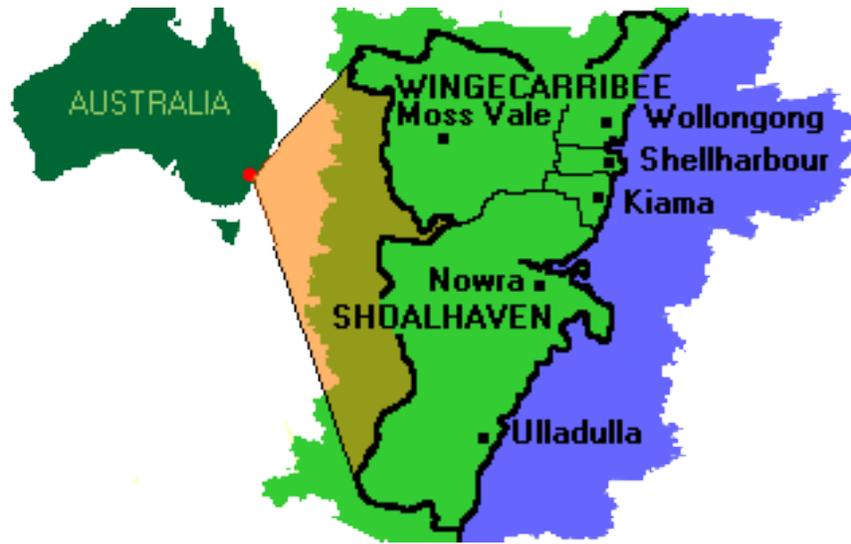
Located to the south of Sydney and to the northeast of Australia's capital city Canberra, the Illawarra region consists of the four local government areas (LGAs) of Kiama, Shellharbour, Wollongong and Shoalhaven, and covers an area of some 5,656 km<sup>2</sup> (Figure 4-1). The city of Wollongong is the region's major population centre with some 210,000 residents, and accounts for around 60 per cent of the region's employment. The region is well positioned strategically, with over five million people living within a three-hour drive from Sydney in the north to Canberra in the south-west and representing nearly one-quarter of Australia's entire population (and containing the nation's political and financial capitals).

What constitutes the Illawarra region is defined differently in different contexts. For example, the Illawarra Regional Information Service and ABS Illawarra Statistical Division indicate that the Illawarra region consists of the LGAs of Kiama, Shellharbour, Shoalhaven, Wingecarribee and Wollongong (area 8,484 km<sup>2</sup>). Elsewhere (NSW Trade and Investment, 2015) the Illawarra region is defined to consist of Kiama, Shellharbour, Shoalhaven and Wollongong LGAs (area 5,656 km<sup>2</sup>, with 89 per cent of the Illawarra regional population). In this report, the Illawarra region is defined to consist of Kiama, Shellharbour, and Wollongong LGAs (area 1,124 km<sup>2</sup>) with a population of approximately 280,000 or 67 per cent of the Illawarra regional population. This approach is consistent with Regional Development Australia's (RDA's) definition in its Regional Development Plan 2010-2015.

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<sup>11</sup> Particularly for youth unemployment.

Figure 4-1: The Illawarra region – broad and narrow definitions



Source: IRIS Research.

The Illawarra region has exceptional natural geography. On its eastern boundary the region has 242 km of coastline and a long coastal plain. According to Iris Research (Regional Profile, 2016):

*The coastline features long, sandy beaches, harbour inlets, rivers, large protected estuaries and bays offering unlimited opportunity for recreation and leisure activities. To the west are the rich agricultural soils and rolling hills of the Southern Tablelands. The divide between the coastal plain and the Tablelands is clearly defined by the sharp rise of the Illawarra Escarpment, which offers spectacular views of the Region.*

*“The region possesses extensive livestock, wood and maritime enterprises, an internationally recognised university, substantial tourism capacity, a population of more than 400,000 and a labour force in excess of 180,000 people. This wealth of resources is perfectly complimented by the region’s stunning physical beauty, making it an ideal place to combine outstanding business success with great lifestyle possibilities.*

The Illawarra region’s many attractions are an important factor in the job and location decision of highly mobile global knowledge workers.

**Figure 4-2: Wollongong's spectacular geography presents natural barriers to growth**



## **4.2 Economic profile – Illawarra region**

The Illawarra region (consisting of the LGAs of Kiama, Shellharbour, Shoalhaven and Wollongong) achieved a Gross Regional Product (GRP) of \$16.2 billion in 2013, representing 12 per cent of Regional NSW's total (\$137.7 billion) or 3.4 per cent of the NSW economy (\$476 billion, NSW Trade and Industry, 2015). The region is traditionally known for its heavy manufacturing industrial production and mining (steel and coal respectively) but is now moving towards a more diverse economy with key industries being manufacturing, health, education and training, tourism, retail, public administration and safety, and construction.<sup>12</sup> The region is going through further transformation and diversification that is being driven by advanced manufacturing, logistics, finance, insurance, business and professional services, ICT, tourism, defence, health (now the largest employment sector) and education sectors although traditional manufacturing, mining and engineering sectors still remain important. The port of Port Kembla is the region's international trade gateway and one of NSW's largest ports and remains critical to the region's prosperity and link with the global economy.

The economic hub of the Illawarra is the city of Wollongong which has almost 300,000 residents and accounts for around 60 per cent of the region's employment. UOW is the region's hub of a strong and growing education and ICT sector. In the IT sector, UOW is an increasingly important contributor and shareholder, having the fourth largest IT student intake in Australia, producing half of all ICT graduates in NSW and one in seven IT graduates nationally. In particular, the University's \$500 million Innovation Campus technology precinct is the focal point for growth in the sector. The precinct is expected to eventually employ around 5,000 people and will help drive collaboration between UOW and industry. With assistance from the NSW Government, the iAccelerate incubator program recently opened a dedicated new \$20 million home at the

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<sup>12</sup> Diversification of the region's economy was given further impetus by a sizeable reduction in steel manufacturing jobs in 2011.

Innovation Campus. By leveraging its skilled workforce, high concentration of ICT graduates and collaboration between government, industry and UOW, the region is in a good position to become an important ICT hub and to drive the growth of the new digital economy. While the UOW's Innovation Campus and the iAccelerate program offer the promise of retaining many of these new IT innovators and entrepreneurs it faces a significant challenge from larger and longer established IT precincts in Sydney. UOW also houses Australia's largest, and one of the longest running, university-based ICT research institutes, which is recognised as a Centre of Excellence in Telecommunications by the NSW Government.

In general, the Illawarra has experienced significant growth in knowledge services sectors (such as professional and financial services), which rely on skilled workers and digital technology.<sup>13</sup> Current public and private investments support continued growth in these sectors. Investment in tourism infrastructure will also be an important growth potential for the region, as well as from the development of industry clusters in aviation, defence and advanced manufacturing. Health Care and Social Assistance (disability, aged care and community services) will also continue to be a driver of economic output in the region, driven by demand for health and aged care services from an ageing population. Wollongong's health and medical precinct is set to gain from large investments expanding both public and private hospital facilities. Strong employment growth is expected in this sector over the next 20 years with the potential for the region to become a 'centre of excellence' in such service delivery (RDA, 2014). Education in the health care sector, both tertiary and vocational therefore represents a key opportunity for the region.

## **4.3 Economic challenges**

Notwithstanding its considerable natural endowments, the Illawarra region is facing a number of economic challenges.

### **4.3.1 An ageing regional population base**

The Illawarra region had a population of 385,250 in 2011, almost two-thirds of which resided in Australia's ninth largest city - Wollongong. Similar to the rest of Australia, the region's population is ageing rapidly.<sup>14</sup> The region's dependency ratio (the ratio of population over 65 to working age population aged 15-64 years) is approximately 26 per cent, and anticipated to rise to 39 per cent over the next twenty years. By comparison, NSW's dependency ratio is 23 per cent, and anticipated to rise to 32 per cent over the next twenty years. As Figure 4-3 shows, the region had a large population over 65 in 2014, about 74,426 or 19 per cent of the region's population, and another large cohort nearing retirement age (aged 45-64yrs), about 101,710, equivalent to a

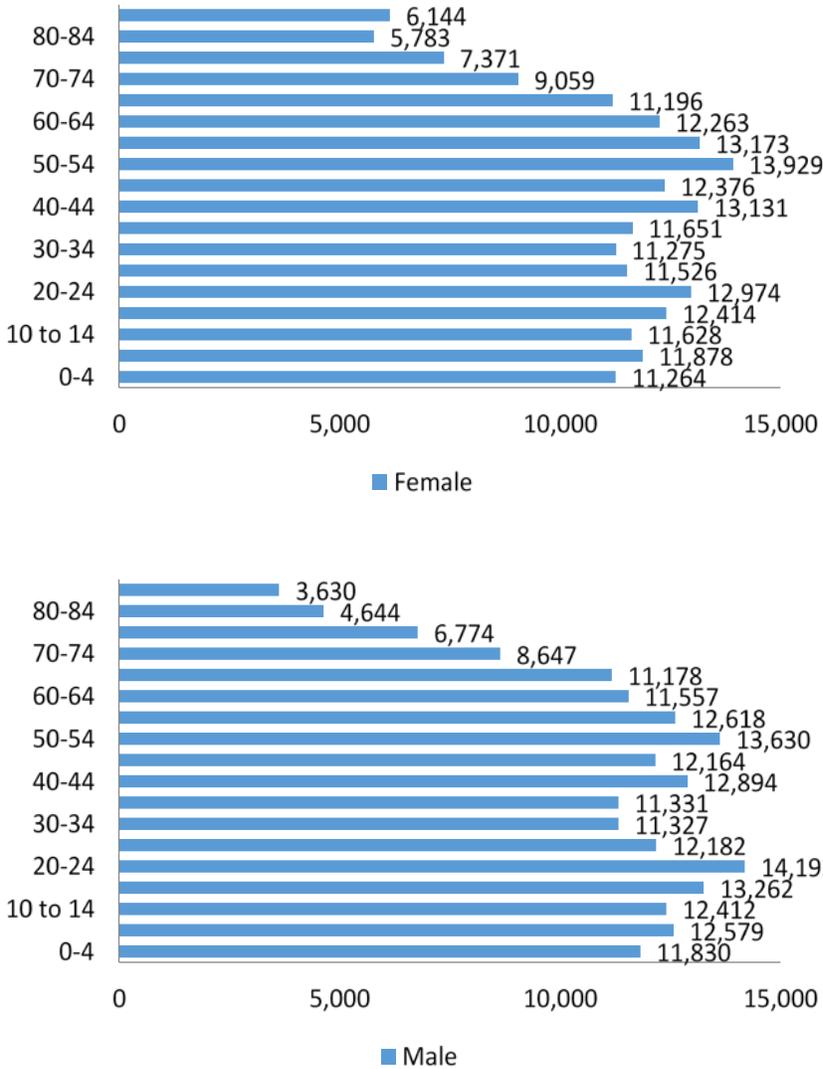
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<sup>13</sup> Around 56.8 per cent of the Illawarra population has post-school qualifications (either university or technical) which is higher than the Regional NSW average of 53.7 per cent.

<sup>14</sup> The fastest growing age group in the region are those 65 years and over; this group is anticipated to grow by 2.54 per cent annually over the next 20 years.

further 26 per cent of the region’s population. The region’s population average age is above that of the state average.

**Figure 4-3: Illawarra Demographics, male and female by age category (2014)**



Source: ABS Regional population growth 2014-2031.

The region’s stunning beaches to the east and dense rainforest escarpment to the west act as a natural barrier to development, leaving the northern Wollongong area, in particular, with a relatively small geographic footprint for new dwellings. Although the Shellharbour and Kiama LGAs have significantly more available land for residential and commercial development than the Wollongong LGA, the projected population growth of the region as a whole is forecast to be at or slightly below the state average over the next 30 years (NSW Department of Planning, 2012). Table 4-1 summarises the anticipated change in the age distribution of the region’s population over the period 2014 to 2031.

**Table 4-1: Projected change in the age distribution of the Illawarra population, 2014-2031**

Age	2014		2031		+/- per cent
	Number	per cent	Number	per cent	
0-14	71,591	18.1	77,200	17	-1.1
15-64	249,869	63.1	259,600	58	-5.1
65+	74,426	18.8	113,600	25	+6.2
Total	395,886	100	450,300	100	0

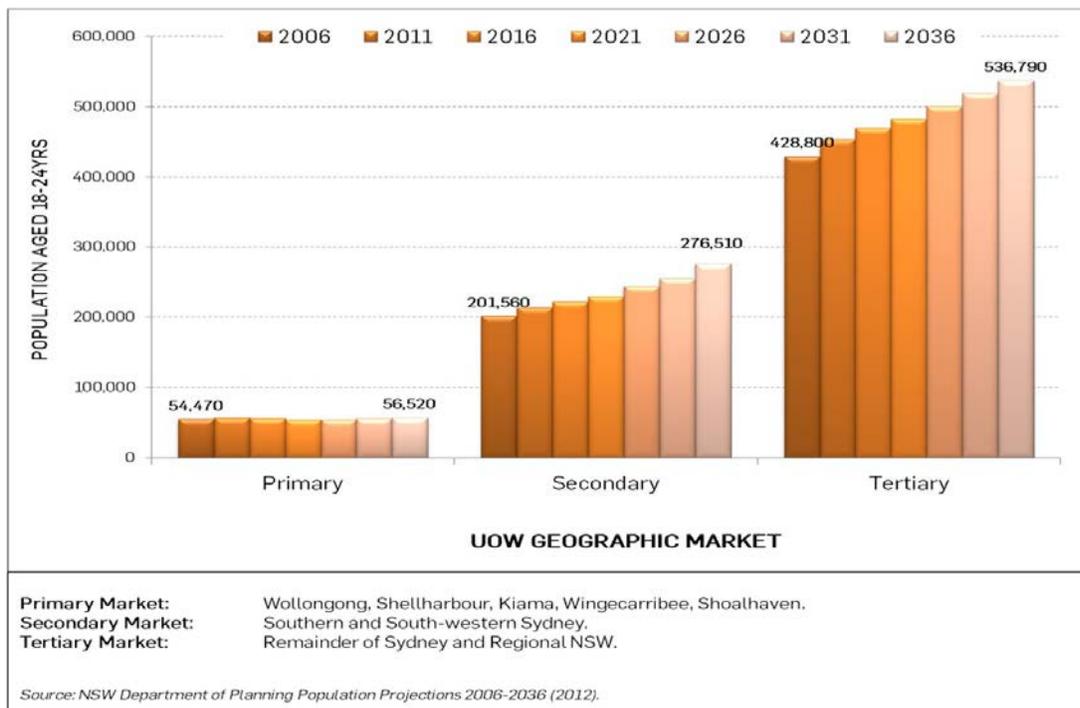
Source: NSW Planning and Environment.

Table 4-1 suggests that the projected annual compound population growth rate will be around 0.8 per cent for the period 2014-2031, well below that for NSW at around 1.2 per cent. The implications of the Illawarra's limited population growth for the period 2014-2031 for UOW is magnified by the related trends highlighted in Figure 4-4. Figure 4-4 shows the projected population growth of the 18-24-year age group up to 2036. The virtual flat lining of growth for Wollongong's 18-24yr age group suggests there is little room for market growth within UOWs primary drawing area over the next 30 years. Conversely, UOWs secondary markets of southern and southwestern Sydney, and tertiary markets of central, northern and north-western Sydney are projected to grow strongly over the same period. Of course, this has longer term strategic implications for UOW, with the importance of sourcing students or establishing campuses outside its traditional 'local' market in order to continue growing.<sup>15</sup>

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<sup>15</sup> This is consistent with the opening of UOWs South Western Sydney campus in Liverpool in 2017.

**Figure 4-4: Actual and projected 18-24yr population cohort in UOW market areas 2006-2036**



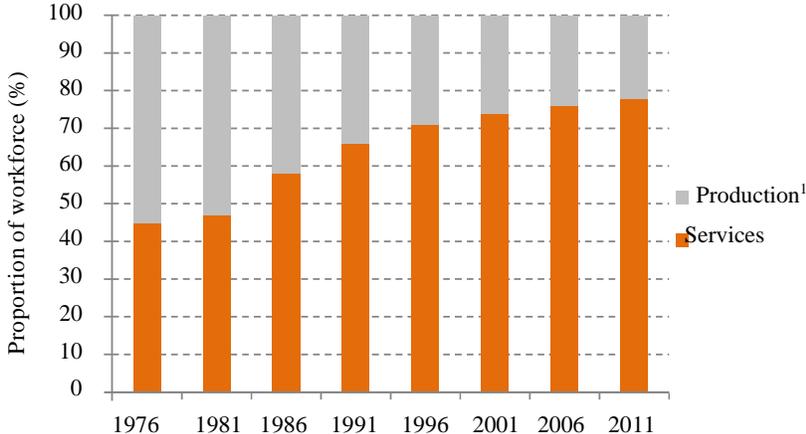
### 4.3.2 The shift from ‘traditional’ to ‘new’ industries

The Illawarra as a region has been economically dependent on coal mining and heavy industry manufacturing since the early 1900s. For decades these industries laid the economic, social and cultural foundations of the region and for Wollongong as a major regional Australian city. However, over the past three decades, there has been a fundamental shift in the balance of international development and terms of trade that has put significant pressure on the region’s traditional industries – particularly manufacturing. Over this period, the Illawarra region has faced substantial economic development challenges, manifested in consistently high unemployment rates, particularly youth unemployment,<sup>16</sup> limited success in attracting new industries and investment and low economic and population growth relative to the state as a whole.

<sup>16</sup> A report by Braithwaite et al (2008) investigating the long term employment challenges facing youth within the Illawarra region found several underlying issues of extreme disadvantage, not least of which were issues of entrenched intergenerational unemployment, educational participation and completion rates consistently well below the state average, and a severe lack of employer demand within the region for jobs suited to 18-24 year old school leavers.

The changing structure of employment in the region over the last 30 years clearly shows the growing importance of UOW’s role as a developer of skilled human capital within the region. As Figure 4-5 and Figure 4-6 illustrate, whilst traditional manufacturing industries, such as the Port Kembla steelworks, continue to be significant employers, there is a clear trend away from production-based employment and toward service-based employment. As the region’s population has become more educated, the region’s skills base has been increasingly able to meet the demands of new industry. Perceptions of the Illawarra and Wollongong linger on past images of smoke stacks, pollution and working class fibro suburbs, but the reality is that the economic and social base of the region has substantially diversified and is now more closely aligned with the structure of the national economy, with knowledge and other service industries becoming prominent employers (Braithwaite, 2006).

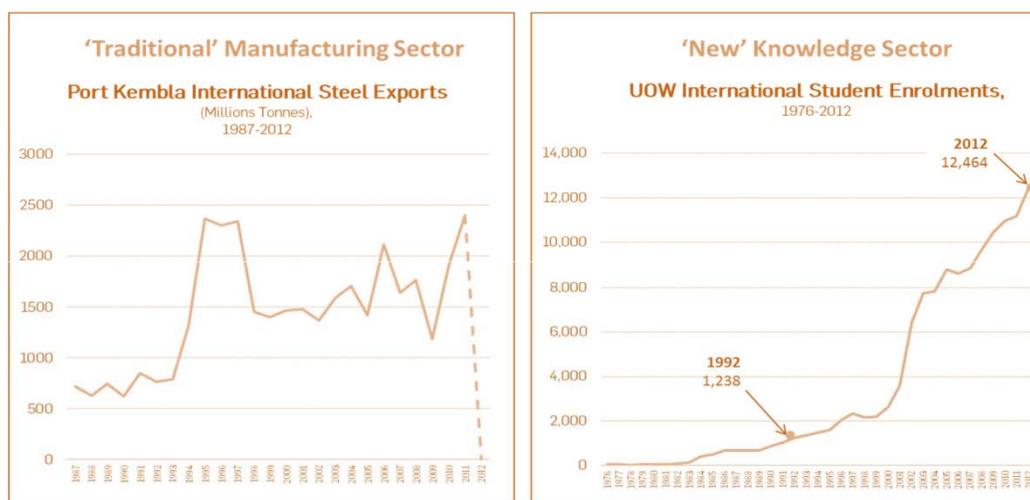
**Figure 4-5: Illawarra’s shift from production to service industries (1976-2011)**



Notes: Production here consists of agriculture, forestry and fishing, mining, manufacturing, utilities and construction.

Source: Source: ABS Census data.

**Figure 4-6: International export comparison – Steel vs. knowledge production**



Notes: Data on international steel exports from Port Kembla was not available for 2012, however, in late 2011 BlueScope Steel announced that it was ceasing its international steel export operations from Port Kembla. Hence, the dotted line represents the assumption that there was no steel exported from Port Kembla in 2012.

Source: IRIS Illawarra Statistical Guides, UOW Performance Indicators database.

### 4.3.3 Unemployment and youth unemployment

The Illawarra’s workforce is comprised of a relatively high share of ‘blue collar’ occupations such as labourers and technicians, and a lower share of highly skilled occupations such as professionals and managers. A characteristic of the Illawarra labour market is a relatively low participation rate (58.6 per cent) compared to that in regional NSW (58.9 per cent) and NSW as a whole (63.39 per cent), reflecting a combination of low job opportunities, a lack of skills and training and a mismatch of skills demanded with skills supplied (Table 4-2).

**Table 4-2: Illawarra labour force trends, 2015**

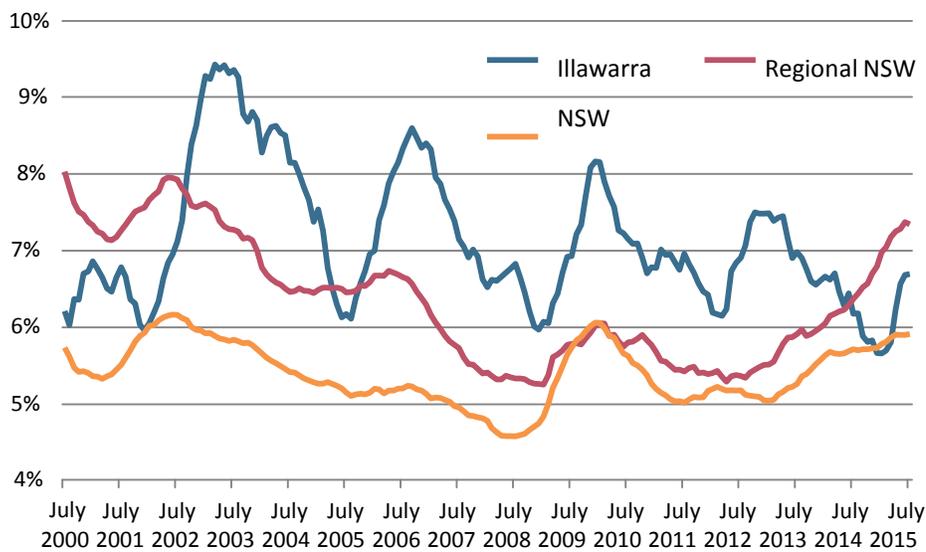
Indicators	Illawarra	Regional NSW	NSW
Employment	134,700	1,197,000	3,664,000
2014-2015 employment growth	0.1 per cent	1.0 per cent	1.7 per cent
Participation rate	58.6 per cent	58.9 per cent	63.3 per cent
Unemployment rate	6.7 per cent	7.3 per cent	5.9 per cent
Youth unemployment rate	14.1 per cent	15.1 per cent	12.7 per cent

Source: ABS, Labour force survey, 2015, September.

Over the last twenty years, there has been a noticeable shift of the workforce toward higher skill industries such as services, and this trend is likely to continue. Despite this trend, the

Illawarra region still remains relatively well represented in terms of employment in traditional industries, and relatively under-represented in regards to service-based industries in comparison to the rest of NSW. Structural, productivity and competitiveness weaknesses in the regional economy have traditionally resulted in sluggish employment growth and high unemployment in the Illawarra relative to other regions of NSW and Australia, an ongoing issue of policy concern (Figure 4-7). The Illawarra’s unemployment rate has been higher than the state average since the late 1980s and its labour force participation has been consistently lower.

**Figure 4-7: Trends in the unemployment rate (per cent), Illawarra, Regional NSW and NSW, 2000 to 2015**



Source: ABS Labour force survey, NSW Parliamentary Research service, September 2015

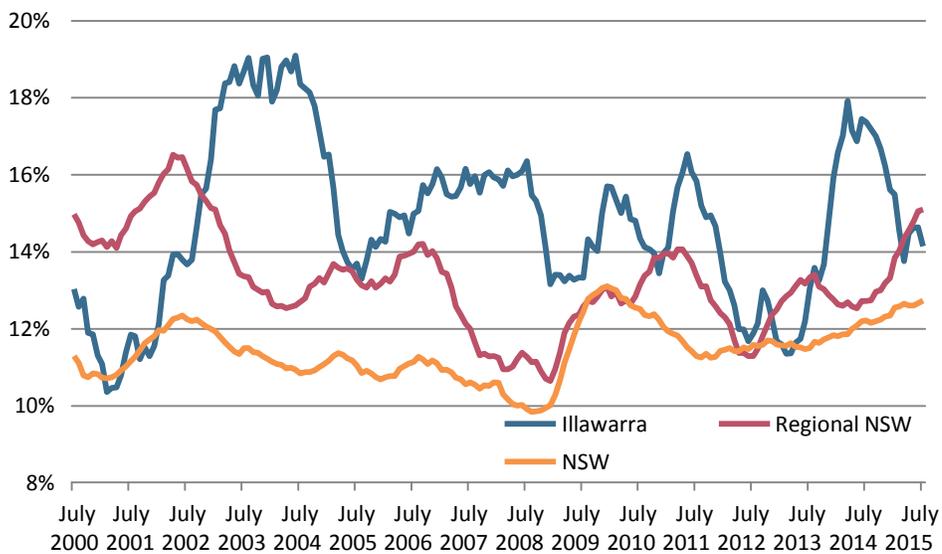
In July 2015 the Illawarra unemployment rate was 6.7 per cent which was higher than the NSW rate (5.9 per cent) but lower than the Regional NSW rate (7.3 per cent). Between July 2000 and July 2015, the Illawarra unemployment rate has generally exceeded the Regional NSW rate. However, the region’s unemployment rate is much lower than the highest value it attained in the last 15 years which was 9.4 per cent in March 2003. Figure 4-7 shows that the region’s unemployment rate has been consistently 1.5 to 2 per cent above the state average, indicative of deep underlying structural unemployment problems.

Over the past 2-3 years this gap has noticeably closed suggesting that the structure of the economy and its competitiveness has improved. Between July 2000 and July 2015, the total number of employed people in the Illawarra grew from 116,400 to 134,700 (up 14.9 per cent) but regional NSW (+17.1 per cent) and NSW (+21.4 per cent) both grew by a larger proportion. Most of the Illawarra employment growth was due to part-time employment growth, from 31,200 to 48,700. Full-time employment only increased from 85,200 to 86,000. Most jobs

growth in NSW generally can be categorized as part time, in the services sector and in higher/medium skilled occupations.

Figure 4-8 shows that unemployment issues are particularly severe for the region’s youth (15-24 year-olds). Over the last 15-16 years the Illawarra youth unemployment rate has fluctuated considerably between a low of 10.4 per cent in February 2001 and a high of 19.1 per cent in June 2004. Over the past 3 years the rate spiked at 17.9 per cent in March 2014 before falling to 14.1 per cent in July 2015. The Regional NSW rate was 15.1 per cent and the NSW rate was 12.7 per cent at this time. The Illawarra had a 2-year average youth unemployment rate of 15.7 per cent, which is higher than Regional NSW (13.4 per cent) and NSW (12.2 per cent).

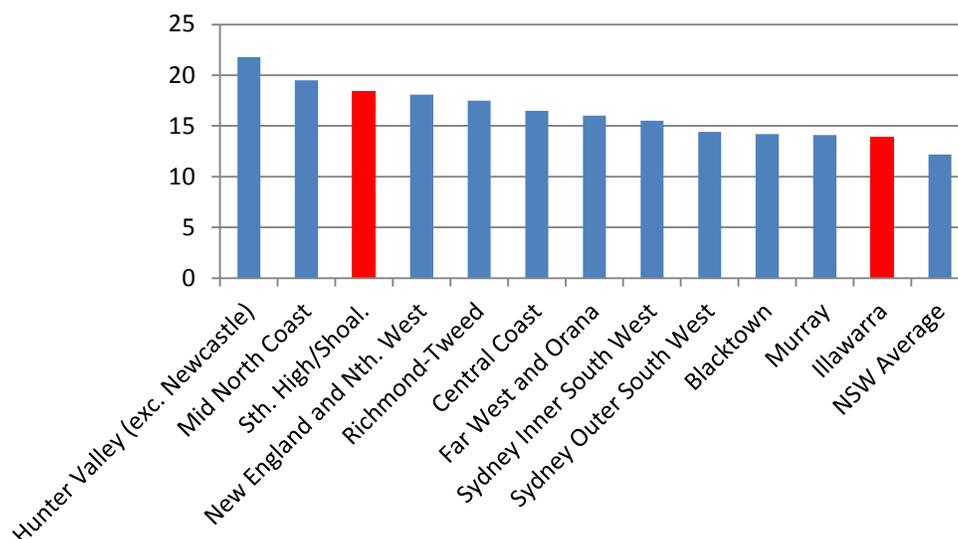
**Figure 4-8: Youth (15-24yrs) unemployment rate (per cent), Illawarra, Regional NSW and NSW, 2000 to 2015**



Source: ABS Labour force survey, NSW Parliamentary Research service, September 2015.

Both the Illawarra (13.9 per cent) and the Southern Highlands and Shoalhaven (18.4 per cent) are amongst the top hot spots in NSW in terms of youth unemployment in 2016 (Figure 4-9). The region’s persistently high unemployment rate is symptomatic of its difficulty in addressing complex and rapidly changing labour market challenges that come with the competitive demands of an increasingly global economy. Like many regions, Wollongong, and the Illawarra more generally, suffers from a latent ‘structural mismatch’, with employing sectors seeking new skills not often held by the displaced workforce. The workforce requires time, resources and significant training support to gain the necessary skills to compete in what is a vastly changed employment landscape. In this context the region’s education sector, with UOW at its hub, has a critical role to play in the regional economy.

**Figure 4-9: Youth (15-24 yrs) unemployment rates (per cent) in NSW hot spots (2016)**



Source: Brotherhood of St Lawrence; ABS, March 2016

Regional Development Australia (RDA, 2014) considered the Illawarra's future labour force and employment outcomes over the next 20 years and came to a number of conclusions:<sup>17</sup>

- First, employment in the Illawarra is expected to experience an average 0.5 per cent per annum growth, compared with 1.0 per cent for New South Wales as a whole.
- Second, there would be a steady decline in the number of jobs in the manufacturing sector by around 4,000, equivalent to about 3 per cent of the Illawarra's workforce in 2014. An overall increase in manufacturing production is anticipated to be driven by improvements in productivity. In some niche areas in manufacturing employment growth could actually increase, although the precise nature of these niche areas was not specified more precisely.
- Third, the fastest growing sector would be health care, driven primarily by an ageing population. This sector's workforce is anticipated to grow by the equivalent of nearly 4 per cent of the region's total employment base over the 20-year period.
- Fourth, employment in education and training are also anticipated to grow rapidly, by about 3,000 workers over the next twenty years, driven primarily by the ongoing strength of the region in vocational and tertiary education programs.

<sup>17</sup> These projections are based on underlying assumption made in the RDA report relating to 1) the region's future demographics: the average age of Illawarra residents is expected to rise more rapidly than other regions in NSW, and 2) the region's industry structure, where manufacturing and mining will remain over-represented in the regional economy, resulting in only very modest employment growth. It can be argued, however, that these assumptions and the conclusions derived from them are rather on the pessimistic side.

- Fifth, the report anticipated that there would be strong growth in the services sector with professional and administrative services and hospitality employment given particular emphasis.
- Finally, the transport sector is anticipated to generate around 2,000 more jobs over the next 20 years linked to increased coals exports through Port Kembla in the short run and in the longer run by a switch to containerized trade and exports.

#### **4.3.4 Large commuter workforce**

The proximity to Sydney and the importance of ‘journey to work’ is a key facet of the Illawarra’s workforce. Some 94 per cent of individuals who work in the Illawarra also reside in the region, but only 72 per cent of Illawarra residents who are employed work in the region. In other words, more than one quarter of employed people who reside in the Illawarra travel outside the region for work (RDA, 2014). This is one of the effects of limited job opportunities in the Illawarra and the close proximity to Sydney and to higher paid employment which exert an important impact on the region’s labour force dynamics. For instance, many Wollongong residents commute outside the region either because opportunities do not exist locally or are better elsewhere (particularly in Sydney).

Figure 4-10 shows where Wollongong residents travelled to work. Nearly 30,000 residents, or 28 per cent of the workforce, were found to travel outside the region for work, with over half of these commuters (17,150) travelling to Sydney for work. Table 4-3 shows the occupations of Wollongong’s commuter workforce by broad occupation level, with those working as professionals (20 per cent), technicians and trades workers (20 per cent) and managers (11 per cent) contributing over half the total.

**Figure 4-10: Where do Wollongong residents work?**



Source: ABS 2011 Census.

**Table 4-3: Occupations of Wollongong’s commuter workforce**

Occupation	Percentage of all travelling
Professionals	20%
Technicians and Trades Workers	20%
Managers	11%
Community & Personal Service Workers	11%
Labourers	11%
Clerical and Administrative Workers	10%
Machinery Operators and Drivers	9%
Sales Workers	7%

Note: Excludes workers whose place of work was not stated or inadequately described.

Sources: 2011 Census of Population and Housing, Google Maps.

## 4.4 Summary – A region in transition and in need of economic leadership

The Illawarra region has much to offer. It is well placed geographically to take advantage of Australia's economic and political capitals – Sydney and Canberra. The region also has a large, diverse and increasingly skilled population, and a stunning natural setting. But it is also a region that has experienced a sustained period of major structural adjustment to its economic base leading to issues of structural unemployment, job creation and investment.

UOW's economic and broader contribution is of course closely tied to its role in the evolution of Wollongong from a steel city towards being a diverse, highly skilled and globally competitive city. UOW has been, and will continue to be, an active partner in creating a better economic future for Wollongong. As the remainder of this report will demonstrate via an analysis of the available evidence, UOW has, is and will continue to provide Wollongong and the Illawarra region more generally with the local economic leadership it needs to grow and reach its full potential as a vibrant, prosperous and globally competitive region well into the future.

In its Illawarra - Regional Development Plan 2013-2020, RDA (2014) argued for the attainment of six regional priorities:

- Broadband/ICT;
- Green Jobs Illawarra;
- Education and Skills Development;
- Transport and Strategic Infrastructure;
- Equity and Human Services; and
- Tourism, Arts and Culture.

RDA (2014) also emphasised that the region's sustainable long run economic growth has to be built upon the 3Ps - population, participation and productivity. The population growth of the Illawarra has been low relative to that in NSW as a whole. Hence the following initiatives were considered important:

- encouraging population movement, particularly of skilled knowledge workers, to the Illawarra region through affordable housing, lower costs for business and good infrastructure;
- encouraging participation in the labour force by improving skill levels, providing assistance for redeployment from declining sectors, and providing more opportunities for university graduates to remain in the region; and
- improving productivity growth by improving the region's knowledge, innovation, new ideas and technology capability in key sectors such as manufacturing, services,

tourism, health care, IT and education.

In two of these aspects the UOW will be pivotal in providing a critical leadership role.

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**PART II:**

**UOW ECONOMIC CONTRIBUTION**

---

## **5 Methodology for determining UOW's economic contribution**

This section describes the methodology that has been applied to determine the contribution of UOW to the Illawarra regional economy, an economy that is undergoing major economic and social transformation.

### **5.1 Universities as engines of growth and innovation**

Universities support, foster and drive economic growth. Universities are a primary institutional source of the most valuable assets in the knowledge economy: highly educated people, technology, new ideas and innovation. Their presence may also attract other key economic resources to the region such as firms, entrepreneurs and associated knowledge workers, as well as others seeking to exploit new business opportunities emanating from university research and technology activity. Local universities have considerable appeal from a local perspective not only as generators of new knowledge, ideas, technology and human capital but also because they, unlike many other globally focused and mobile institutions and firms, are largely immobile. A university, in its physical form, and its activities are necessarily committed to its region for the long term and is a critical part of its physical and social infrastructure.

University engagement with the local community, state, nationally and internationally is multidimensional in nature. There are numerous contributions to the local community in the economic domain in the form of direct and indirect employment generation, direct and indirect income generation, student fees, direct spending and investment on local products and services by the university as well as spending on local products and services by students from outside the region. Universities also provide important cultural, intellectual, architectural, aesthetic, artistic, athletic, recreational and medical resources, which can add to the vibrancy, creativity and dynamism of local communities. University students and staff also participate and make important voluntary contributions to local social projects through voluntary and other activities.

All of the above emphasises the need to take cognisance of a broader view of the university's role in local economies – as creators, receptors, and interpreters of innovation and ideas; as sources of human capital; and as key components of social infrastructure and social capital.

### **5.2 Modelling parameters**

This study updates UOW's 2011 economic activity at three geographic levels - Wollongong, New South Wales and Australia (Figure 5-1). For the purposes of this study, the Illawarra region is defined as the geographic area starting 50km south of the Sydney CBD at Stanwell Tops, includes the cities of Wollongong, Shellharbour and Kiama, and is bordered by the small town of Gerroa to the south and the Illawarra escarpment to the west.

**Figure 5-1: Geographic focus – Illawarra region / NSW / Australia**



The economic modelling uses 2015 data, the most recent year for which comprehensive data is available on the operations of the University. The model also uses the most current population and employment figures from the Australian Bureau of Statistics Census (August 2015).

### **5.3 Estimating expenditure impacts**

UOW-related expenditures have an impact at the local, state and national levels in a number of ways. UOW's operational and construction activities provide linkages with firms through the purchase of goods and services as inputs to its operations, and through the employment of workers who in turn spend within the economy. Similarly, students and visitors attending the University contribute to the economy through the consumption of goods and services.

Student expenditures are an important component of the wider economic impacts of UOW. One important measurement issue is whether or not to include local student expenditure in the economic impact analysis. As shown in Figure 3-5, 5,539 students attending UOW are 'local'. If UOW did not exist, many of these students would likely attend university outside the region. This study has taken a conservative approach to estimating local student expenditure, by excluding all non-university related expenses, as it could be assumed that this expenditure would have occurred within the region regardless of whether they were attending UOW. More generally, the approach that has been taken to modelling student expenditures is:

- **Non-Local Students:** All expenditure by students who come from outside the Greater Wollongong (Illawarra) region. If UOW did not exist, this cohort would not have come to the region and would not have been a source of expenditure.
- **Local Students:** Most local student expenditure (e.g. food, housing, utilities etc.) and flow-on effects would have occurred even without the existence of the university. Our

analysis only includes that proportion of expenditure by local students that can be attributed to the completion of university studies (e.g. transportation to and from university, parking, on-campus expenditure such as food, books and amenities fees etc.).

## **5.4 Choosing an appropriate economic modelling approach**

The most common way to measure these types of demand-side effects is through modelling the impacts of economic activity on key macro-level indicators. But there is a wide range of modelling approaches and it is important to select the right one for the task at hand.

Input-output modelling revolutionised the study of economic structure. The first empirical inter-industry model was developed by Leontief in the 1930's in his study of the American economy (Leontief, 1936). Since then, the input-output approach has developed from a relatively simple and naïve tool to one with a seemingly infinite variety of modifications and adaptations. Modern input-output models bear little relationship to their forebears.

There are a number of inter-industry modelling approaches, ranging from simple input-output (IO) through extended demo-economic and commodity-activity models to input-output – econometric (IOEC) and computable general equilibrium (CGE) models. No single tool (model) will solve all problems. The type of model selected will depend on various factors; the particular application (macro/inter-industry, static/dynamic), type of region (national/large/small, open/closed), available resources (time, cost), and data availability (primary/secondary, real/imposed).

### **5.4.1 A simple explanation of input-output analysis**

One standard approach to identifying and measuring an organisations economic impact or its contribution to GDP (or GSP or GRP) is through the use of IO analysis. IO analysis is an approach to measuring economic activity that is based on the trade linkages between economic sectors. For example, UOW is dependent on many industries to supply crucial inputs such as electricity generation, manufacturing, transport services, financial services and retail trade. This study uses the IO tables produced by the ABS that form part of the Australian national accounts as the basis for developing similar tables for the Illawarra region. These regional IO tables provide detailed information about the supply and use of products in the Illawarra economy, and the structure of and inter–relationships between industries. In this way, IO analysis is ‘locked-down’ by the national accounting framework and essentially maps spending and production across industries in the economy. As a result of these relationships the IO tables can measure both the *direct* and *indirect* contribution of output, as discussed below.

### **5.4.2 The Cadence Economics Regional Input Output Model (CE-RIOM)**

For this study, UOW partnered with Cadence Economics who developed a regional model of the Illawarra economy – the Cadence Economics Regional Input Output Model (CE-RIOM) – based

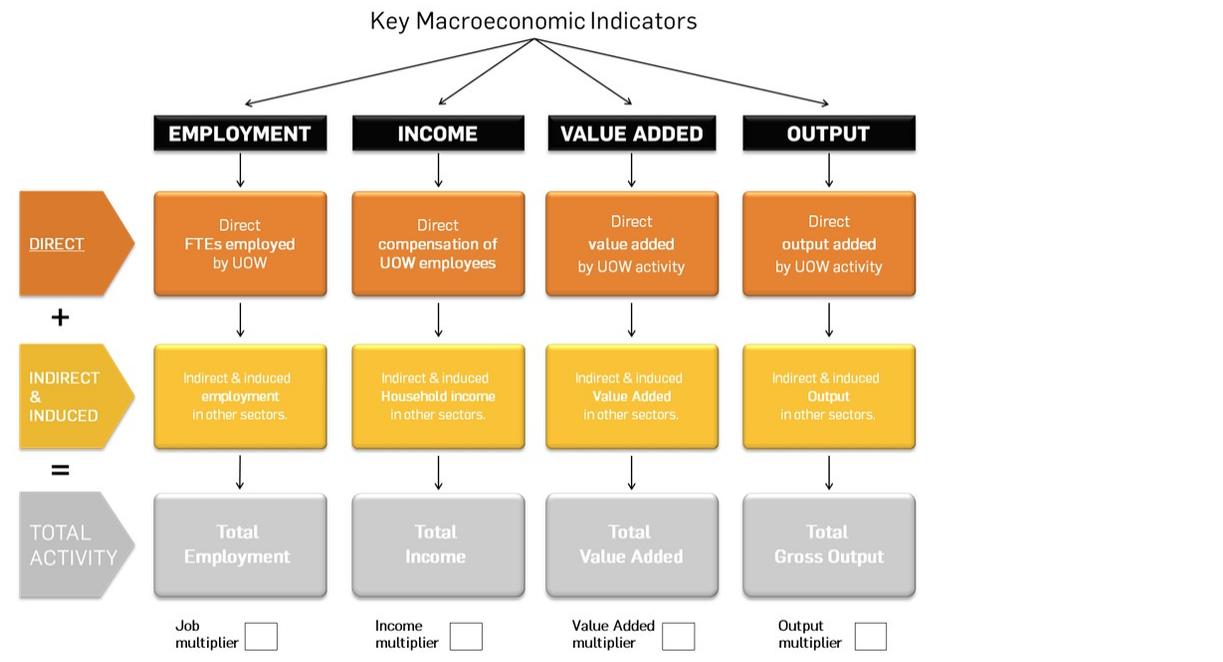
on the standard ABS Input Output tables and census data on residence and place of work.

The ABS IO tables are used in economic contribution studies to account for the intermediate flows of goods and services between sectors. These tables measure the direct economic activity of every sector in the economy at the national level. The IO tables allow for intermediate inputs to be further broken down by source. These detailed intermediate flows can be used to derive the total change in economic activity associated with a given direct change in activity for a given sector.

CE-RIOM is a standard IO Model whose uniqueness is the algorithm used to measure the economic contribution (direct, indirect and induced) by any combination of LGA in Australia.

CE-RIOM uses the 2012-13 Input Output Tables published by the Australian Bureau of Statistics, and utilises the standard 114 industries by product group.

**Figure 5-2: Four measures of UOW’s direct, indirect and induced effects**



## 5.5 Understanding the indicators

UOW’s direct, indirect and induced effects are measured for four key economic indicators (Figure 5-3):

- (1) **Value added.** Gross expenditure measures are susceptible to multiple counting because they sum of all the intermediate transactions over all stages of production during the production process. Consequentially, they can substantially overstate the contribution to economic activity. A preferred measure of the contribution to economic

growth is value added. This is technically defined as wages and salaries and supplements paid to labour plus gross operating surplus plus indirect taxes on products and production less subsidies, but for practical purposes measures payments to factors of production (labour and capital), including net taxes on production. The sum of all industry value added is equal to GRP, so value added impacts refer to the contribution to GRP (or gross state product, GSP) at the state level and GDP at the national level). This is the accepted economic measure of what an economy produces.

- (2) **Gross Output.** This is the value of goods and services produced by an economic entity (such as UOW). Output is equal to total revenue plus internal consumption as a result of intermediate production.
- (3) **Income.** This is the income earned by employees (or compensation of employees (COE)) as part of the normal operations of the economy.
- (4) **Employment.** The number of full-time equivalent jobs generated.

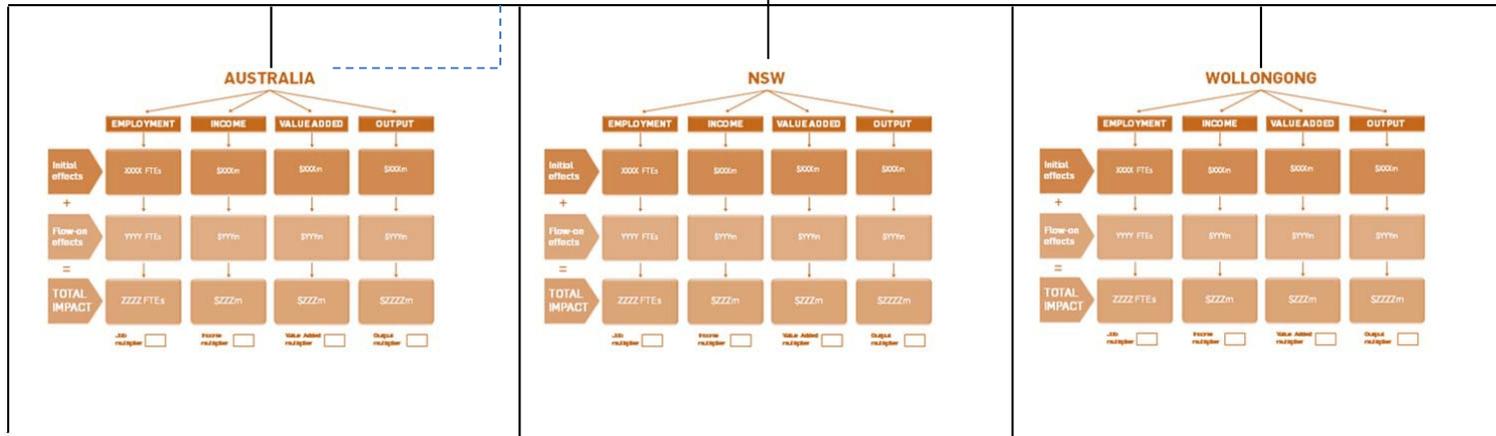
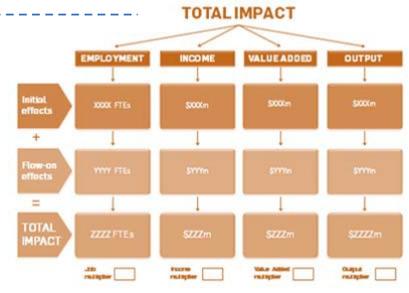
## 5.6 Understanding the different levels of economic influence

Figure 5-4 describes the different levels of economic influence modelled for UOW:

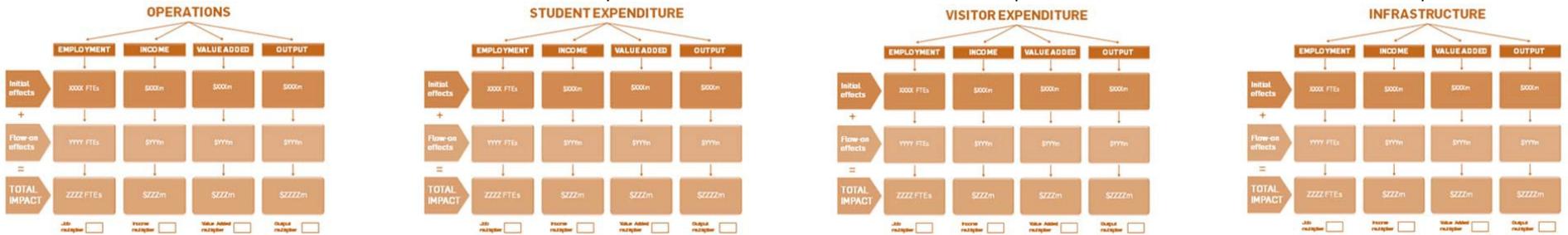
- Level 1 - Overall: 'Total' within this report refers to UOWs complete effect – across all geographic and expenditure areas stated at Levels 2 and 3 below.
- Level 2 - Geographic: economic effects have been modelled and reported at three geographic levels - regional (Wollongong), state (NSW) and national (Australia). Total state effects include our modelling of 'Wollongong' + 'Rest of NSW'. Likewise, total national effects include our modelling of 'Wollongong' + 'Rest of NSW' + 'Rest of Australia'. Purely from an 'export earnings' or 'import substitution' perspective, the regional effects are by far the most significant. Nonetheless, it is useful to look at the economic activity supported by UOW's various expenditure effects at broader levels such as the state and national levels.
- Level 3 – Expenditure Area: economic effects have been modelled and reported for four distinct UOW- related expenditure areas. UOW operations includes all aspects of the University's day-to-day activities (including teaching, research and commercial activities). It is important to note that student fee income is modelled under this activity and not under student expenditure. Student expenditure includes all living expenses of international and non-local domestic students, and also includes the specific university-related expenses of local students (the data for this activity is based on an extensive expenditure and income survey completed by over 1,400 UOW students in 2011). Visitor expenditure includes visitors for UOW events, such as graduation ceremonies, conferences and workshops, tourism visitation to the Science Centre, and special events. 'Capital expenditure' includes all UOW construction and refurbishments.

**Figure 5-3: Levels of reporting on the direct, indirect and induced economic effects of UOW**

Level 1: Overall  
 'Total' and 'Australian' activity are the same.



Level 2: Geographic



Level 3: Activity

## 5.7 Measuring economic activity

An economy's size can be measured in many different ways. One common approach is to sum all of the economic activity in a single year. This annual *flow* of economic transactions is reported using a standard national accounting framework GDP being the often-quoted indicator of economic activity.

In the national accounts, the flow of economic activity is measured using three alternative approaches related to consumption, production and expenditure. Importantly, these approaches are unique methods for measuring economic activity – they are not added together. Conceptually, these different methods provide the same result in terms of measuring GDP.<sup>18</sup>

The University of Wollongong's economic contribution is, of course, accounted for in Australia's GDP measure. For instance, the direct 'value-added' of the university is a part of the 'Education and Training' industry in the production (or value-added) measure of GDP. The spending of all staff, students and workers attached to the university is measured in the expenditure measure of GDP. However, it is not possible to uniquely identify UOW's economic footprint in the aggregated national accounts.

### Box 5-1: The concept of value added

The concept of value-added production requires some explanation. To avoid double counting in the national accounts, production is measured using the concept of industry value-added. For instance, the direct value-added of a cup of coffee purchased at a café is not say, \$3.50, but rather the difference between the price paid for the coffee and the costs involved in making the coffee (like electricity, coffee beans and milk). Essentially, the direct value-added can be thought of as the sum of wages (being returns to labour) and profits (being returns to capital), plus taxes less subsidies. Profits and taxes are accounted for in EBITDA, which is the standard measure of returns to capital in the national accounts.

The costs involved in making the coffee are some other industries wages and profits (e.g. dairy farming, electricity production). As a result, they so should not be counted as part of the value-added produced by the 'Accommodation and food services' industry, rather this is the value added in supply sectors.

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<sup>18</sup> Notwithstanding measurement error and a complicating factor when the Terms of Trade changes, which changes the income we receive but not the volume of goods and services produced in the economy.

## 6 Economic contribution of UOW operations

This section describes the results of the analysis to update the 2012 Study.

### 6.1 UOW expenditure channels

This economic contribution study measures the economic value of the administration, teaching and research services provided by UOW, student expenditure, and related visitation to the Illawarra. As set out in Section 5, we measure this activity by calculating the following:

- the size of UOW operations in the Illawarra region (i.e. teaching, research, administration and maintenance) using both published (from the annual reports) and unpublished financial and student data such as revenue, expenditure, capital investment and enrolments (provided by UOW administration);
- the amount of student expenditure (using ABS data and survey data from Universities Australia) and mapping that expenditure onto the production side of the economy; and
- measuring ‘indirect’ and ‘induced’ (i.e. flow-on) impacts by applying the value-added, expenditure and employment multipliers derived from the Cadence Economics IO model of the Illawarra and NSW (based on the ABS IO tables).<sup>19</sup>

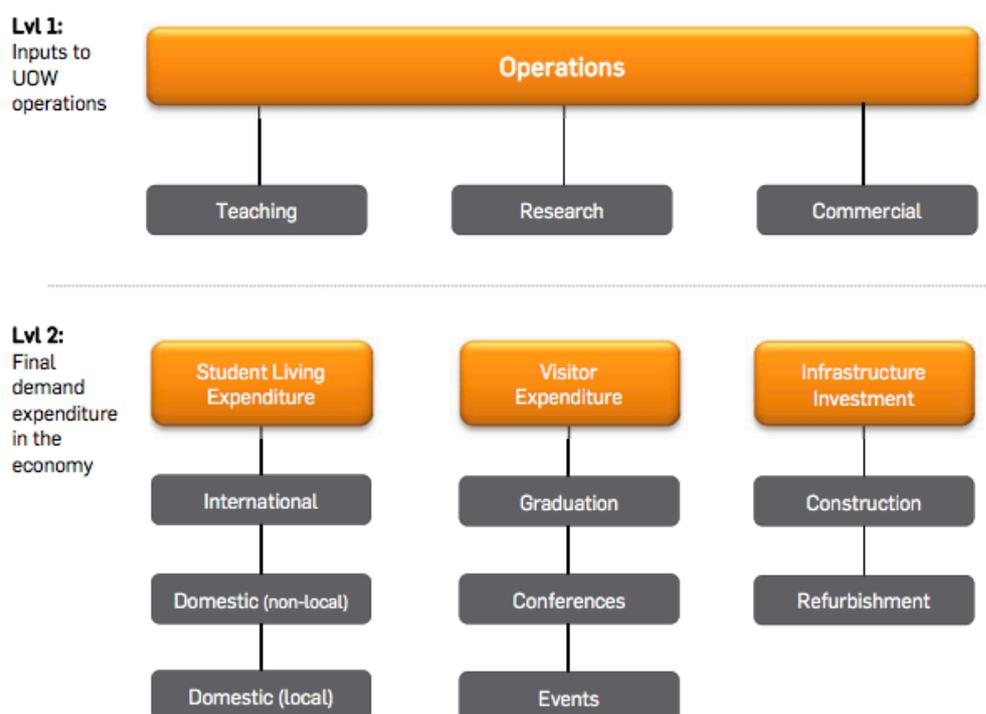
Figure 6-1 illustrates the channels through which UOW affects economic activity:

- At the first level, the day-to-day operations of UOW in the teaching, research and commercial fields generates value-added in the economy.
- At the second level, the activities of the university attract students to Wollongong, generating student expenditure within the region and, to a lesser extent, visitor expenditure. For this study, at the second level, the main focus is on student expenditure.

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<sup>19</sup> Economic terms such as value-added and gross output are defined in Appendix A Methodology for Measuring Expenditure Impacts. This study includes indirect and induced impacts in calculating total value added in order to keep it consistent with the 2013 study. However, only direct value-added is the equivalent measure of GDP.

**Figure 6-1: UOW-related expenditure in the economy**



## 6.2 Direct impacts

As described above, the first part of the economic contribution analysis is to measure the economic contribution of UOW operations. The day-to-day operations of the University are vast and have a major direct, indirect and induced effect on the economy, particularly within its regions of operation.

Table 6-1 shows the direct value added of UOW operations. As the term implies, ‘direct’ value added is the first-order (or immediate) impact of UOW operations. Direct value-added can be measured by adding the wages paid to UOW staff and the profit (EBITDA) generated by the university. The EBITDA measure includes the university’s tax obligation and is therefore equivalent to the definition of value-added described above.

**Table 6-1: Direct value-added of UOW operations**

University Operations	2015 (\$m)
Operating revenues	556
Operating costs (expenditures):	
Employee related expenses	342
Repairs and maintenance	7
EGWWS	8

<b>University Operations</b>	<b>2015 (\$m)</b>
Scholarships	33
Rent	19
Other	99
Total operating costs	508
EBITDA (Operating revenue – Operating costs)	48
Direct value added (wages + profits + taxes paid)	390

Source: UOW Vice Chancellery.

Table 6-1 shows that in 2015, the direct value-added generated by UOW operations in the Illawarra region, which is the GDP-equivalent measure, was \$390 million. This figure can be interpreted as UOW's contribution to the Education and Training industry value-added. The direct economic contribution measure does not change when the lens is widened to include NSW and Australia because, by definition, the direct economic contribution does not account for flow-on (or indirect and induced) impacts, it is limited to the UOW economic unit.

Gross output can be interpreted as the total transactional value of goods and services produced by an economic entity (such as UOW and its suppliers). It is equal to total revenue plus internal consumption as a result of intermediate production. The direct gross output of UOW Wollongong operations – the operational revenue generated by the University – is \$523 million (or over half a billion dollars), which indicates that the university is a significant institution in the context of the Illawarra economy. In terms of the table above, gross output is calculated as value-added (\$390 million), plus intermediate inputs (i.e. costs, not including wages of \$166 million).

A total of \$342 million in labour income is directly generated by UOW operations, which can be interpreted as the university's wages bill. Again, in the context of the Illawarra economy, UOW is the major employer and payer of wages. The university employed 2,659 FTE staff in 2015, indicating average annual staff costs (including on-costs such as superannuation and workers compensation) of around \$129,000.

### **6.3 Indirect and induced impacts**

This section addresses the direct, indirect and induced effects of UOW's day-to-day operations, as summarised in Table 6-2. As outlined above, the indirect economic contribution is generated in other sectors of the economy, through UOW's purchase of intermediate inputs from these other sectors. For instance, a decision by UOW to hire a local cleaning company boosts that company's value-added. Induced impacts pick-up the increased consumption (expenditure) that results from direct employment from UOW and its suppliers. As an employer of over two thousand academic and professional staff, buyer of goods and services from a wide range of businesses, and a generator of local, state and

federal tax revenue, UOW contributes significantly to the ongoing economic vitality of Greater Wollongong, NSW and Australia.

**Table 6-2: Economic contributions of UOW operations (2015 \$ millions)**

	Direct	Indirect	Induced	Total
<b>Illawarra region</b>				
Gross Output	\$523	\$185	\$51	\$759
Value Added	\$390	\$88	\$28	\$506
Labour Income	\$342	\$58	\$13	\$413
Employment (FTE)	2,659	775	208	3,642
<b>NSW</b>				
Gross Output	\$523	\$204	\$75	\$801
Value Added	\$390	\$97	\$40	\$526
Labour Income	\$342	\$63	\$18	\$423
Employment (FTE)	2,659	846	303	3,808
<b>Australia</b>				
Gross Output	\$523	\$253	\$185	\$960
Value Added	\$390	\$119	\$104	\$613
Labour Income	\$342	\$75	\$46	\$463
Employment (FTE)	2,659	1,021	742	4,422

Table 6-2 shows that:

- In 2015, adding indirect and induced effects, which account for the flow-on impacts of UOW operations, the total value-added of UOW operations was \$506 million in the Illawarra region. Widening the lens to include NSW and Australia, the value-added figure grows to \$526 million and \$613 million respectively.
- Total Australia-wide gross output, just from university operations, was almost \$1 billion in 2015. And \$463 million in labour income was generated in 2015 across Australia. The total direct plus indirect and induced employment across Australia was 4,422 FTE's.

## 6.4 Economic contribution of student expenditure

Of course, without students, there is no university since UOW's dual mission is to foster learning through teaching and undertake cutting-edge research. Student expenditure is

clearly an important channel of UOW’s influence on the local economy because most students live and spend in the Illawarra region.

In addition to the economic effects generated by its day-to-day operational spending, UOW attracts a large number of students who spend a significant amount of money in these operating regions. We have modelled the localised spending effects of three separate student cohorts:

- for international students, who represent important export income not just to Wollongong and NSW, but to Australia;
- for domestic ‘non-local’ students, who either live in, or travel to, the Illawarra and spend money within the region, representing export income; and
- for domestic ‘local’ students, who live within the Illawarra, but whose education-related expenditure has been isolated and modelled, as it is reasonable to expect that, had UOW not existed, many of them (and their expenditure) would have been lost to the Illawarra region as they would have moved away to go to university (i.e. a genuine case of ‘import substitution’).

As discussed in the methodology section, the modelling was based on inputs derived from a comprehensive survey of student income and expenditure conducted by Universities Australia.

**Table 6-3: Economic contribution of student expenditure (2015 \$ millions)**

	Direct	Indirect	Induced	Total
<b>Illawarra region</b>				
Gross output	\$379	\$130	\$124	\$634
Value added	\$183	\$57	\$68	\$308
Labour income	\$115	\$32	\$31	\$178
Employment (FTE)	2,564	482	507	3,553
<b>NSW</b>				
Gross output	\$379	\$180	\$184	\$743
Value added	\$183	\$79	\$97	\$360
Labour income	\$115	\$43	\$46	\$204
Employment (FTE)	2,564	676	746	3,986
<b>Australia</b>				
Gross output	\$379	\$335	\$487	\$1,201
Value added	\$183	\$146	\$268	\$597

	Direct	Indirect	Induced	Total
Labour income	\$115	\$79	\$120	\$315
Employment (FTE)	2,564	1,251	1,931	5,747

Table 6-3 shows that:

- The direct additional value-added resulting from student spending in the Illawarra was \$183 million in 2015. Widening the lens to include the indirect and induced effects results in a total additional value-added of \$308 million in 2015.
- Accounting for the flow-on effects in NSW and Australia, increases measured value-added resulting from student expenditure to \$597 million in 2015.<sup>20</sup>
- The direct labour income generated in the Illawarra was \$115 in 2015. The total labour income, after accounting for indirect and induced activity, was \$178 million in the Illawarra region. Total labour income generated in Australia as a result of student expenditure was \$315 million in 2015.
- The estimated direct employment impact of student expenditure in the Illawarra was 2,564 FTEs in 2015. That figure increases to 3,553 when indirect and induced impacts are included. Widening the lens to include Australia, the total number of FTE's relating to UOW student expenditure is estimated to be 5,747 in 2015.

## 6.5 Total economic contribution

Table 6-4 shows the estimated total economic contribution of UOW:

- in value added terms, UOW's total economic contribution is estimated to be \$1.2 billion in 2015;
- gross output is estimated to be \$2.2 billion;
- labour income generated is estimated at \$778 million; and
- the total number of FTE's jobs generated by UOW is estimated to be 10,169 in 2015.

<sup>20</sup> Conceptually, if a student buys a cup of coffee on campus, a dairy farmer in Victoria will benefit. The broader measures of economic impact capture this effect.

**Table 6-4: UOW total economic contribution (2015 \$ millions)**

	Direct	Indirect	Induced	Total
<b>Illawarra region</b>				
Gross output	\$902	\$315	\$175	\$1,393
Value added	\$573	\$146	\$96	\$815
Labour income	\$457	\$90	\$44	\$591
Employment (FTE)	5,224	1,257	714	7,195
<b>NSW</b>				
Gross output	\$902	\$384	\$258	\$1,545
Value added	\$573	\$176	\$137	\$886
Labour income	\$457	\$106	\$64	\$627
Employment (FTE)	5,224	1,522	1,049	7,794
<b>Australia</b>				
Gross output	\$902	\$588	\$671	\$2,161
Value added	\$573	\$265	\$371	\$1,210
Labour income	\$457	\$154	\$167	\$778
Employment (FTE)	5,224	2,272	2,673	10,169

## 6.6 Comparison with the 2013 report

In 2013, UOW undertook a similar exercise measuring its total economic footprint. That study was based on 2011 calendar year data. The 2015 results are roughly similar to the 2011 results, indicating at first glance, little measurable growth in the university's operations.

However, a number of modifications and improvements to the previous methodology have been made so a more accurate comparator is to look at the 2011 results using the updated methodology and improved data, and in real terms (that is, reporting the 2011 results in 2015 dollars). For instance, for this study we have used journey/travel data to and from UOW campus, which has given us a more accurate picture of where students live.

Table 6-5 below compares the direct value-added generated by university operations in 2011 and 2015. The table clearly shows that the main driver of the increase in direct value-added between the two years is the increase in wages paid to UOW staff. This 23 per cent increase represents a combination of increases in the per person wage as well as an increase in the total number of UOW employees (discussed further below).

**Table 6-5: Comparison of UOW operations (direct value-added), 2011 and 2015 (2015 \$millions)**

University Operations (2015 dollars)	2011 (\$ millions)	2015 (\$ millions)	Change (per cent)
Operating revenues	517	556	7.5
Operating costs (expenditure):			
Employee related expenses	278	342	23
Repairs and maintenance	13	7	-46.2
EGWWS	n/a	8	-
Scholarships	n/a	33	-
Rent	n/a	19	-
Other	156	99	-36.5
Total operating costs	447	508	13.6
EBITDA (Operating revenue - Operating costs)	70	48	-31.4
Direct value added (wages + profits + taxes)	348	390	12.1

Note: It is likely that the declines in 'Repairs and maintenance' and 'Other' costs has been caused by definitional changes.

Table 6-6 below compares the main indicators by year. In real terms, the direct economic contribution of UOW (in value-added terms) increased by 7.7 per cent.

**Table 6-6: Total Economic Contribution of UOW, 2011 and 2015 (2015 dollars)**

	2011 Direct (\$ millions)	2015 Direct (\$ millions)	Change (Per cent)	2011 Total	2015 Total	Change (Per cent)
<b>Illawarra</b>						
Gross output	\$874	\$902	3.3	\$1,386	\$1,393	0.5
Value added	\$532	\$573	7.7	\$784	\$815	3.9
Labour income	\$393	\$457	16.2	\$534	\$591	10.7
Employment (FTE)	5,021	5,224	4	7,082	7,195	1.6
<b>NSW</b>						
Gross output	\$874	\$902	3.3	\$1,542	\$1,545	0.2
Value added	\$532	\$573	7.7	\$858	\$886	3.3
Labour income	\$393	\$457	16.2	\$571	\$627	9.8

	<b>2011 Direct</b>	<b>2015 Direct</b>	<b>Change</b>	<b>2011</b>	<b>2015</b>	<b>Change</b>
	<b>(\$ millions)</b>	<b>(\$ millions)</b>	<b>(Per cent)</b>	<b>Total</b>	<b>Total</b>	<b>(Per cent)</b>
Employment (FTE)	5,021	5,224	4	7,698	7,794	1.2
<b>Australia</b>						
Gross output	\$874	\$902	3.3	\$2,176	\$2,161	-0.6
Value added	\$532	\$573	7.7	\$1,191	\$1,210	1.6
Labour income	\$393	\$457	16.2	\$726	\$778	7.2
Employment (FTE)	5,021	5,224	4	10,137	10,169	0.3

## 7 Knowledge impacts

As set out in the following, UOW's teaching and research activities give rise to knowledge impacts that have both a private and a public dimension.

### 7.1 UOW graduate earnings premium

Most individuals and the broader community receive both financial and non-financial benefits as a result of an individual undertaking university studies. As was the case for the 2012 Study, this study assesses both these types of benefits within the context of gaining a UOW degree.

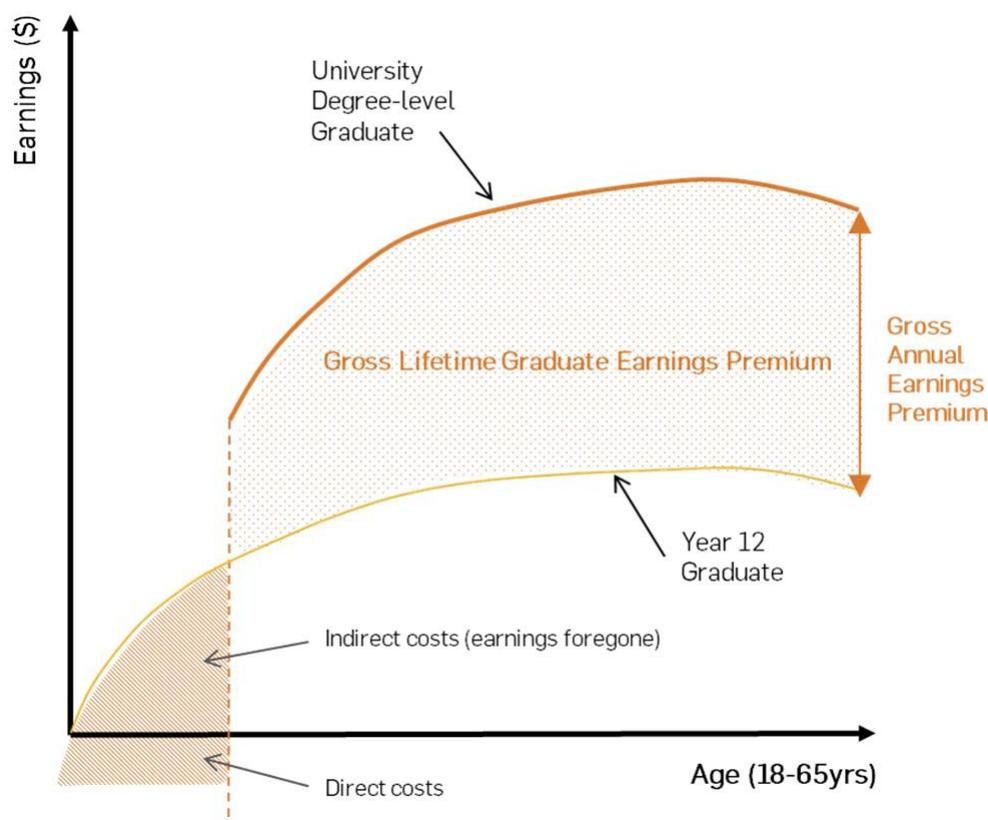
In order to measure these economic benefits, the interested reader is referred to the 2012 study which attempted to measure the lifetime graduate premium of UOW alumni and the subsequent return to both the individual and society. This section simply provides an overview of the methodological approach taken to calculate the graduate premium of a UOW degree holder and, in turn, estimating the Internal Rate of Return to individuals and society.

The benefits of a UOW degree, to individuals and to society, can be calculated using methods developed in the economic literature. The literature commonly quantifies individual returns in one of two ways: either via some variant of the earnings equation developed by Jacob Mincer (1974), or via the Internal Rate of Return (IRR) method. Both methods have advantages and limitations:

- The Mincerian equation is popular amongst labour economists for measuring the returns to education more generally (a recent example of its use within the Australian context is Leigh, 2008). However, this approach does have important limitations. Foremost is the fact that the Mincerian approach does not consider the actual costs incurred in undertaking tertiary studies (Daly et al, 2012). Students not only incur the direct costs of education, but also the 'cost' of foregone earnings during the period they are studying. Moreover, there are costs to account for in measuring government/societal returns: including the direct expenditure of subsidising student learning, and the opportunity cost of not investing elsewhere, as well as the loss of tax revenue whilst students are undertaking education and not working. It is important to capture these costs as closely as possible.
- The second method commonly used to quantify individual and public returns on higher education is to calculate the IRR of investment in a degree. This approach considers the costs incurred and earnings foregone in undertaking tertiary studies. It considers the net present value (NPV) of an investment in higher education by accounting for the costs incurred versus the potential future earnings benefits (appropriately discounted). The advantage of this method is that it considers the full investment decision of undertaking a degree relative to the counterfactual (high school completion only), and calculates the net benefit (or cost). The goal is to invest when the NPV is positive. Figure 7-1 illustrates a simplified version of the

lifetime earnings profile of a university graduate.

**Figure 7-1: The costs and benefits of gaining a university degree**



Source: Based on Daly et al, 2012.

The 2012 Study (Braithwaite et al. 2013, p.103) quantified the private and public pecuniary returns of a UOW education using the IRR method, similar to the approaches applied by Michael (1996), Borland et al. (2000), Larkins (2001), Borland (2002) and Daly et al. (2012).

## 7.2 Economic returns to university research

Knowledge effects are as much about the value added through research as they are about the human capital universities develop. Research undertaken within UOW's institutes and centres has the goal of generating public good or commercially useful outcomes. However, the question of how best to reliably and accurately measure the dynamic effects of university research and development (R&D) on the economy is one of on-going debate in the academic literature.

The first serious attempt to measure the dynamic effects of university R&D on the economy was undertaken by American academic Adam Jaffe in the late 1980s, who measured the economic 'spillover' (or external) benefits of innovation and commercialisation of university research to industry (Jaffe, 1989). His study provided evidence that university R&D in the United States had significant spillover effects on commercial patents and indirect effects on local innovation and commercial R&D spending (1989, p957). Since then, Jaffe (1993) and

others such as Audretsch and Feldman (1996), have provided convincing empirical evidence that such R&D spillovers are most intense within the region where the innovation and new knowledge is generated, suggesting that UOW's R&D impacts are likely to most benefit both the Wollongong, Illawarra and the state of NSW – although there will be instances where UOW expertise, innovation and high technology infrastructure will also benefit a broader region (such as Australia as a whole, Oceania, Southeast Asia and beyond).

Another approach that has gained increased attention in recent times has been an attempt to separate out that part of long-run total factor productivity (TFP) that can be directly attached to university R&D efforts. Of particular note, Fernand Martin (1998) undertook an increasingly cited study that quantified that component of Canadian total factor productivity attributable to Canadian university sector R&D. Several Canadian universities have since used Martin's methodology in an attempt to estimate the spillover effects of their R&D on total factor productivity (for example see Sudmant, 2009, Sun & Lee, 2011 and Briggs & Jennings, 2012).

The benefit of approaches such as those touched on above is that they can provide an estimate of the aggregate impact of a wide array of economic drivers of innovation and productivity growth (Sudmant, 2009). However, an attempt to develop a model of the dynamic long-run economic effects of UOW R&D is beyond the scope of the current study.

The graduate earning premium is defined as the gross income differential between Year 12 qualified and UOW degree qualified workers within UOW's main areas. Assuming that UOW graduates remain and work full-time in Wollongong region, the 2012 Study used data on median income of full-time workers in the Wollongong Statistical Region (including the local government areas of Wollongong, Shellharbour and Kiama) from an unpublished 2011 Census.<sup>21</sup> In order to be consistent with the 2012 Study, and also to provide a comparison between the costs and benefits of studying at UOW in 2011 with those of 2015, we have made the same assumptions. However, due to the lack of data of income of full-time workers in Wollongong in 2015 we inflate the data from the original report by five years. To this end, we used the Wage Price Index (WPI) published by Australian Bureau of Statistics (2016a) and found that the Australian wage rates increased by 2.7 per cent over the five years of study. This leads to an increase in the graduated female (male) full-time income from \$47,008 (\$75,504) in 2011 to \$48,277 (\$77,543) in 2015 and an increase in Year 12 qualified females (males) full-time income from \$32,419 (\$52,072) to \$33,294 (\$53,478).

As the result, the gross income differential is increased to \$14,983 for females and \$24,065 for males in 2016 (Table 7-1).

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<sup>21</sup> While there are a number of methodological limitations with the analysis we have applied the same approach as the 2013 study for consistency and comparability.

**Table 7-1: Gross income differential – Year 12 qualified and UOW degree qualified workers, 2011 and 2015**

Education Level	Females		Males	
	2011	2015	2011	2015
Degree qualified workers (25-64 years - FT workers only)	\$47,008	\$48,277	\$75,504	\$77,543
Year 12 qualified workers (18-64 years - FT workers only, assuming 45 per cent differential)	\$32,419	\$33,294	\$52,072	\$53,478
Annual gross income differential	\$14,589	\$14,983	\$23,432	\$24,065

### 7.3 Total foregone income

Table 7-2 shows the estimations of total income forgone during degree study at UOW. Again, due to the lack of data, we increased the 2011 gross annual earnings 5 years using the Australian wage rates growth of 2.7 per cent. Following the 2012 Study, also, we discounted the gross annual earnings by 20 per cent to consider the probability of unemployment during the three-year study period. Multiplying the result by 3 corresponds to the gross earning of a three-year degree. Subtracting income tax and Medicare levy payments from gross income results in the total net income over study period. Subtracting the assumed income to consider the probability that a student might undertake casual or part-time work during their study or receive some government assistance such as Austudy, the total income forgone over the period of a three-year degree at UOW is estimated to be \$15,035 for females and \$15,845 for males.

**Table 7-2: Total foregone income – Three-year degree**

	Females		Males	
	2011	2015	2011	2015
A. Gross annual earnings (less 20 per cent discount for unemployment risk)	\$9,693	\$9,955	\$10,026	\$10,297
B. Gross income over study period (3A)	\$29,078	\$29,864	\$30,077	\$30,890
less- Income tax	\$1,662	\$2,216	\$1,812	\$2,411
less- Medicare levy	\$436	\$597	\$451	\$618
C. Total net income over study period	\$26,980	\$27,051	\$27,814	\$27,861
less– notional net income (casual work/ Austudy)	\$11,700	\$12,016	\$11,700	\$12,016
D. Total foregone income	\$15,280	\$15,035	\$16,114	\$15,845

## 7.4 Internal rate of return

This section used the findings from Table 7-1 and Table 7-2 to estimate the private and public costs, benefits and internal rates of return on a UOW degree.

Beginning with the costs, the total HECS costs assume that students can pay their student contributions upfront for three-years (Study Assist, 2016). Using the median student contribution in terms of the mid-level student contribution band we found that the total HECS costs for a three-year qualification is \$26,751. Comparing this figure with that of 2011, we can see that the total HECS costs has increased by more than 43 per cent over the five years of study. In order to update the direct costs of education, including the textbooks, transport and other student fees (excluding tuition fees), we used the Consumer Price Index (CPI) from the Australian Bureau of Statistics (2016b) and found that it increased by 2.5 per cent in 2011-2015. Applying this inflation rate, the direct costs of education grew from \$4,500 in 2011 to \$4,613 in 2015. Considering the total cost per student over the period of a three-year degree at UOW as the sum of HECS costs, the forgone income and the direct costs of education, the private costs for a UOW degree can be estimated as \$46,398 for females, \$47,209 for males and \$46,804 per person. These figures imply that the private costs of attaining a three-year degree have increased by more than 20 per cent since 2011 which is mainly due to the significant increase in HECS (by 43 per cent).

In order to estimate the public costs per UOW degree, the total government contribution has been divided by the number of domestic degree graduates per year, resulting in an annual cost to the government per UOW degree of \$31,188.

On the benefit side, the approach in the 2012 Study has been adopted by assuming a male working lifetime of 40 years and a female working lifetime of 38 years (to account for the higher probability that female graduates will spend an amount of time out of the workforce for family reasons). Using this assumption and the outcomes of Table 7-1 (the gross graduate annual premium) we can calculate the gross graduate lifetime premium of \$569,350 for females, \$962,587 for males and \$761,428 per person. Adjusting these figures by a discount rate of 3 per cent we obtain the NPV of the lifetime premium of \$337,002 for females, \$556,249 for males and \$445,303 per person. Now we can estimate the income tax revenue of graduate lifetime premium by multiplying the NPV of the lifetime premium by the marginal tax rate of 35 per cent. Assuming that the net NPV of the graduate lifetime premium corresponds to a 10 per cent return to the economy, the government benefit from investing in a UOW degree can be calculated as the tax revenue, plus the total HECS, plus 10 per cent return on the net NPV of graduate lifetime premium at \$161,967 for females, \$252,874 for male and \$206,871 per person.

Using the costs and benefits of a UOW degree described above, the private and public rates of return can be estimated. Table 7-3 shows, the private rate of return decreased from 12 per cent to 9 per cent for females, from 20 per cent to 15 per cent for males, and from 16 per cent to 12 per cent per person. This reflects the fact that the costs of a UOW degree increased by 20 per cent since 2011, while wage rates and consequently, the benefits of a degree did not change significantly. We also estimate that it will take 9 years for females, 6 years for males and 7 years in average to recover the total cost of their education. Using the

public costs and benefits from investing in UOW, also, we estimated the public rate of return of 15 per cent per person with the payback period of 6 years.

**Table 7-3: The private and public rates of return to a three-year UOW degree**

	Female		Male		Person	
	2011	2015	2011	2015	2011	2015
<b>1 Cost analysis: Total costs per UOW completion for bachelor's degrees</b>						
A Total HECS costs (median student contribution)	\$18,683	\$26,751	\$18,683	\$26,751	\$18,683	\$26,751
B Estimated earnings foregone	\$15,280	\$15,035	\$16,114	\$15,845	\$15,697	\$15,440
C Direct education costs	\$4,500	\$4,613	\$4,500	\$4,613	\$4,500	\$4,613
D Total private costs for a UOW degree (A + B + C)	\$38,464	\$46,398	\$39,297	\$47,209	\$38,880	\$46,804
E Total public costs per UOW degree	\$30,538	\$31,188	\$30,538	\$31,188	\$30,538	\$31,188
<b>2 Benefit analysis: Economic benefits of a UOW bachelor's degree</b>						
F Gross graduate annual premium	\$14,589	\$14,983	\$23,432	\$24,065	\$19,010	\$19,524
G Gross graduate lifetime premium (F multiplied by 38yrs for females, 40 yrs for males)	\$554,370	\$569,350	\$937,291	\$962,587	\$741,409	\$761,428
H NPV of graduate lifetime premium (at 3 per cent discount rate)	\$328,136	\$337,002	\$541,632	\$556,249	\$434,884	\$445,303
I NPV in excess of total private and public costs (H - (D + E))	\$259,134	\$259,416	\$511,094	\$477,853	\$385,114	\$367,311
J NPV of income tax payable on gross graduate premium (H multiplied by marginal tax rate of	\$114,847	\$117,951	\$189,571	\$194,687	\$152,209	\$155,856

	Female		Male		Person	
	2011	2015	2011	2015	2011	2015
0.35)						
K NPV to individual of income premium after tax and costs (H - D - J)	\$174,825	\$172,653	\$312,763	\$314,353	\$243,794	\$242,643
L Government revenue from investment in UOW (A + J + (0.1 x K))	\$151,013	\$161,967	\$239,531	\$252,874	\$195,272	\$206,871
<b>3 Internal rate of return on a UOW degree</b>						
M Private Rate of Return (per cent)	12	9	20	15	16	12
Approximate Payback Period (Years)	9	9	5	6		7
N Public (Federal Government) rate of return (per cent)	10	12	17	17	14	15
Approximate payback period (Years)	10	7	6	5		6

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**PART III**

**UOW'S BROADER CONTRIBUTION**

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## 8 UOW's broader contribution

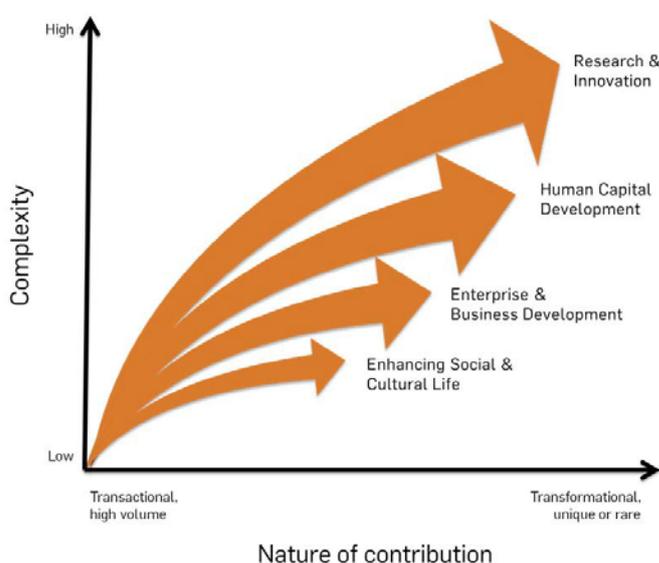
Part II of this report considered the economic impact of UOW, using a standard approach of not including the contribution of knowledge and innovation related activities. However, important economic effects can also arise from a university's knowledge and innovation activities. Being intangibles, however, measuring their economic impact and quantifying this in monetary terms is difficult, and somewhat arbitrary. In this refresh report we follow the approach adopted in the 2012 Study to indicate how this contribution can potentially be captured.

### 8.1 Framework for assessing university contributions

In addition to economic benefits, universities make other contributions to society. In 2011, the European Commission engaged urban and regional development scholar Professor John Goddard, of the Centre for Urban and Regional Development Studies at Newcastle University (UK), to develop a guide evaluating university contributions to the communities and regions within which they operate (European Commission, 2011). Using a slightly modified version of Goddard's framework, Figure 8-1 describes a framework for assessing UOW's contribution under four broad headings:

- research and innovation;
- human capital development;
- enterprise and business development; and
- enhancing social and cultural life.

**Figure 8-1: Framework for assessing the broad university contribution**



Source: Adapted from European Commission (2011: 5-7).

Australia is experiencing a period of profound economic and social change occurring at a rate not seen since the Industrial Revolution and UOW is developing research partnerships and collaborations with business and industry nationally and globally to help create the technologies of tomorrow. Significant investments by UOW help drive the economic transitioning in the Illawarra by creating jobs and industry – which in turn attracts business research and investment. For the purposes of this report, these broader impacts are included under four broad areas of influence: research and innovation; human capital development; and enhancing social and cultural life. This section addresses some of these economic and social benefits in detail.

## **8.2 Research and Innovation**

Knowledge effects are as much about the value added through research as they are about the human capital universities develop. Research undertaken within UOW's institutes and centres has the goal of generating public good or commercially useful outcomes. UOW is well positioned to help Australia meet the challenge of competing in a global race for next-generation manufacturing.

### **8.2.1 Industry research partnerships**

#### **Innovative steel manufacturing through collaboration**

Australia's proud standing as a world-class steel manufacturer is under threat due to a range of economic factors, both global and domestic. By drawing on the combined capacity of leading universities and the steel industry, UOW's Steel Research Hub delivers manufacturing innovations that will ensure the industry's global competitiveness. The Australian Research Council (ARC) Research Hub for Australian Steel Manufacturing, based at UOW, is focused on research and development programs that address manufacturing techniques and processes, innovation in new products and best-practice pathways for bringing new ideas to market.

Product innovations include a project to develop a self-cleaning, anti-microbial organic coating for painted sheet steel to prevent the build-up of mould, algae and other bacteria on roofs, particularly in humid environments. Mould and other build up can cause discolouration and eventually degrade the steel, leading to high costs of maintenance, repair and replacement. Steel surfaces with high reflectivity have also been shown to reduce energy needed to cool the building.

Also under development is a new roofing system that incorporates thin-film solar panels and aesthetically pleasing designs that can produce energy, heating and cooling for new Australian buildings. The system was used to great effect in construction of the Illawarra Flame house, a retrofit project built by UOW and Illawarra TAFE students that went on to win the international Solar Decathlon China 2013.

Supporting partners in the research hub include Arrium, Bisalloy Steels, Cox Architecture, Australian Steel Institute, Lysaght, University of Queensland, University of NSW, University of Newcastle, Swinburne University of Technology and RMIT. Steel Research Hub Director

Oscar Gregory said the steel industry has had to face extremely challenging conditions since the global financial crisis.

Under the umbrella of the ARC Research Hub for Australian Steel Manufacturing (Steel Research Hub), UOW is currently engaged in the following four programs:

- Managing innovation in the Australian steel industry. Examining the effects of “openness” on innovation in the steel industry.
- Market-focused product innovation. Improved abrasion resistant and high-strength Q&T steels; steel-intensive, mid-rise residential building designs and anti-fungal coatings for steel surfaces.
- Innovative coatings technologies. Innovative coatings technologies for existing BlueScope coatings and processes.
- Sustainable steel manufacturing. Involving researchers from UQ, the University of Newcastle and Monash University, this program covers a broad array of projects focused on environmentally and economically sustainable steel and iron manufacturing for BlueScope and Arrium.

### **ARC Training Centre in Additive Biomanufacturing**

UOW is a partner in a new training centre that will position Australia as a world leader in 3D bioprinting for medical applications. Federal Government funding has been awarded to establish the ARC Training Centre in Additive Biomanufacturing – a collaboration between universities, companies and clinicians, under the Industrial Transformation Training Centres scheme. The training centre aims to bring together leading researchers and industry to develop and translate key technology platforms for personalised treatments of challenging medical conditions. The centre expects its research will lead to synergistic and innovative technologies needed for personalised therapies including:

- modular additive biomanufacturing platforms;
- advanced bio-inks for regenerative medicine; and
- additive manufactured tools for surgical planning and education.

It is anticipated that Australia will be a world-leader in additive biomanufacturing, and that the research will change the fields of science, health and biotechnology. For example, researchers have used a handheld 3D printing pen to ‘draw’ human stem cells in freeform patterns with extremely high survival rates. The device, developed out of collaboration between the UOW based ARC Centre of Excellence for Electromaterials Science (ACES) researchers and orthopaedic surgeons at St Vincent’s Hospital, Melbourne, is designed to allow surgeons to sculpt customised cartilage implants during surgery.

### **Defence Materials Technology Centre**

Welding and automation expertise developed at UOW is supporting Australian manufacturing as part of a major new defence contract. UOW’s welding automation group

will be a critical part of the estimated \$1.3 billion contract awarded to Thales Australia to supply the Australian Defence Force with 1,100 four-wheel drive vehicles over three and a half years from 2017. The highly mobile armoured vehicle, known as the Hawkei, will be built in Australia and will provide Australian soldiers with increased protection and mobility. The Hawkei follows on from the success of the larger Bushmaster vehicle, which has protected Australian and other troops in some of the most challenging combat environments on earth.

The contract will lengthen the welding group's research and development contribution to defence projects, particularly in robotic welding automation and armour materials, as part of the Defence Materials Technology Centre (DMTC). DMTC is a joint venture between Defence, industry, universities and government research agencies. The DMTC NSW node was established at the University of Wollongong in 2008 with government and industry support to provide the defence industry with materials and manufacturing solutions to enhance Australia's defence capability. It draws on the University's expertise in materials engineering, particularly steelmaking technologies and welding, automation and robotics.

The Hawkei contract announcement comes as the welding group's contribution to the naval research and development was recognised with the National Innovation Award at the Pacific 2015 Maritime Exposition. The award is for a range of technologies developed with partners Defence Science and Technology Group (DST), Australian Nuclear Science and Technology Organisation (ANSTO) and ship builder Forgas, for maritime welding and fabrication of air warfare destroyers.

### **New and improved mobility aids**

A Global Challenges project is designing new and improved mobility aids, while, at the same time, providing a much-needed boost to the region's manufacturing industry. 'Enabilise' is working with the aged care industry and local manufacturers to identify, and solve, the problems presented by existing mobility aids and develop new prototypes based on engagement with the people who will actually be using the equipment. The findings of the research will inform the third and final stage of the project – designing, developing and potentially manufacturing new mobility equipment in collaboration with local manufacturers. The project is truly interdisciplinary and enables the region's businesses and manufacturers to provide solutions that meet the real-world needs of those aged over 55 who experience mobility issues. Enabilise brings together different disciplines from across the university and engages with AusIndustry, Aged and Community Services NSW/ACT, and the Illawarra Forum.

### **Energy Storage Materials Research – innovative energy storage**

The Energy Storage Materials Research Group within the Institute for Superconducting and Electronic Materials (ISEM) at the Australian Institute for Innovative Materials (AIIM) is developing materials and technologies for a new generation of energy storage devices.

The team collaborates with a number of national and international industrial organisations, and major contributions include research that has developed a number of strategies to enhance the electrochemical performance of lithium-ion batteries. A single, integrated

solution for renewable energy generation, storage and management will make it cheaper and simpler for consumers. Over the course of the four-year project, three UOW research groups will combine their expertise in battery technology, power reliability and building integration to develop sodium-ion battery materials technology in a modular and expandable battery packaging platform.

UOW's Institute for Superconducting and Electronic Materials (ISEM), which has a well-established world reputation on energy storage materials research, will develop a pilot-scale sodium materials production facility to prototype and develop the modular and expandable battery packs. Key manufacturing partners – McNair Technology, Hebei ANZ, Hong Cheng Electric Power, and Nano-Nouvelle – will develop the manufacturing processes, techniques and capacity to mass-produce the required sodium-ion cells for this project, and to meet the anticipated demand for this technology in the future. As an end user, project partner Sydney Water will provide a platform for evaluation of the sodium storage pack at its pumping station and demonstrate its commercial viability. The project is expected to be completed in early 2020.

## **8.2.2 Developing a regional innovation ecosystem**

### **Innovation Campus**

UOW's Innovation Campus is the engine that drives the economic transformation of the Illawarra by creating jobs and industry and attracting businesses, research and investment. It makes the Illawarra a destination for innovators and investors. The \$600 million Innovation Campus is an award-winning research, innovation and commercial precinct that helps activate new economic activity and regional jobs, as well as increase Australia's innovation performance. It is a seven-minute drive from the University's main campus and is set on 33 hectares by the beach at North Wollongong.

The Campus is a place where national and international businesses and leading researchers meet and translate products to commercial success. University research entities at the Innovation Campus include the Intelligent Polymer Research Institute (IPRI), The Australian Research Council Centre of Excellence for Electromaterials Science (ACES), the Institute for Superconducting and Electronic Materials (ISEM), the Electron Microscopy Centre (EMC), the Sustainable Buildings Research Centre (SBRC), the Australian National Centre for Ocean Resources and Security (ANCORS) and the Centre for Health Initiatives. These institutes work in the development of "intelligent" innovative materials with the potential to regenerate damaged human nerves, the development of superconductors that make energy transmission more efficient, new techniques for sustainable building design and maritime law and security.

Several multinational and national companies are residents at the Campus and are strongly engaged with the University. These include NEC Australia, Telecommunications Systems Inc and Pactera. Around 1500 people currently work at the campus, with employment expected to pass 5000 within the next 5 to 10 years.

## **iAccelerate Centre**

As a key component of the regional innovation ecosystem, the iAccelerate Centre is the place for university graduates and Illawarra residents to turn their great ideas into business in their own community and share their knowledge and products with the world. The centre was opened in July 2016 and is the Illawarra's purpose-built business incubator and accelerator of new businesses and attracts other businesses to the Illawarra. The three-storey, 4000 square metre building features "plug and go" expandable space for up to 280 entrepreneurs. The centre helps retain talent locally, giving University graduates the option of local employment and the opportunity to determine their own economic future through entrepreneurship.

The iAccelerate program provides the infrastructure, mentoring and education programs for great ideas to grow and helps connect entrepreneurs with funding opportunities. To date, the iAccelerate program has supported 65 start-up companies, creating 143 jobs. Nine companies have had new product launches and in 2015 six companies have expanded their international presence. Female cofounders currently make up just under half of iAccelerate's 32 start-up companies (47 per cent). Since its inception, the initiative has been focused on increasing opportunities for women to participate equally in all aspects of entrepreneurial endeavours. Longer-term, the aim is for the program to create 500 direct and 1000 indirect jobs by the end of the decade, attracting \$70 million in investment to the regional and state economies. UOW Vice-Chancellor Professor Paul Wellings CBE said: "The iAccelerate Centre will have significant, far reaching and long-lasting positive outcomes for not only the Illawarra but also for NSW more broadly as innovative ideas reach the market sooner."

## **Southern Manufacturing Innovation Group**

In 2015, UOW initiated bringing together innovative manufacturers in the region with university researchers to form the Southern Manufacturing Innovation Group (SMIG). Since then, a series of networking events have been organised to provide a forum for manufacturers in the region to create an exchange of ideas and specific collaborative opportunities facilitating a strong connection with researchers from UOW. Discussion topics were established by an initial survey of SMIG companies and in response workshops were organised around new materials, 3D printing and sensors and data analytics. Researchers from a range of disciplines at UOW have been invited to present their research in those areas and SMIG members have also contributed their experiences and expertise.

## **Advantage SME Program**

UOW has partnered with the NSW Government to deliver the Advantage SME Program, which provides small to medium enterprises with a one-stop access point to the capabilities at UOW, including academics, students, researchers and labs. The two-year partnership, announced in 2016, is about supporting local businesses to develop relationships with the University's researchers to create new initiatives resulting in jobs growth. It provides SMEs with easier access to resources, equipment and expertise to help them build their businesses, create new employment and grow the local economy.

## **ICTI**

UOW, Wollongong City Council and the NSW Government work with ICT Illawarra (ICTI) to connect and support ICT businesses and professionals. ICTI was formed to assist with the ongoing growth and competitiveness of the Illawarra's ICT industry, recognising the potential IT sector in the region. ICTI consists of local ICT and support service businesses working together to promote the capabilities of the region

### **8.2.3 Technology transfer**

UOW's Innovation and Commercial Research team delivers engagement with the University's researchers through the facilitation of strong and positive relationships with government bodies, the commercial realm, industry, communities and academic research facilities. Innovation and Commercial Research (ICR) is the first port of call for those interested in engaging UOW to undertake research. The case studies below give a few examples of the commercialisation successes of UOW research.

#### **Research-led invention: energy storage advance**

Chemical formulas that provide the recipe for key ingredients in advanced energy storage, developed and enhanced at UOW, are being commercialised through an industry partnership. The 10-year agreement between UOW and Boron Molecular will see commercial expansion of the processes developed for application in hydrogen energy storage solutions and rechargeable batteries.

#### **Research-led solutions: Wearable technology**

Responsive clothing is the new frontier of sports and health technology, with UOW researchers leading the way in solutions that prevent injury and improve comfort. The Intelligent Knee Sleeve, the Bionic Bra and the Lymph Sleeve are three examples of cutting-edge "wearable technologies" developed via collaborations among biomechanics researchers, material scientists, chemists, mechatronic engineers, clinicians, patients and industry.

#### **Research-led commercialisation: Disrupting the \$6 billion condom industry**

Universal access to reproductive and sexual health is a great challenge. The Geldom product, being created at UOW, provides a viable option to decrease the spread of disease and unwanted pregnancy.

## **8.3 Contributing to the development of human capital and skills**

UOW enables access to quality higher education in regional, rural and remote areas of southern NSW and has a proud history of working closely with its communities to drive increased participation and attainment among disadvantaged groups.

### **8.3.1 Positive impact on employment outcomes**

UOW's initiatives for graduate employment were recognised in 2015 at the inaugural Australian Financial Review Higher Education Awards. UOW was announced the winner of the employability category for its whole-of-institution strategy to help students where there is no regular access to work-integrated learning or who face barriers in finding employment. These students include those with disabilities, those in non-vocational disciplines, international, Indigenous and those from rural and regional areas.

In 2015, for the ninth year in a row, UOW was ranked in the top 1 per cent of universities in the world in the QS World University Rankings Graduate Employers survey – a review which rates institutions based on employers' opinions of their graduates. A high level of student satisfaction saw UOW receive a five-star rating across seven categories in the 2017 Good Universities Guide. The results also revealed that 73 per cent of UOW graduates were employed full-time within four months of completing their course.

### **8.3.2 Enabling Access to quality higher education in regional NSW**

UOW's six regional campuses in Batemans Bay, Bega, Shoalhaven (West Nowra), Southern Highlands (Moss Vale), Southern Sydney (Loftus) and South Western Sydney (Liverpool) play a vital role in building strong relationships between the University and local communities and in improving access to higher education. There are more than 1300 students that study across the centres. These centres are designed to bring a UOW education to students who may not be able to come to Wollongong. In recognition of the links built between schools and rural communities, in 2015 the Batemans Bay and Bega regional campuses were awarded an Australian Rural Education Award for their In2Uni Regional Outreach Program.

The South Western Sydney Campus will open in 2017 to provide world-class educational opportunities for the people of Liverpool and the Great South West. In addition to addressing the issue of outward flow of students from the area, the campus will also cater for the burgeoning demand for nursing education and training with the establishment of a Western Sydney Nursing Education and Research Centre. Liverpool City Council is a partner in the South-Western Sydney Campus.

### **8.3.3 Social equity and tertiary participation**

UOW endeavours to provide its students access to every opportunity to reach their potential, to become global citizens and make their own impact on the world. The University has a proud history of providing opportunities for 'first generation' students to become the first members of their families to undertake university studies. Three UOW engagement and transition support programs, described below, put the University at the forefront of the sector in delivering social equity.

#### **In2Uni - guiding the way in educational journey**

In2Uni programs are committed to raising the educational aspirations and academic capacity of students from a range of backgrounds, particularly those groups currently

underrepresented in higher education in our local UOW communities. Launched in 2011, the program centres in the involvement of current University of Wollongong students, who as mentors, engage with our local school students. Through a variety of activities, they increase the students' aspiration and awareness of higher education. In 2015, In2Uni engaged with and reached 66 primary schools, 36 high schools and 10,183 primary and high school students. The Year 12 Summer Master Class program is a three-week intensive course held over the summer school holidays which provides students with the opportunity to get a head start in their HSC and future UOW degree, and experience life on campus.

In 2015, the Outreach and Pathways unit formed a collaborative working relationship with Australian Indigenous Mentor Experience (AIME) and Woolyungah Indigenous Centre (WIC) to ensure an Indigenous presence at all In2Uni and Pathways activities and to promote programs to Indigenous students across the region.

### **AIME – Indigenous mentoring**

The Australian Indigenous Mentoring Experience (AIME) at UOW was established in 2008 to help redress imbalance in high school completion rates between Indigenous and non-Indigenous students. The program pairs student mentors one-on-one with Indigenous high school students for an hour a week for 15 weeks, while others are involved as tutors at afternoon learning sessions at the Aboriginal Corporation Centre in Wollongong and as members of tutor squads which go to schools during school hours to help the students.

The UOW Australian Indigenous Mentoring Experience (AIME) team has exceeded expectations through lots of hard work and dedication in 2015. AIME UOW has worked with 1041 local Indigenous high school students in 2015 between Eden and Sylvania and out to Moss Vale and Camden (39 local high schools). At the Wollongong campus, 470 mentees have accessed the program, while 571 mentees have accessed through the South Coast campuses of UOW. 296 UOW students have mentored with AIME in 2015 – 197 at Wollongong, 49 at Shoalhaven, 21 at Batemans Bay and 29 at Bega.

AIME also runs an Outreach Program where high school students located within two to three hours of the UOW campus visit for a full day, three times a year, in a program designed to break down the barriers between them and the University. There is clear evidence that participating in AIME gives Indigenous high school students the skills, opportunities and confidence not only to complete high school but to then transition to university, TAFE or other tertiary education.

### **Woolyungah Indigenous Centre**

Woolyungah Indigenous Centre is responsible for Indigenous student recruitment, access and support. UOW and Woolyungah are committed to increasing the participation of Indigenous Australians in tertiary education. The centre provides programs and facilities that encourage and support Indigenous Australians from entry to university, through to successful completion. Woolyungah's goal is to guide students through their academic programs and the challenges of tertiary study so that the time spent at UOW is both enjoyable and enriching. The centre provides tutorial assistance and access to facilities such as computer rooms, study areas, a kitchen and common room area.

The centre holds events throughout the year to celebrate dates of importance to both Indigenous and non-Indigenous Australians. Participation in events such as Reconciliation Week and NAIDOC Week provides an opportunity for university staff, students and the local Indigenous community to come together and celebrate culture.

## **8.4 Promoting enterprise, business development and growth**

UOW is engaged with the global economy, having strong partnerships with key government agencies overseas as well as major international corporations to ensure its research is impact driven and commercially relevant. The University promotes a culture of research, innovation and collaboration to bring sustainable benefits to business and society.

### **8.4.1 Global linkages and industry connections**

#### **China connections**

Since 2007, UOW has been in partnership with Chinese Government-owned Baosteel, China's largest steel company and fourth-largest steel producer in the world. UOW was the first foreign university to undertake research and development activities with Baosteel. The University is also one of the four Australian partner universities of the \$25 million Baosteel-Australia Joint Research Centre. UOW participates in commercial research projects in not only Baosteel's traditional business of steel manufacturing and processes, but also in new materials for energy storage and efficiency improvement. These projects directly contribute to Baosteel's business operations, including improvement in stainless steel quality and new rolling technology.

UOW also has a long-standing research collaboration with one of China's leading battery companies, DLG, in electric vehicle power systems, and a partnership with Ningbo Jan Sen to develop next generation magnetic resonance imaging (MRIs) devices using advanced superconductor technology.

UOW is also attracting major Chinese corporations to the Illawarra with Chinese-based global IT services provider Pactera opening an office at the University's Innovation Campus. The centre provides an interface in Australia between Pactera's Australian and Asia-Pacific customers and its main delivery centres in China. Some of the staff at the Wollongong centre work directly on projects for Australian customers, while the centre also facilitates offshore delivery by the company's main delivery centre in China.

#### **Hong Kong connections**

Hong Kong's MTR Corporation has commissioned UOW's SMART Infrastructure Facility to investigate how social media chatter can be captured and used to boost innovation and customer service. Collaborating with UOW's Faculty of Business and using advanced geosocial techniques developed at SMART, researchers aim to enable MTR to develop a knowledge-sharing platform that will capture, organise and act on information harvested from social media networks.

This project will assist the world-renowned rail service provider to develop strategies for harnessing information published by commuters on social networks such as Twitter, Weibo, WeChat and Facebook. SMART, a leader in the space of geosocial intelligence (GSI) is custom-building a platform to suit MTR's needs. With a GSI system, MTR will be able to detect in real time the reactions or mood of its customers, allowing staff to better allocate tasks for immediate action, prioritise, review or respond to an issue. The project adds to UOW's growing presence in the Asia-Pacific Region and will be delivered in collaboration with the Centre for Communication and Public Opinion Survey at the Chinese University of Hong Kong (CUHK) and the Connected Intelligence Centre at the University of Technology Sydney.

In 2015, UOW was recognised for its contribution to international education, winning the prestigious 2015 Hong Kong-Australia Business Association (NSW Chapter) Award which recognises companies striving for excellence in international trade with Hong Kong. UOW has also been awarded a Business Excellence Award for Education and Training in the 2015 AustCham Westpac Australia-China Business Awards.

### **Japanese connections**

A 20-year partnership between UOW researchers and a Japanese institute is furthering innovation in materials science for sustainable energy and development. UOW's Institute for Superconducting and Electronic Materials (ISEM) and Japan's National Institute for Materials Sciences (NIMS) formalised an existing partnership by signing a Memorandum of Understanding in September 2015.

UOW is the only university in NSW to link with the prestigious Japanese institute. The ISEM-NIMS partnership has so far yielded seven joint research projects worth close to \$3 million, staff and student exchanges and 105 joint publications with over 1400 citations. Under the MoU, both parties will work on a proposal to form a joint research centre. Collaboration with one of the major divisions within NIMS, the International Centre for Materials Nanoarchitectonics, will focus on pioneering functional materials with a vast array of applications that range from energy storage to medical services.

### **United Arab Emirates connections**

The Simulation and Smart Systems (S3) Research Centre was recently established by the University of Wollongong in Dubai's Faculty of Engineering and Information Sciences to support simulation-based research in a diverse range of fields including health, education, urban planning, sustainability, engineering and computing. There are three main research groups within the centre, each focusing on the application of technology to address lifestyle challenges that are particularly relevant to the UAE, such as healthcare, traffic congestion, energy use and security systems.

The University of Wollongong in Dubai (UOWD) was established by the University of Wollongong in Australia in 1993 and currently maintains partnerships with a range of businesses including Abu Dhabi National Oil Company (ADNOC), Roads and Traffic Authority (RTA), Dubai Police, Dubai Municipality and UAE Defence/Military. In 2015, UOWD has teamed up with Dubai Business Women Council for the first study of its kind in the region

which will contribute to public policy initiatives aimed to heighten career leadership development opportunities among women in the UAE.

### **Visiting International Scholar Awards**

UOW is meeting the needs of lasting impact that contributes to the needs of communities and empowers people to achieve their aspirations. In 2015 it launched the Visiting International Scholar Awards to bring 40 of the world's best scholars to UOW over four years. These visiting scholars will have the opportunity to expand their research network, gain new knowledge and skills, and work with leaders in their field on a 2-6 month sponsored placement. Research projects to generate energy from sewage, advance artificial muscle technology and investigate the impact of omega-3s in pregnancy are among the topics being explored by visiting international scholars at UOW in 2016.

## **8.5 Enhancing social and cultural life**

UOW provides important cultural, intellectual, architectural, aesthetic, artistic, athletic, recreational and medical resources which can add to the vibrancy, creativity and dynamism of its local communities. UOW students and staff also participate and make important contributors to local social projects through voluntary and other activities.

### **8.5.1 Community Health**

#### **IHMRI: improving regional health through community-based medical research**

The Illawarra Health and Medical Research Institute (IHMRI) is a joint initiative between UOW and the Illawarra Shoalhaven Local Health District dedicated to excellence and innovation in health and medical research that will lead to better health services and a healthier local community. IHMRI engages with a large network of organisations and individuals with an interest in health and medical research in the Illawarra and Shoalhaven region. It provides an independent medical research environment to bring academics and clinicians together to solve broadly relevant health problems.

In 2014-2015 IHMRI-affiliated researchers were actively involved in 102 externally-funded projects, including 31 projects funded by the National Health and Medical Research Council and 48 projects supported by other Australian competitive grants. More than 100 scientists are based at IHMRI's \$30 million facility at UOW's main campus, with more than 290 researchers, students and research staff utilising the facility during 2015. The research program at IHMRI consists of three broad-based themes that target health and medical issues prevalent in the Illawarra region such as chronic lifestyle-related conditions, cancer, mental health and the 'diseases of ageing' including dementia. Through the Illawarra Health Insights research cluster, IHMRI fosters innovative observational studies and community health interventions that not only seek to improve the health of local residents, but influence national conversations on the best way to prevent disease, promote good health and prolong life.

## **Mind the GaP: innovative mental health care**

A joint initiative by the University of Wollongong and Shoalhaven Council is tackling the issue of mental health and wellbeing in the Shoalhaven area by establishing an innovative mental health care facility providing patient-centred, holistic care. The new purpose-built \$2.5 million MIND the GaP facility, to be located at UOW's Shoalhaven Campus in Nowra, will address the high rate of mental health needs in the Shoalhaven community, particularly among younger people, and will focus on improving the prevention, early recognition and treatment of mental health issues, including suicide prevention.

Construction started in 2016 and the facility will bring together healthcare professionals, researchers and frontline support services, such as Lifeline, to create an integrated mental health and wellbeing precinct. The initiative, which is jointly funded by the Commonwealth Government's National Stronger Regions Fund and the University of Wollongong, will be led by Shoalhaven City Council and the University of Wollongong, and delivered in partnership with Lifeline South Coast, Lifeline Australia Research Foundation, Coordinare, Nowra Medicare Local, the Illawarra and Shoalhaven Local Health District, Noah's Shoalhaven, and the Illawarra Health and Medical Research Institute (IHMRI).

## **Dementia-Friendly Communities: boosting quality of life**

The South Coast town of Kiama is the pilot site for a bold new project aimed at creating dementia-friendly communities throughout Australia. The wider research project, led by UOW's Dr Lyn Phillipson, aims to change the way people with dementia interact with their social and physical environments and boost their quality of life. Part of UOW's Global Challenges, Dementia-Friendly Communities is in direct response to the growing number of Australians who are expected to be diagnosed with dementia in the coming decades, a figure set to rise from the current 32,000 to approximately one million in 2050. The multidisciplinary initiative has also seen the development of Our Place – an interactive website that enables users to map dementia-friendly places in their area.

The site encourages people with dementia and their supporters to share local knowledge about places in their neighbourhood that are dementia-friendly and also allows users to share ideas about places that could be improved. Lead researcher Dr Chris Brennan-Horley said the maps currently focus on Kiama and Darwin, however he hoped to expand it to other communities. Our Place is funded by the Alzheimer's Australia Dementia Research Foundation and is part of the Dementia Friendly Kiama and Dementia Friendly Darwin initiatives.

## **Early Start Research Institute: a head-start for all learners**

The Early Start Research Institute (ESRI) has a multidisciplinary team of 26 members and more than 110 higher-degree research students across the areas of education, psychology, health sciences, arts and creative arts all working to overcome disadvantage and impact the lives of children, youth and families through world-class research and using cutting-edge facilities. The institute is partnered with Cancer Council NSW, the Movember Foundation, Pearson Education Group and Big Fat Smile in research into overcoming disadvantage and effecting real social change through Australia's first children's discovery centre and its 38

connected Early Start engagement centres across NSW. ESRI has teamed with Movember on a multimillion-dollar first-of-its kind project, involving six of Australia's major sporting organisations, which aims to address mental health issues among adolescent male athletes.

### **Northfields Clinic – supporting mental health in the community**

Northfields Clinic was founded in 1981 as the third oldest clinic of its kind in Australia, and is widely regarded by as one of the best psychology training clinics in Australia. The clinic has provided low-cost, high quality psychological treatment and assessment services to the community, treating children and adults for a range of psychological issues. The clinic treats children and adults for a range of issues including anxiety and phobias, depression, drug and alcohol problems, obsessive compulsive disorder, stress management, sleeping disorders, assertiveness, self-esteem building, anger management, learning disabilities and child behavioural problems.

Over 400 clinical psychology trainees have graduated from the clinic over the past 35 years as clinical psychologists with masters, doctorate and PhD degrees, and are now serving the mental health needs of the community. Over 120 Masters of Professional Psychology students have also undertaken work at the clinic during their training. Approximately 12,000 individual clients have benefited from the service offered at Northfields, and as such the clinic has touched the lives of many more - including family and friends. The clinic has also facilitated many successful clinical research projects in partnership with the Illawarra Institute for Mental Health. It has the backing of highly qualified national and internationally-recognised clinical academics.

### **8.5.2 Volunteering**

University of Wollongong students and alumni are making an economic and social impact throughout the region by serving as volunteers both within the university and throughout the broader community. Volunteerism not only creates strong, vibrant local and regional communities- it also has global impact. It is any community's most valuable hidden asset with the true value of volunteering reaching far beyond financial figures.

UOWx is a co-curricular learning and recognition initiative which was started by the University of Wollongong in 2015 to provide greater access to and recognise learning that takes place outside the formal curriculum – particularly through volunteering within the University and in the broader community. Students engage in a multitude of activities that provide strong opportunities for 'real-world' learning ranging from volunteering, peer mentoring, and being a student ambassador, to running clubs and societies and engaging in cross-cultural experiences. UOWx was designed in consultation with more than 25 employers and more than 60 current students.

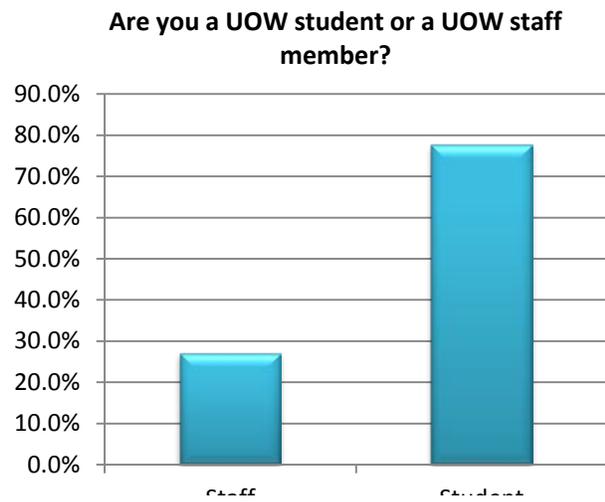
Figure 8-2 shows the results of a 2016 survey on volunteering, in which 1,379 respondents participated:

- Of those respondents who identified themselves as volunteers, 59 per cent commit to 1-3 hours of volunteering each week. A further 22 per cent commit to 4-6 hours of volunteering per week. The remaining 19 per cent of respondents commit to

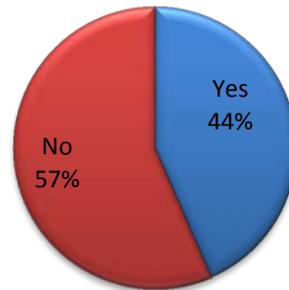
more than 7 hours of volunteering per week.

- More than one-third of respondents that commit to regular volunteering have increased their commitment since joining the UOW community. This may reflect the availability of volunteering options for new staff and students and the inclusive culture of the UOW community.
- Of the survey respondents that identified as volunteers, 42 per cent volunteered in the Education/Training/Youth Development sector, perhaps reflecting the availability of volunteering options on campus. A further 33 per cent volunteered in the Community/Welfare sector, 13 per cent in Sport/Physical Recreation, 10 per cent in the Health/Aged/Disability sector, and 3 per cent in Emergency Services/Disaster Relief (for instance, the Rural Fire Service).

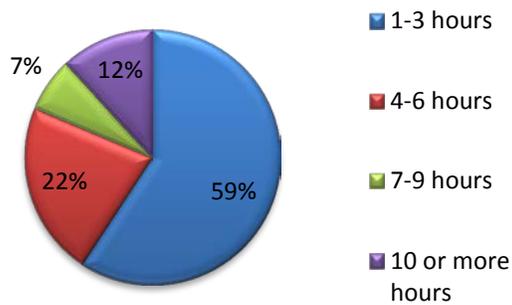
**Figure 8-2: Volunteering at UOW**



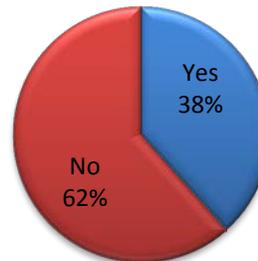
**Do you undertake unpaid voluntary work, specifically in the Illawarra region?**



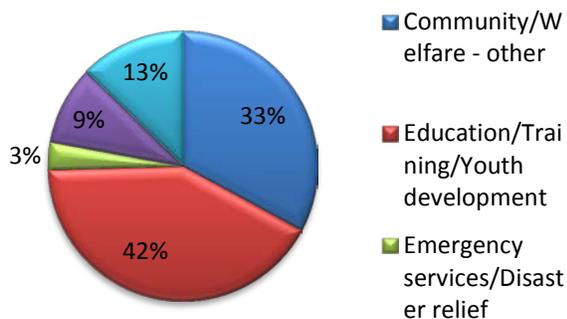
**Over the last year, and on average, how many hours in a week would you work as a volunteer?**



**Since commencing at UOW have you increased your volunteerism commitment?**



**Broadly speaking, in which sector do you contribute?**



### **8.5.3 Sustainability**

UOW research groups are contributing to a project that aims to reduce energy costs for low income, older Australians while delivering improved energy efficiency, sustainability and comfort. A partnership consortium including UOW researchers, led by Green Jobs Illawarra within RDA Illawarra (RDAI), secured \$2.3 million in the Federal Government's Low Income Energy Efficiency Program. The project is titled Energy Efficiency in the 3rd Age (EE3A) and demonstrates the role innovation and commercial research plays in linking researchers with external partners to address real-world problems. It is aimed at designing, implementing and evaluating approaches to encourage older people to manage their energy usage without reducing their quality of life.

Research trials will be run by UOW's Sustainable Buildings Research Centre (SBRC), Centre for Health Initiatives (CHI) and Australian Centre for Cultural and Environmental Research (AusCCER). The consortium also includes Illawarra Retirement Trust, Warrigal, Illawarra Forum, WEA Illawarra, Southern Councils Group and the Royal Freemasons Benevolent Institution. The SBRC is the flagship of UOW's Building Sustainability Research Program, which focuses on making Australian buildings more sustainable and energy-efficient. In 2015, the SBRC was awarded a 6-star Green Star by the Green Building Council of Australia. It is the first certified 6-star Green Star building in the Illawarra.

### **8.5.4 State-of-the-art sports and recreation facilities**

A wide variety of community groups use the sporting facilities operated by the UOW Recreation and Aquatic Centre (URAC). In 2015, 645,274 visitors to URAC were recorded. There are about 3400 URAC memberships and of these about 25 per cent are community memberships. During 2015-2016, 98 individual sporting clubs, community groups, organisations and schools have utilised URAC facilities. These included the Illawarra Academy of Sport, Illawarra Water Polo, Cricket Illawarra, Illawarra Amateur Football, Illawarra Netball Association, Illawarra Triathlon Club, Wollongong City Netball, Wollongong Hawks, Wollongong Underwater Hockey, Activate Events, Wollongong Wizards Triathlon Squad, Bulli Surf Club, North Wollongong Surf Club, Wollongong City Surf Club, Wollongong Surf Club and Illawarra Triathlon Club.

High profile Australian and international sporting teams have used the sporting facilities as training bases – from the United States and Australian national swimming squads to the Wallabies rugby union team and the St George Illawarra Dragons in the National Rugby League. Other sporting teams include Australian University Sport, Football South Coast, NSW AFL, Cutters, Royal Lifesaving Society, Swimming NSW, Triathlon Australia, Canadian National Triathlon Team and Surf Life Saving NSW. 24 local schools used URAC facilities frequently throughout 2015. URAC also houses the headquarters of the Illawarra Academy of Sport – a regional junior sports academy.

## **8.5.5 Community support**

### **UOW Cares: Workplace giving program**

UOW Cares enables UOW staff to make regular tax-free donations to charitable organisations through the payroll system. UOW Cares provides a regular funding stream for nine charities: SCARF, the Smith Family, Landcare Illawarra, Headspace Wollongong, Autism Spectrum – Aspect South Coast School, Indigo Foundation, the Fred Hollows Foundation, AIME and UOW's Learning and Development Fund.

### **CEGS: connecting UOW expertise with community needs**

The University's Community Engagement Grants Scheme - an innovative program which supports projects that benefit that local community - celebrated its 10th anniversary in 2015. CEGS was introduced to encourage and support collaborative University-community projects which have mutually beneficial outcomes. To date, more than \$490,000 has been awarded to 59 projects since the scheme started in 2005. CEGS is a UOW initiative representing its commitment to supporting those seeking to achieve the goals of its communities. The projects are innovative, starting small and dreaming big: they create new and sustainable approached, connections and futures.

### **UOW Community Investment Steering Group**

The University of Wollongong has a longstanding history of supporting its multiple local communities with the intention of creating positive social impact. In recent years, the University has created the Community Investment Program in order to maximise the potential of its assistance within communities. Through this program, UOW hopes to support regional communities, with a focus on cultural, environmental and economic developments. UOW recognises its social responsibility to local communities and hopes to make a real difference to these communities through the sponsorship of a variety of programs. Between 1 January 2015 and 30 June 2016 the UOW Community Investment Steering Group recommended funding of \$371,741 towards the organisations and initiatives.

## **8.5.6 Cultural engagement**

### **Early Start Discovery Space: a partnership of play**

The \$44 million Early Start building, which opened in July 2015, is the most sophisticated early childhood teaching, research and community engagement initiative in Australia. A feature of the building is the Early Start Discovery Space, which is about children and adults sharing the fun of interactive experiences and stimulating educational programs. It is the first of its kind in the world based on a university campus. The Discovery Space has proved enormously popular in its first year, with 102,034 people visiting from its opening to May 31, 2016.

## **Innovation Campus Science Centre and Planetarium: star-struck by STEM**

Around 50,000 people visit UOW's Science Centre and Planetarium at the Innovation Campus every year, making its interactive exhibitions, science shows, planetarium and observatory with a research-quality telescope, one of Wollongong's most popular tourist attractions. The visitors each year include about 15,000 school students, many from outside the area.

## **UOW events and visitation: a tourism catalyst for Wollongong**

Destination NSW figures show visitors to UOW for conferences, graduation ceremonies and visiting friends or family members who are working or studying at the University are an important and growing element of the region's tourism industry. Education is the third top purpose for people visiting the Illawarra sub-region, representing 11.9 per cent of visitors in the year ending December 2015, compared to the NSW average of 5.2 per cent for the same period. Visiting friends and relatives was the second top purpose for people visiting the Illawarra sub-region.

## **2016-2036 Wollongong Campus Master Plan**

The University has been able to continually improve the quality of its unique campus due to enduring support from regional business partners, institutions and the community. In turn, the University has made many of its facilities available to the community. The University's campuses are constantly evolving with the changing needs of community, education and industry, as reflected in the 2016-2036 Wollongong Master Campus Plan. While the Plan relates specifically to the landholdings of the Wollongong Campus, it also considers potential aligned projects and partnerships in surrounding neighbourhoods and in Wollongong more broadly. The campus forms part of an important network of well-connected economies and partnerships across the city. This will contribute to the economic, social, cultural and creative success of Wollongong, and provide a major hub of employment for the region.

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