



GREATER CURTIN DRIVERS FOR CHANGE

PART A

**CREATING THE CITY
OF INNOVATION**



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Contact

Andy Sharp
Director Properties, Facilities & Development
Curtin University
Kent Street Bentley WA 6102
GPO Box U1987 Perth WA 6845
Tel: +61 8 9266 4428
Email: andy.sharp@curtin.edu.au

Document Control

The Greater Curtin Drivers for Change (Part A) has been prepared by the Curtin City Project Group consisting of AECOM, Arup, Block Branding, CBRE, Donaldson and Warn, Pracsys and Syrinx Environmental PL.

Second edition

Approved by: Andy Sharp

Director Properties, Facilities & Development

Date: 19/03/2014







GREATER CURTIN DRIVERS FOR CHANGE

PART A

**CREATING THE CITY
OF INNOVATION**



CHANCELLOR'S FOREWORD

Curtin University is an institution with an incredibly bright future. It brings together the very best minds in research and teaching and has created a vision for the future that aims to bring prosperity to all Western Australians. Curtin is building upon an area that already possesses the largest concentration of innovative industry and research in the State. We aim to create an important economic and innovation hub with a rich diversity in culture and the arts – a district that celebrates our creative knowledge. Curtin is committed to pursuing this goal with and for the citizens of Perth and Western Australia so that we may become a globally competitive knowledge economy.

Greater Curtin is a visionary plan for our future. It is a bold and exciting plan that sets out the transformational changes required to bring together the world's best minds to solve real world problems. We envisage Greater Curtin to be 'the place' to rub shoulders with some of the most dynamic and exciting businesses and community groups in Australasia. It will be a place where large and small businesses and entrepreneurs can exchange knowledge – a place where creative relationships are forged between colleagues. Greater Curtin will give the community, students and companies a unique opportunity to conceive and develop ideas and technologies – a place where innovation and opportunity coexist ready for the taking.

The University has prepared this master plan as the first step in showcasing the very best in urban planning and design. We are forging strong relationships with business and government to ensure our goals and aspirations meet the demands and changing face of university education and delivery. We have every desire to create an urban centre that will become a hub of innovation and research. Greater Curtin is set to develop into one of the most dynamic districts conceived for the benefit of Perth and Western Australia. We invite you to join with us in making this a truly globally competitive knowledge centre – a Greater Curtin.

COLIN BECKETT

CHANCELLOR
CURTIN UNIVERSITY



VICE-CHANCELLOR'S FOREWORD

If the role of the university is to look ever forward, to challenge and to create opportunities for its citizens by finding new and better ways of understanding our world, then Curtin University exceeds these aspirations by bringing to life the Greater Curtin initiative.

Our vision for a knowledge hub defined by the synergies of research, business and entrepreneurial enterprise forms the basis of the Greater Curtin proposal. Our plans for an urban centre will deliver significant opportunity for a wide range of knowledge industries, business and research groups and will extend to help position Western Australia as a key knowledge economy in Australia and Asia.

Greater Curtin is underpinned by a broad spectrum of innovation and delivers on four key network strengths;

Education and Innovation Network – Meeting the demands of future generations will require Curtin University to provide contemporary courses and research capabilities that closely align with community and business expectations. Greater Curtin will become the centre of research and innovation in Western Australia, blending new practices for entrepreneurship with business and industry partners.

Social and Cultural Network – With one of the largest humanities faculties in Western Australia, Greater Curtin will be the place where arts and culture meet technology and innovation. We seek to become the creative hub for Perth and an attractive vibrant destination for the community.

Urbanisation Network – Greater Curtin will support an urbanisation economy based around public transport, dense residential and high participation rates of knowledge workforce and visitor populations. In the spirit of great urban places, Greater Curtin will serve its community as a living laboratory where technology and research are visible and accessible to everyone.

Business and Research Network – A collection of visionary companies and researchers already exists in Bentley, and Greater Curtin seeks to leverage this critical mass to form new business and research opportunities – multiplying the number of innovative companies within Western Australia. The Greater Curtin project will demonstrate the network benefits offered to entrepreneurial business and researchers by the promotion of fresh ideas and collaboration between new and existing innovators. Greater Curtin is planned to contribute an estimated \$4.5B in annual output to the State economy when fully developed, comprising knowledge exports, value-added industry and significant wages income.

These exciting networks provide solid foundations for Curtin University and form the cornerstone from which Greater Curtin is implemented. We invite all Western Australians to be part of Greater Curtin and to participate in making Curtin University a leading light in research and innovation for this and future generations.

DEBORAH TERRY

VICE-CHANCELLOR
CURTIN UNIVERSITY

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1.0 INTRO- DUCTION



The Greater Curtin Master Plan has been developed by the Curtin City Project Group, consisting of AECOM, Donaldson and Warn, Syrinx, Arup, Pracsys, CBRE and Block Branding. The master plan provides a vision, supporting frameworks and design direction to guide the transformation of Curtin University's Bentley campus into a vibrant and diverse community, a 'Greater Curtin' over the next 20 years.

1.1 PROJECT CONTEXT

Greater Curtin encompasses the Bentley campus of Curtin University, an area of approximately 114ha, 6km south-east of Perth CBD. The Greater Curtin Master Plan provides spatial strategies to support Curtin University's Vision, the aspirations set by the Western Australian (WA) Government's strategic plan for Perth and Peel – Directions 2031 and Beyond. It also advances the Curtin Town Structure Plan, completed in October 2011.

Curtin University's vision is:

“To be an international leader in research and education – changing minds, changing lives and changing the world.”

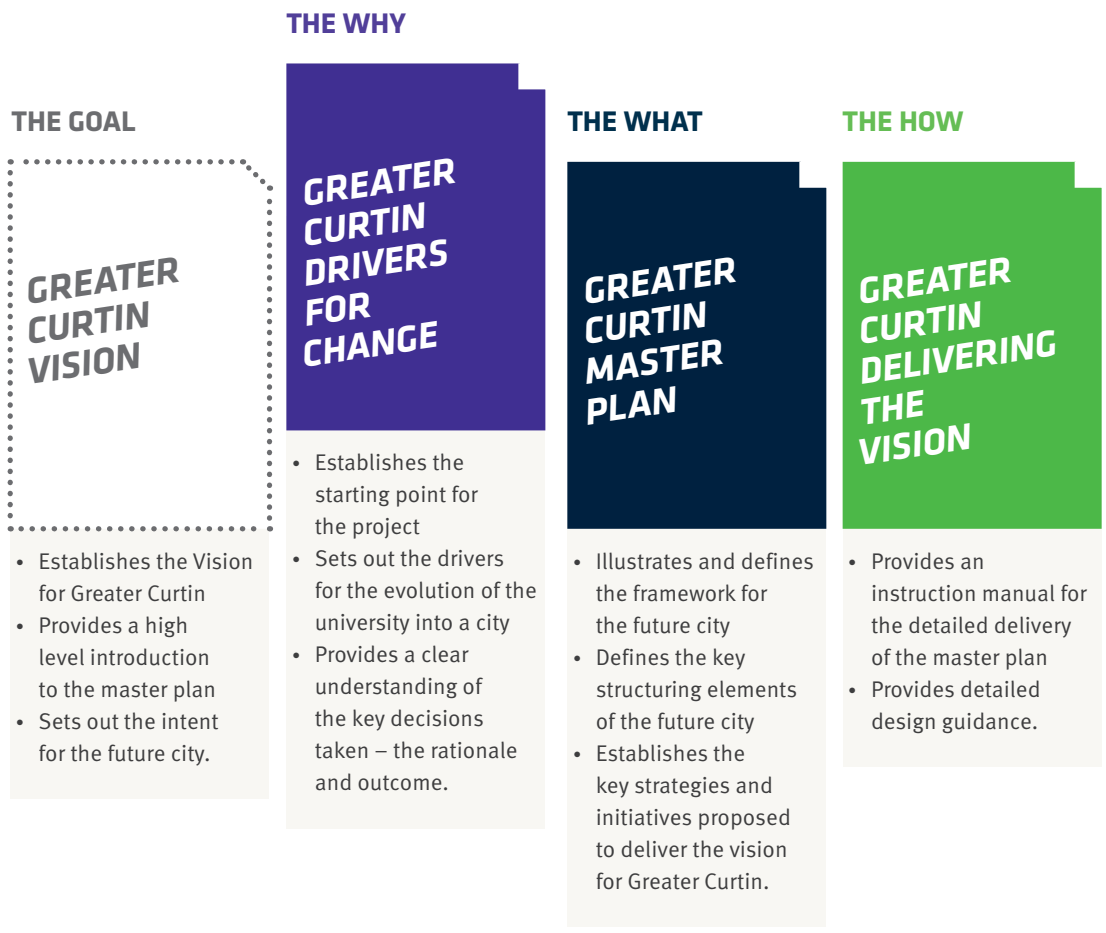
Its mission is its commitment to leadership, innovation and excellence in teaching and research, for the benefit of its students and the wider community. Seven objectives underpin this mission statement, namely:

- 1. Governance** – a collaborative governance structure that seeks to build research and development capacity
- 2. Knowledge, Research and Training** – facilitating partnerships with industry, business, government and researchers
- 3. Global Influence** – providing an environment to grow economic benefits for the university, state and nation
- 4. Innovation** – a place where innovation and creativity are championed
- 5. Identity** – an international campus with world class facilities and a culture of lifelong learning and innovation
- 6. City Experience** – a vibrant, safe, productive and enjoyable 24/7 city
- 7. Student Life** – a complete experience encompassing learning and living.

The master plan seeks to fully translate the objectives of both the University and the WA Government into tangible outcomes for its communities. The goal of the master plan is to set in place a vision and supporting strategies to guide the transformation of the current University from an isolated suburban campus into a major node of activity.

The master plan seeks to establish a flexible framework that the University and its partners can work with to guide the evolution of an urban centre with a strong identity, high levels of vitality, community interaction and opportunities for growth, prosperity and strong partnerships.





1.2 PURPOSE OF THE DOCUMENT

The Greater Curtin Drivers for Change is document A in a suite of three documents:

- **Document A – Greater Curtin Drivers for Change (this document)**
- Document B – Greater Curtin Master Plan
- Document C – Greater Curtin Delivering the Vision.

The role of these documents is outlined in the accompanying diagram. A Vision document supports these documents, establishing a high level introduction to Greater Curtin. A series of technical documents also exist to provide further detail behind the analysis, strategies and initiatives developed during the master plan process.

DOCUMENT A DRIVERS FOR CHANGE

The starting point for any master plan, which seeks to guide positive change over a defined timeframe is a comprehensive understanding of the relevant issues and constraints which influence social, ecological and economic opportunities.

In this document, ‘Drivers for Change’, influences critical to Curtin University’s future as a university and at a city scale are explored. The document provides a concise summary of the key factors that have defined the foundations and focus for the development of the Greater Curtin Master Plan. These are explored in three sections:

THE FUTURE OF ACADEMIA

Explores the global influences that are changing the future shape of academia and how universities will need to operate in order to understand the opportunities for the master plan to shape a future city that is ready for and able to respond to new and more dynamic academic models.

CURTIN AS A BUSINESS INNOVATOR

The vision for Curtin, in both the university and the wider Perth planning context, is for it to become an innovative and globally competitive knowledge environment. Curtin’s designation as a specialised centre within Perth’s Activity Centre State Planning Policy 4.2 (SPP 4.2) requires the development of a significant proportion of complementary knowledge and research-based businesses to maximise the value of the existing institutional activities. In this section of the document opportunities for the integration of the ‘core’ university functions and new ‘city’ activity are explored.

CITY ROLE

Both Curtin University and the Western Australian (WA) Government’s strategic plan for Perth and Peel – Directions 2031 and Beyond set in place a vision and supporting strategies to guide the transformation of the current University from an isolated suburban campus into a major urban node of activity. In order to ensure this ambition is fully and successfully realised, ‘City Role’ explores a broader understanding of the area, the community, ecologies and activities required to guide the evolution and integration of Curtin as a new urban centre.

2.0 **THE FUTURE** **OF ACADEMIA**



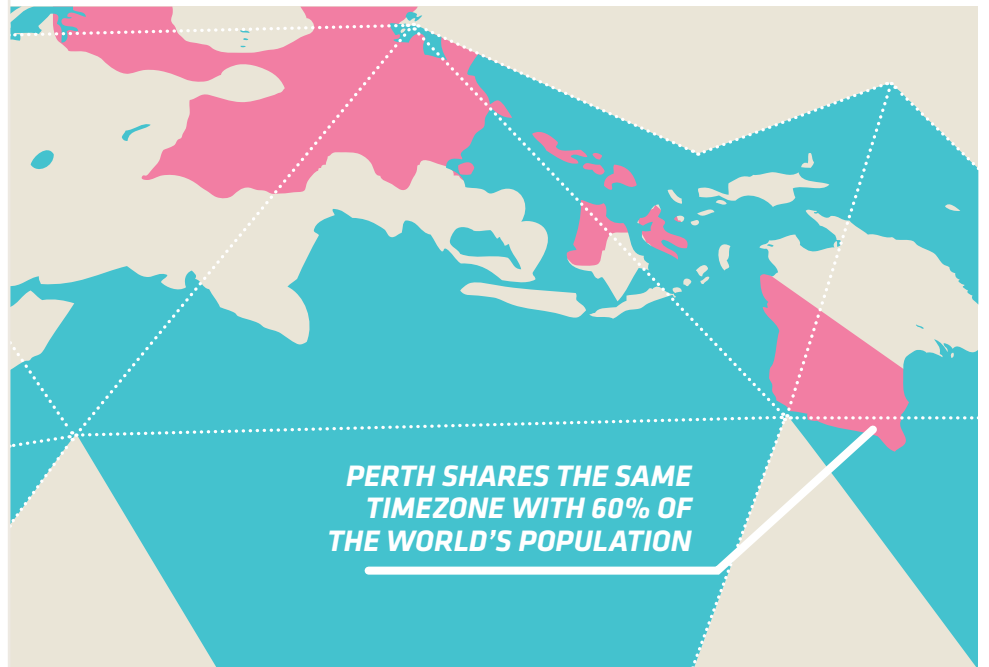
The following section explores the influences that are likely to shape how Curtin University will operate in the future and the opportunities for Greater Curtin to respond to these influences.

A man with dark hair and a beard, wearing a white shirt, is looking intently at a computer monitor. The background is a dimly lit server room with multiple racks of servers and glowing lights. The overall atmosphere is professional and focused on technology.

[THE] INFLUENCES

2.1 WHERE IS THE WORLD HEADING AND WHAT CHANGES ARE OCCURRING?

The world's social, economic and political systems are constantly changing. The following global influences will have a profound influence on Curtin University's future operating environment.



[A]

DIGITAL AGE

The digital age is characterised by a shift from traditional industry based around the production of goods to an economy based on the computerisation of information. Jobs in traditional industries have become increasingly automated, leading to greater efficiency and productivity, reducing the need for lower skilled labour and creating new knowledge industries. Information Communications Technology (ICT) has enabled countries, firms and institutions to connect to global networks, opening new markets and facilitating international collaboration.

[B]

GLOBALISATION

Globalisation has seen the increased economic and financial integration of economies around the world. National borders are opening to allow free transfer of goods, services and capital, as well as a greater mobility of labour between countries. Mobility of capital makes it easier for multinational corporations to relocate to places that offer the greatest competitive advantage or the least financial disincentive (such as high rates of tax).



[C]

GLOBAL ECONOMIC DOWNTURN

Following the collapse of major US financial institutions in 2007, the global economic downturn has posed major challenges for governments, corporations and individuals. Global markets and the connectivity of countries and institutions enabled the debt crises to spread from the US to Europe and affect financial and economic systems around the world. Recession involving loss of jobs and spiralling debt has led to greater political instability, with reduced ability to manage and implement change.

40%

OF ALL INNOVATION OVER THE NEXT DECADE TO BE DRIVEN BY INTERNATIONAL COLLABORATIONS.

[D]

SCIENCE

The science and innovation system has become increasingly internationalised, with a forecast 40% of all innovation over the next decade to be driven by international collaborations. China's focus on science is growing rapidly, producing more scientific publications in 2011 than any country except the United States. Institutions and governments across the globe are taking strategic steps to respond to changes in the science and innovation landscape, through measures to boost international engagement and national competitiveness.

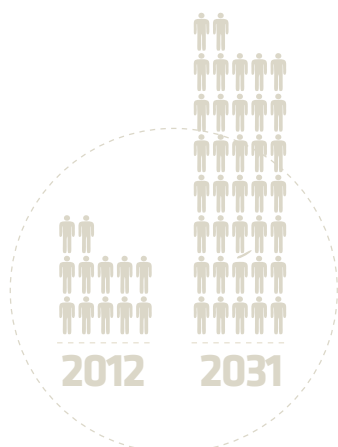


[E]

GROWTH OF CHINA AND INDIA

China and India have sustained annual GDP growth rates in the order of 8-10% over recent years, and almost tripled their share of the global economy in the past 20 years. The region is set to be the world's largest producer of goods and services, and the largest consumer of them. While Australia predominantly exports natural resources to the region, the OECD reports that China's investment in R&D accounted for 13% of the OECD total in 2008, up from 5% in 2001.

AS POPULATIONS GROW, ESSENTIAL RESOURCES LIKE FOOD, WATER, MINERALS, AND ENERGY MUST KEEP PACE.



[F]

POPULATION GROWTH AND SUSTAINABILITY

Population related issues are among the most contentious areas of public debate in recent years. In the face of populations that are living longer and consuming more resources, sustainability focuses on the ability of global and local ecosystems to cope with the pressures of human activities. As populations grow, essential resources like food, water, minerals, and energy must keep pace, through increasing production, regulating use and developing renewable sources.



[G]

CLIMATE CHANGE

The term climate change is often used to refer to human-specific impacts, in which the climate is affected in various ways by an increase in greenhouse gases from fossil fuel emissions, deforestation and other factors. In recent years, science has applied many resources toward understanding climate change and its causes, in order to develop greater knowledge around how the current and projected impacts will affect people today and future generations.

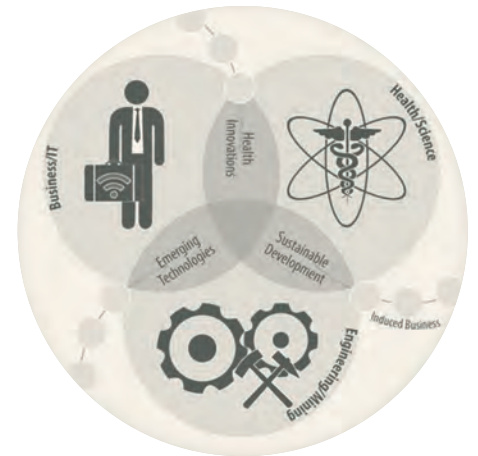
In developed countries such as Australia, more than 80% of the population already live in urban areas, generally concentrated around capital cities that operate as central economic nodes.

[H]

URBANISATION

Rural migration and economic benefits associated with cities have seen the rapid growth of urban areas in all countries around the globe. The largest changes in population settlement patterns are currently occurring in developing countries, with people leaving traditional rural communities to access greater economic opportunities, amenities and quality of life in major cities. In developed countries such as Australia, more than 80% of the population already live in urban areas, generally concentrated around capital cities that operate as central economic nodes. While the growth of cities is bringing with them the advantages of proximity, diversity, and competition, they are also generating negative externalities such as congestion, pollution and social conflict.

Most successful innovation is occurring where the problems and needs of users and the potential of technologies are linked together in a creative and collaborative process.



[I]

PRODUCTIVITY

Productivity is a measure of how efficiently an organisation, government, region or nation uses resources to produce outputs. In the developing world, labour productivity is growing at a greater rate than in developed countries, as more of the workforce receives education and low skilled labour is replaced by machinery. In developed countries, complex political systems are making it difficult to implement new productivity-enhancing reforms, and an increase in compliance costs associated with risk management, security needs and environmental regulation has increased costs to business without a corresponding increase in output.

[J]

INNOVATION

Innovation is the creation of new products, services or processes, or the improvement of existing ones. Innovation is one of the key drivers of productivity growth, through more efficient processes and creation of products of higher value. Most successful innovation is occurring where the problems and needs of users and the potential of technologies are linked together in a creative and collaborative process. Over the past 25 years, the digital revolution has dramatically changed the way organisations operate. The huge growth in data and analytic capabilities is providing the information necessary for firms and government to make informed decisions, and new communication technologies are enabling greater mobilisation, globalisation and process efficiency.

[K]

KNOWLEDGE ECONOMY AND AGGLOMERATION

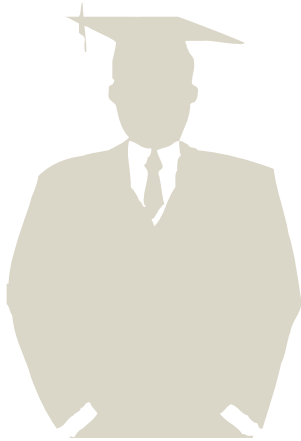
Empirical evidence worldwide finds positive productivity gains from urban agglomeration, supporting the theory that firms can successfully increase productivity through agglomeration. As economic welfare benefits of the knowledge economy are increasingly recognised around the globe, the creation of compact urban knowledge precincts has become a strategic planning focus. Specially designed knowledge centres are providing a spatial input to the encouragement of collaboration between innovative firms, academic researchers and policy-makers to produce high value commercial outcomes.



2.2 HOW ARE SOCIAL, TECHNOLOGICAL, ECONOMIC, ENVIRONMENTAL AND POLITICAL (STEEP) FACTORS AFFECTING UNIVERSITIES AND SPECIALISED KNOWLEDGE-BASED ACTIVITY CENTRES?

STEEP analysis is a way of assessing the impact of external macro-environmental characteristics on an industry, organisation or locality. STEEP assessment is a vital component of strategic planning for institutions such as universities. Being actively aware of present and future trends in the external environment and responding in a proactive manner will enable institutions to offer programs that meet the rapidly changing needs of their students and achieve success in an increasingly competitive environment.

Additionally, STEEP analysis is necessary for the strategic location decisions of innovative industry and for government decision-makers in planning for specialised knowledge centres such as Greater Curtin that drive the city's economic development.



The student population is becoming increasingly globalised and mobilised through advances in technology that enable students to study remotely or to attend foreign universities.



SOCIAL FACTORS

Social factors include considerations of demographics, lifestyles, consumer behaviour and social and cultural values.

- A major shift has occurred in society's view of education. Previously higher education was seen as a public good, an investment in human capital that would benefit both society and the individual studying. As greater proportions of people are accepted into universities, higher education is increasingly being seen as a private good that primarily benefits the individual. This has implications for funding, with many believing education should be paid for by the individual, rather than receiving public support in the form of fee subsidisation.
- The student population is becoming increasingly globalised and mobilised through advances in technology that enable students to study remotely or to attend foreign universities. This leads to a change in student demographics with greater numbers of students of different ethnicities on campus, presenting a new challenge for universities in responding to diverse needs and maximising the value of diversity.
- Current students of university age come from a generation that has grown up with rapidly advancing technology, meaning that they are comfortable with and demand new ways of teaching and learning.
- A greater number of older adults are returning to university with a focus on reskilling or improving career opportunities rather than gaining a degree.
- Students have a changing attitude toward higher education, in which they are reluctant to pay rising course fees for a non-specific career outcome. The ability to access knowledge in other ways, particularly online, is beginning to reduce the demand for expensive degrees in fields that do not require professional certification.
- Attitudes towards higher density living are also changing, with people increasingly prepared to trade dwelling size for greater levels of amenity such as access to transport, recreation, shopping and employment. In Perth, greater numbers of people are living alone or in group households.

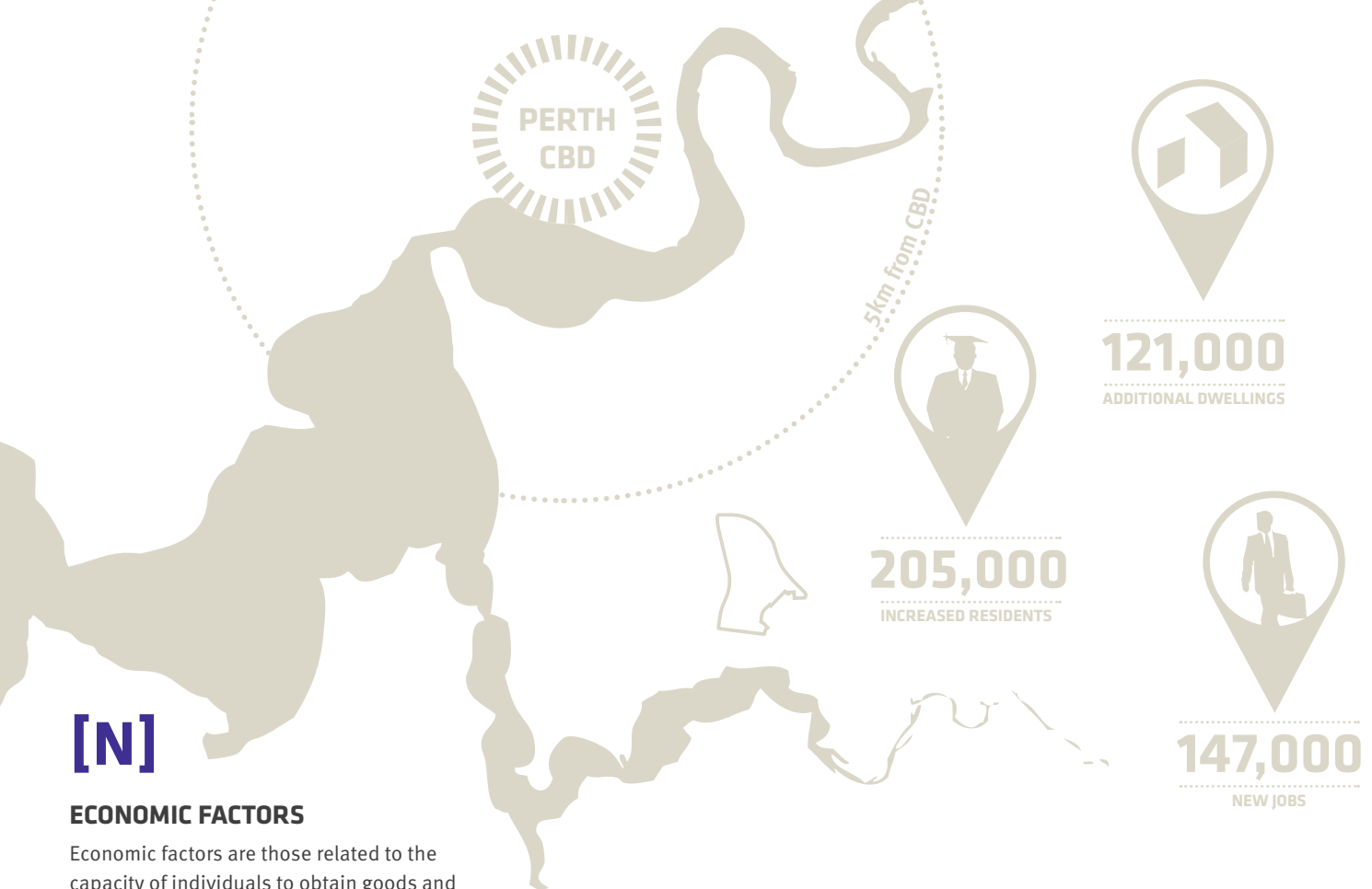
The largest technological impact on higher education is the introduction of new and evolving technologies.

[M]

TECHNOLOGICAL FACTORS

Technological factors encompass changes in technology that have resulted in new products or changes in the way services are provided. Areas of focus for technological change are innovation, communication, transport, energy, research and development. Changes in technology influence social, economic, environmental and even political fields.

- The largest technological impact on higher education is the introduction of new and evolving technologies. The Internet, and the ability to learn electronically is a huge driving force in the changing nature of teaching. New technologies are being implemented across all levels of higher education, and are increasing at an exponential rate.
- A significant trend in the external environment is advances in the telecommunications industry, with particular respect to personal communication. Students can send and receive information from any location without a physical need to be present. Personal devices enable quicker and more efficient ways of attaining and absorbing information, which frees time for more in-depth application of knowledge.
- The growth in Internet and virtual technologies is likely to reduce physical attendance at university campuses and increase online learning. Universities will have to expand their online capabilities in order to meet the demands of technologically-driven students in a competitive environment.
- The focus on new technologies offers opportunities for universities to cater for students seeking IT-based studies and careers. There are also growing opportunities for innovation and economic growth in industries pertaining to technology and communications that can be developed via university research and industry partnerships.
- A rapidly growing number of Massive Open Online Courses (MOOCs) are offering free courses from leading international universities without the course credit. The value of the courses is based around gaining knowledge in areas that can assist with personal and professional development, rather than focusing on a need for accreditation.



[N]

ECONOMIC FACTORS

Economic factors are those related to the capacity of individuals to obtain goods and services. These include characteristics of the economy, participation in the workforce, exchange rates, interest rates and the quality of employment offered. Economic factors are usually closely related to social and environmental factors, and may be strongly influenced by technological factors.

- The current global economic downturn creates various challenges for universities. Opportunities arise from the ability to attract people that are returning to school to upgrade knowledge and skills in order to improve job prospects. However, reduced government budgets mean less government assistance, reduced business profitability impacts the ability of business to subsidise postgraduate education for employees, and reduced personal income makes it more difficult for people to commit to large student debts in an uncertain economic environment.
- Domestically, higher education has almost reached universal access rates and proportions of university-age students in the population are not growing. This means that although numbers of mature-aged students are on the rise, potential school graduate-aged students are remaining fairly constant. This brings about competition for a finite number of students, and in turn means that universities are essentially operating in a buyers' market. If they do not respond quickly to the needs of students – including flexibility with attendance, micro-packaging of preferred courses and technological progress – universities will cease to attract the required student numbers.
- Although domestic markets are somewhat saturated, international markets are growing rapidly, with rising wealth in countries such as India and China leading to demand for education and knowledge-based services. Universities are increasingly marketing themselves in Asia and aiming to provide diversified campus environments in order to attract this segment, and the associated high fees.
- Businesses are reporting a disconnect between the skills of graduate employees and the knowledge required upon entry to the workplace. The need to better align university courses with industry requirements is manifest in new programs that bring industry experts into the classroom teaching sphere, and place students within businesses to work on specific relevant projects.
- Within Directions 2031, the central metropolitan Perth sub-region is expected to experience a large growth in population and employment to 2031. Directions 2031 estimates an increase of 205,000 residents within an additional 121,000 dwellings under the connected city scenario. To maintain a relatively constant level of employment self-sufficiency, an additional 147,000 jobs will be required within the activity centres that comprise the central sub-region. Of these 147,000 jobs, it is expected that up to 40% should be in knowledge-intensive and export-oriented industries (KIEO) to drive economic development and ensure sustainable growth. This means that almost 60,000 new high quality jobs will need to be grown and attracted to Perth's strategic centres – including Greater Curtin – by 2031.
- Research and development – key functions of universities – are important drivers of innovation. The interface between business and universities is driving the transition of traditional university campuses to integrated innovation precincts, where academic researchers, private business and government agencies work collaboratively to develop educated workforces and new processes, services and products for the community.
- Of increasing focus globally, knowledge generation within universities and precincts acts as a catalyst for attracting high quality jobs such as research-based businesses, advanced product developers, innovative commercial and professional services that drive a city's economic development.

The focus on green initiatives offers opportunities for universities to create courses that will attract students across the globe seeking green studies and careers.

[0]

ENVIRONMENTAL FACTORS

Environmental factors include all aspects of the physical environment and climate. This includes the natural environment and ecosystem factors like water, wind, soil, food and energy; along with the built environment of parks, streets, buildings, transport and service networks.

- Globalisation and technological advances are enabling successful university networks to include external links to business, institutions, government and research networks, which can operate intrastate, interstate and internationally. The ability to form networks creates greater potential opportunities for developing export goods and services that solve real world problems and have widespread commercial application.
 - Urban transport systems play an important role in the productivity of cities, and Perth currently suffers from a lack of public transport options linking key economic nodes within the knowledge radius of the Perth CBD.
 - Environmental concerns are affecting the daily operations of many organisations and institutions, including higher education, through a focus on reducing energy usage and greenhouse gases. University research institutes also accommodate some of the key drivers of knowledge around sustainability.
 - The focus on green initiatives offers opportunities for universities to create courses that will attract students across the globe seeking green studies and careers. Opportunities also exist for research, development and innovation in industries related to environmental issues and solutions.
 - Making more classes available online or through virtual classrooms can reduce the need for students to make frequent car-based trips. Greater opportunities to live on campus (within student housing or residential apartments) will also reduce journey times, resulting in lower motor vehicle emissions.
 - Large employment concentrations combined with a lack of residential development mean that the City of Perth and surrounding localities experience overly high rates of employment self-sufficiency. With housing development occurring in outer suburbs, people must travel long distances to work by car or public transport.
- The implication for inner urban areas is the need to increase residential development to create live/work/study opportunities that reduce car-based pollution.
- With a lack of greenfield land and many constraints to higher density development in well-established areas, the central sub-region will have to maximise growth in and around existing activity centres and corridors. The implication for centres such as Curtin, with available land and opportunities for densification in proximity to the Perth CBD and other important employment nodes, is a need for much higher concentrations of commercial and residential development.
 - The ability to access employment and study by public transport is of increasing importance as roads become congested and extensive car travel generates negative externalities such as pollution. Key economic nodes in Perth, such as Curtin and UWA are currently inaccessible by public transport with the exception of buses. The potential for a light rail route linking the centres in the knowledge arc could increase the reliability of centre-to-centre transit and home to work commutes.

ACTIVITY
CENTRE
SPP 4.2
REQUIRES THE
DEVELOPMENT
OF A SIGNIFICANT
PROPORTION
OF COMPLEMENTARY
KNOWLEDGE
AND RESEARCH-BASED
BUSINESSES
TO MAXIMISE
THE VALUE OF
THE EXISTING
INSTITUTIONAL
ACTIVITIES.

[P]

POLITICAL FACTORS

Political factors revolve around the government policy environment. This includes the degree of government intervention in the economy, the goods and services provided or subsidised by the government, trade restrictions, tax policy, government type and political change. These factors can have a strong influence on all other factors, especially economic factors.

- The public funding debate has implications for the cost of course fees. With reduced budgets and the changing attitude of the community towards the public value of higher education, governments are decreasing funding to universities for fee subsidisation and research grants.
- With reduced R&D budgets, universities are increasingly required to justify each dollar of government funding, through illustrating productive outcomes and application of knowledge to commercial enterprise.

Government planning policy regulates the types of activity that can occur within particular centre types. Curtin's designation as a specialised centre within Perth's Activity Centre SPP 4.2 requires the development of a significant proportion of complementary knowledge and research-based businesses to maximise the value of the existing institutional activities.

2.3 MAJOR TRENDS AND DRIVERS FOR CHANGE

Higher education across the globe is in the process of significant upheaval, with social, technological and economic factors impacting the viability of existing business models into the future. Where the historical role of universities has focused on teaching and providing degree certification to large numbers of high school graduates:

- Employers are now experiencing a disconnect between the knowledge of graduate employees and the skills necessary to contribute immediately to business success
- Higher education is experiencing difficulty keeping up with rapid industry and technological change and is in danger of being considered out of touch with the marketplace
- Prospective students are wary of committing to large (and growing) debts for an education that may not guarantee smooth access into the job market
- A new education paradigm has emerged, in which high quality education is provided online for free, enabling students to gain knowledge without the degree certification.

A series of interrelated trends and drivers are bringing major changes for the higher education sector. In order for universities to compete and ensure survival, adaptation will need to occur via streamlining existing processes, greater specialisation of content and target markets, increased focus on applied research and commercialisation, and rapid response to changing consumer demand.

DRIVERS FOR CHANGE

[Q]

DIGITAL TECHNOLOGIES

The introduction of new and evolving technologies is a huge driving force in the changing nature of teaching and learning. Personal devices enable quicker and more efficient ways of attaining and absorbing information, which gives students greater flexibility in how and when they choose to learn, and gives teachers greater flexibility to provide content without being physically present through the conventional university semester. Physical attendance at university campuses is likely to be supplemented by an increase in online learning, and universities that do not continuously progress their online capabilities will be unable to compete.

[R]

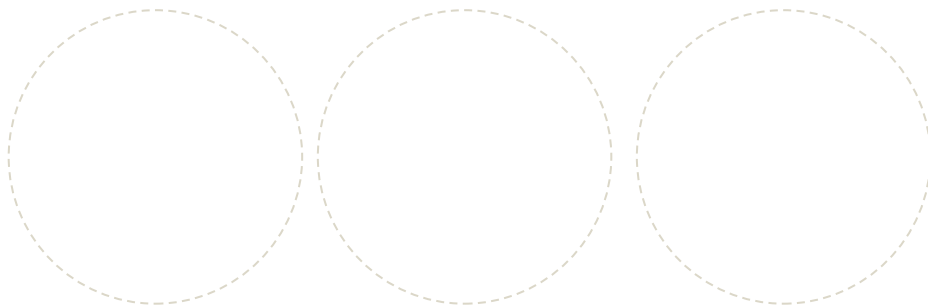
GLOBAL MOBILITY

The globalisation of the international economy has increased the mobility of organisations and the ability of students, academics and researchers to study or work in different countries. Australian universities have already positioned themselves to compete for international students, and opportunities will continue as growth in countries such as India and China creates a wealthier middle class of education consumers. Digital technologies and open international markets also provide greater opportunities for universities to develop knowledge networks, which facilitate research collaboration and the potential for the wider application of knowledge outcomes. The downside of global mobility is that Australian universities are increasingly competing in national and international markets, with students and academics afforded greater flexibility to study and work overseas. This change in student demographics will mean greater numbers of students of different ethnicities on campus. This presents new challenges for universities in responding proactively to diverse needs.

[S]

COMPETITION FOR STUDENTS AND GOVERNMENT FUNDING

In addition to the greater competition for students in what has become a buyers' market, universities are competing for reduced government funding. A difficult political environment combined with changing societal attitudes to public funding means that government budgets for higher education have dropped. Universities can no longer channel government funding to ad-hoc areas of research without demonstrating how the knowledge created will generate future economic benefit.



[T]

COST OF DEGREES INCREASING MUCH FASTER THAN INFLATION

A reduction in government funding means that the rising cost of providing students with a university degree must be covered by income from other sources. Student fees have increased considerably and continue to grow rapidly, making the cost of a university degree prohibitive for many prospective students. In the current global economic climate, the idea of beginning a career with significant levels of debt is not an attractive prospect, in addition to the declining ability for students to walk into the workplace directly following university.

[U]

POOR ALIGNMENT OF UNIVERSITY GRADUATE SKILLS WITH EMPLOYER DEMANDS

There is a growing need to better align university courses with industry requirements, as courses are not keeping up with rapidly changing industry and students are not graduating with the required knowledge to create immediate value in the workplace. In the current economic climate, businesses cannot afford to spend significant time and resources training graduates, making it increasingly difficult for graduates to gain employment without demonstrating levels and application of learning supplementary to their degree.

[V]

MASSIVE OPEN ONLINE COURSES (MOOCS)

MOOCs are enabling students to access free courses from leading international universities without the course credit. The value of the courses is based around gaining knowledge in areas that can assist with personal and professional development, rather than focusing on a need for accreditation. While MOOCs can provide students with educational opportunities that would otherwise be too expensive or physically inaccessible (courses operating in other countries for example), they represent a remarkably different business model from the traditional bricks and mortar university. As students replace full fee degrees with a selection of free online short courses, and employers increasingly hire based on this changing knowledge base, universities will see falling student numbers and fee-based income.

The interface between business and universities is driving the transition of traditional university campuses to integrated innovation precincts.

[W]

UNIVERSITY-INDUSTRY PARTNERSHIPS

The interface between business and universities is driving the transition of traditional university campuses to integrated innovation precincts. Rather than industry employing in-house research programs, the new model will require much greater interaction between universities and business, with the potential for collocating functions, offering student placements in the workplace and encouraging industry experts to be involved in the teaching process. A significant shift in focus toward university-industry partnerships must occur, in which academic researchers, private business and government agencies work collaboratively to develop new services and products for a global market, in addition to new applied learning methods.

[X]

TRADITIONAL UNIVERSITY BUSINESS MODEL BROKEN

The traditional university business model is no longer profitable or competitive in the changing world environment. Major issues that must be addressed include: administration staff outnumber teaching or research staff, course offerings are extensive and do not provide a competitive specialisation, lectures focus on explicit rather than tacit knowledge, degrees lack flexibility, technology is not keeping up with digital change, knowledge is generated but not transferred or commercialised, and large land assets are underutilised or sold for uses that do not maximise the knowledge benefit of the university.



[THE] OPPORTUNITIES

2.4 HOW DO UNIVERSITIES RESPOND TO ENSURE SURVIVAL?

[1]

GET CLOSER TO ALUMNI

Keeping close ties with alumni has long been a focus of universities in the US, enabling donations by past students to assist with university funding. In addition to supplementing income, the strong networks formed by university alumni should be maintained to ensure that university teaching and research remains connected to the commercial realm. This drives opportunities for further research, collaboration and commercialisation, ensuring continued relevance and alternative sources of income. “In 2009, there were 25,800 active companies founded by MIT alumni that employ approximately 3.3 million people and generate annual world revenue of \$2 trillion, the equivalent of the 11th largest economy in the world”.¹

[2]

REMOVE SILOS

In an increasingly complex world, problems such as climate change, terrorism, epidemics, energy and water, require a multi-disciplinary approach. Traditionally university faculties have been separated into silos that do not encourage interaction within the teaching or research spheres. In order to generate research that is relevant to solving the problems of today, research centres that encompass a variety of knowledge fields are being developed, with project-related links to all faculties. Students are also increasingly demanding the option of combining degrees, and flexibility in choosing courses that deliver a more specialised but multi-faceted career path.

[3]

CHANGE KNOWLEDGE FOCUS

Traditionally, the most profitable teaching model for universities has involved one lecturer teaching hundreds of students in a large lecture theatre, supplemented by smaller tutorials. With improved technology enabling students to listen to lectures online and download lecture notes and course information electronically from a range of portable devices, there is no longer a need for lecturers to spend hours of lecture time imparting explicit knowledge. Improving students levels of tacit knowledge, which involves learning how to apply explicit knowledge to a situation or problem is necessary for ensuring that graduating students are prepared to enter the workplace.



In 2009, there were 25,800 active companies founded by MIT alumni that employ approximately 3.3 million people and generate annual world revenue of \$2 trillion, the equivalent of the 11th largest economy in the world



¹ Counterfactual Campus: Scott Page, 2112 and the Resilient Idea, Wisc Institute for Discovery, <http://vimeo.com/55045254>

[4]

LINKS TO INDUSTRY

Rather than a focus on research for purely academic reasons, universities must link to industry or engage with entrepreneurs in order to maximise the commercial value of research. As industry is experiencing a disconnect between skills required by employees and those attained by students during university, it is necessary for industry to play a role in guiding course content and providing real problems for students to work on. These cooperative arrangements benefit students by improving the applicability of their studies and a pathway to employment, and employers by ensuring that courses remain relevant in a changing environment. The ability to interact with industry experts within the university environment also provides an incentive for students to attend campus, ensuring that they remain engaged, and develop social and professional networks, rather than receiving a purely virtual education.

[5]

NURTURING ENVIRONMENT FOR STUDENTS

When many students graduate from high school at the age of 18, they have not yet achieved the level of maturity required to enter the workforce as adults. Involvement in campus life assists with the transition of students to adulthood and enables the development of friendship and support networks. In the digital age, universities must think about providing a nurturing environment for students that teaches them not only the knowledge required for a career, but knowledge about how to become a useful citizen of the world. Graduate networks also carry through to the post-university commercial realm, aiding employment and driving for formation of new business.

[6]

RESPOND BETTER TO DIVERSITY OF STUDENTS

With globalisation and the ability to compete in an international market, universities are seeing a greater diversity of student ethnicities on campus. To be competitive in attracting international students, universities must respond to their varied needs, including campus housing options and improved communication channels. Rather than just responding to changing needs, universities should aim to maximise the benefits of diversity, such as the formation of international networks, a broadening of opinion, and new ways of seeing the world. Proactively providing opportunities for integration will assist with the development of communities of learning.

[7]

IMPROVE FLEXIBILITY

With the removal of faculty silos and the ability to access course content online, universities are providing more flexibility for their students. One avenue for change is the micro-packaging of course content, in which students can integrate a range of multi-disciplinary courses to create a knowledge platform that meets the needs of their career path, rather than following a rigid degree pathway. Flexibility must also be built into the way that students can access classes, with a need for universities to keep up to date with emerging online technologies. The ability to study at convenient times can improve student productivity, while also allowing them to combine study with work and other activities. Greater flexibility will also aid the productivity of university staff, in which faculty can focus attention on being entrepreneurial and developing project links with researchers from other countries, rather than spending all semester in the classroom.

[8]

RECONSTRUCT THE NICHE

Universities primarily operate as repositories of knowledge; places where wisdom is created. They provide a disciplined yet illimitable place in which people are encouraged to think, draw new lessons in how to better understand and improve, and develop themselves and solutions that can have wide-reaching application for real-world problems. The value of concentrating wisdom in one place has not been maximised due to the issues of silos, lack of flexibility and scarcity of university-industry partnerships as detailed above. The university of the future must reconstruct its niche via interrelationships, sharing of ideas, active learning, development through technology and application of knowledge.

[9]

CHANGING BUSINESS MODEL

In order to respond to increased competition and reduced income, universities must explore a changing business model. Traditionally Australian universities have offered a wide range of disciplines, with faculties covering all possible fields of education. Although focus is primarily on high school graduates, course are also generally offered for mature aged students and international students, with the majority of teaching and learning occurring on campus. University administration is also carried out internally, with almost all Australian universities accommodating greater numbers of administration staff than research and teaching staff combined. A changing business model requires a much leaner back office, with the potential for some components of administration to be outsourced. Specialisation of student markets and academic disciplines can also assist in reducing costs and creating a knowledge niche that better utilises resources.

3.0

CURTIN

AS A BUSINESS

INNOVATOR



The following section explores opportunities for the integration of the ‘core’ university functions and new ‘city’ activities.

3.1 VISION

The vision for Greater Curtin is for an innovative and globally competitive knowledge environment within the Curtin University specialised activity centre. Curtin’s designation as a specialised centre within Perth’s Activity Centre SPP 4.2 requires the development of a significant proportion of complementary knowledge and research-based businesses to maximise the value of the existing institutional activities.

The aim of the master planning process is to plan for the university campus to develop into Greater Curtin over the long term. Rather than an isolated university, or a cheaper alternative to the CBD, the growth potential for Curtin is based on knowledge generation as a catalyst for attracting high quality jobs such as research-based businesses, advanced product developers, innovative commercial and professional services.

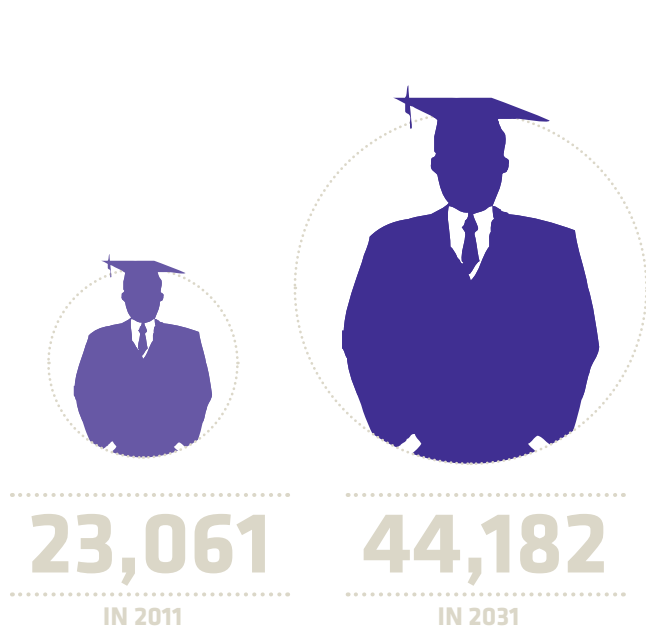
The integration of the ‘core’ university functions and the new ‘city’ activity will create opportunities for businesses, researchers, academics and students to interact, with the ultimate aim of commercialising knowledge outputs.



[THE] INFLUENCES

3.2 FORECAST GROWTH

Forecast modelling defines user groups into segments including students, teachers, academic staff, residents, businesses and visitors. The growth of these user groups within Greater Curtin is forecast based on national and international benchmarking, expenditure and ratio analysis, trends in staff and student growth and the impact of catalytic drivers on the university research and business environment.



3.2.1 STUDENT GROWTH

Figure 1 identifies potential growth in (equivalent full-time student load) student numbers by faculty between 2011 and 2031.

Figure 1: Estimated Student Population Projection

Students (EFTSL)	2011	2031	Difference
Humanities	5,435	7,291	1,856
Curtin Business School	6,515	9,835	3,320
Aboriginal Studies	247	747	500
Health Sciences	6,377	13,273	6,895
Science & Engineering	4,487	13,036	8,549
All Faculties	23,062	44,182	21,121



3.2.2 UNIVERSITY STAFF GROWTH

Figures 2 and 3 contain the current breakdown and potential future growth in university staff by faculty and by employment category.

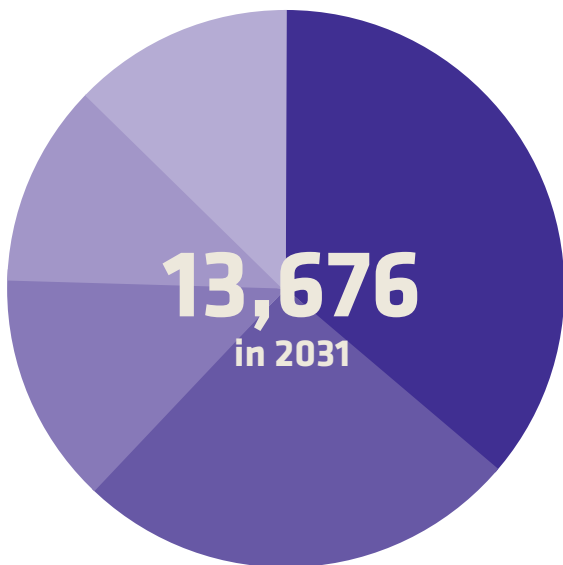
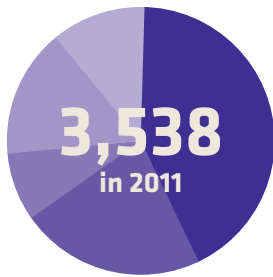
Figure 2: Estimated University Staff Population by Faculty

Total University Staff	2011	2031	Difference
Humanities	375	854	479
Curtin Business School	365	1,139	774
Aboriginal Studies	37	148	111
Health Sciences	602	1,487	885
Science & Engineering	613	1,498	885
Vice Chancellery	1,020	1,573	553
Total	3,012	6,700	3,688

Figure 3: Estimated University Staff Population by Employment Category

Employment Categories	2011	2031	Growth
University Research	688	2,333	1,645
University Teaching	654	1,367	713
Administration	1,540	2,500	960
Other	130	500	370
Total	3,012	6,700	3,688

Figure 3 illustrates the growing significance of research employment as opposed to traditional teaching jobs. This reflects the changing nature of universities and a need to link to industry through generation, transfer and commercialisation of knowledge. Figure 2 demonstrates an increased reliance on the faculties of health sciences and science & engineering, reflecting the strategic direction of the university, competitive strengths and catalyst projects such as a proposed new hospital.



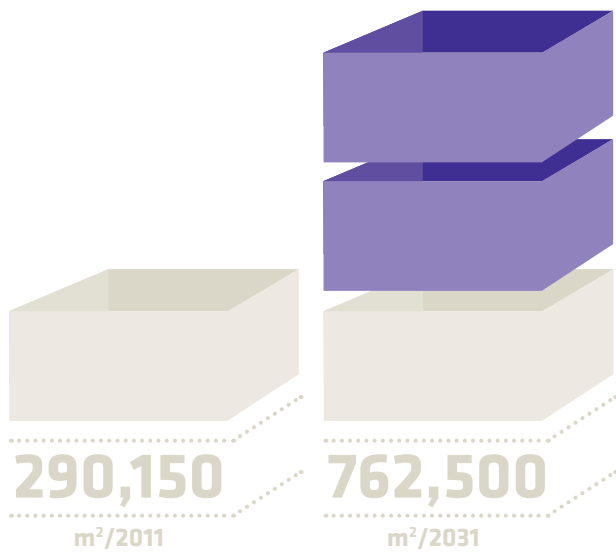
3.2.3 OTHER BUSINESS GROWTH

Figure 4 contains potential growth forecasts for non-university categories of employment. These include:

- Induced Business that require access to specific knowledge strengths at Curtin (such as health or resources-related firms)
- General Business (such as professional services or ICT) that can take advantage of Curtin’s innovative knowledge environment
- Retail and Community Services, including entertainment, food, consumer services, health, welfare and cultural services driven by the spending and amenity needs of the daily user population.

Figure 4: Estimated Other Employment Forecasts

Employment Categories	2011	2031	Difference
Induced Business	1,529	5,000	3,471
General Business (knowledge, government)	800	3,500	2,700
Retail/Commercial Services/Entertainment	280	1,900	1,620
Community Services	550	1,543	993
Other (utilities, transport, public order)	379	1,733	1,354
Total	3,538	13,676	10,138

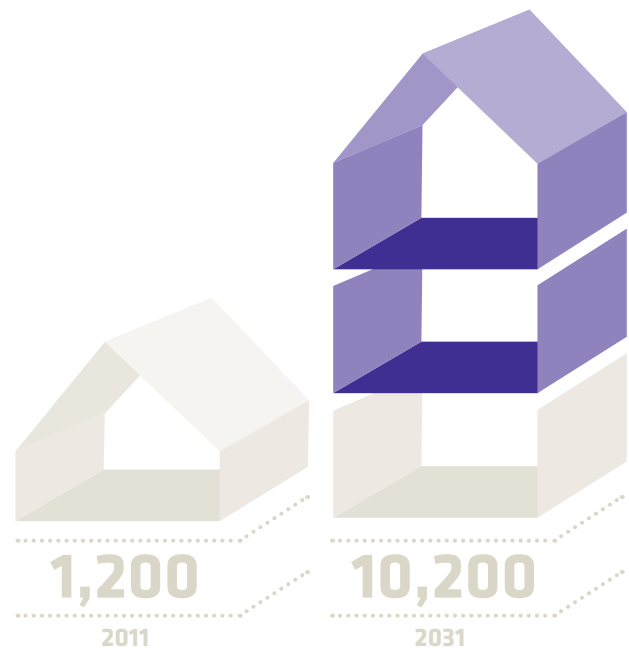


3.2.4 FLOORSPACE GROWTH

Figure 5 identifies the potential floorspace requirement associated with Greater Curtin's employment growth.

Figure 5: Estimated Floorspace Projections (m²)

Categories	2011	2031	Difference
University Total	220,000	370,000	150,000
Induced Business	20,600	150,000	129,400
General Business	20,000	87,500	67,500
Retail/Commercial Services/Entertainment	21,000	75,000	54,000
Community Services	6,500	54,000	47,500
Other (utilities, transport, public order)	2,050	26,000	23,950
Total Floor Area (m²)	290,150	762,500	472,350



3.2.5 RESIDENTIAL GROWTH

Figure 6 contains projections for growth in Curtin's student housing (Curtin owned and operated), student and staff individually owned apartments, and further in-centre residential dwellings for a wider target market.

Figure 6: Residential Projections

Resident Categories	2011	2031	>2031
Student Housing	1,200	2,500	3,000
Student/Staff/Residential Apartments (Owned)	0	4,700	5,000
Residents in private dwellings (Stage 1)	0	3,000	6,000
Residents in private dwellings (Stage 2)	0	0	6,000
Total	1,200	10,200	20,000

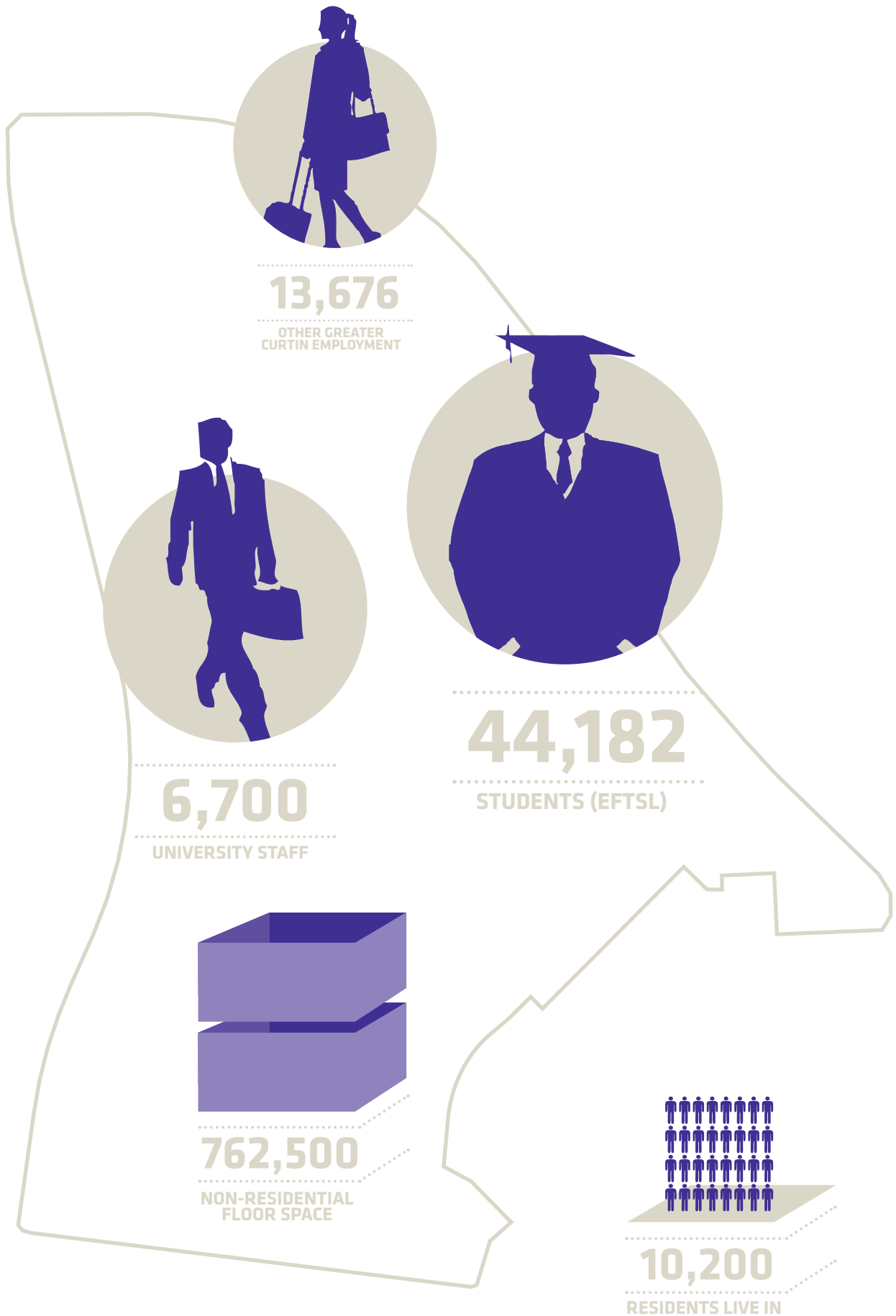
BY 2031...

3.2.6 GROWTH SUMMARY

Figure 7 contains a summary of potential growth by category associated with the Greater Curtin Master Plan.

Figure 7: Estimated Curtin Growth Summary

Growth Categories	2011	2031	Difference
Students (EFTSL)	23,062	44,182	21,121
University Staff (teaching, research & administrative)	3,012	6,700	3,688
Other Greater Curtin Employment	3,538	13,676	10,138
Non-Residential Floorspace (m ²)	290,150	762,500	472,350
Residents in centre	0	7,700	7,700
Students (live in)	1,200	2,500	1,300



3.3 VALUE OF CURTIN'S ECONOMIC IMPACT

The value of Curtin's economic impact on Western Australia is explored in the following section.

3.3.1 MEASURING INDUSTRY IMPACT

There are several ways of measuring the dollar value of industries to the national economy. Some examples include analysis of the total output of the industry, the gross value added (GVA) per industry, the export dollars that the industry brings into the economy from external markets, and the average wages received by employees of an industry. It is more difficult to measure impacts of specific industries on metropolitan or regional economies due to the lack of available accounts data at spatial units below a State level.

To estimate the economic impact of a development project on an economy – in terms of dollars spent and employment generated – the ABS uses Australian National Accounts to develop Input-Output tables. Input-Output tables measure inter-industry flows within the Australian economy, or how all sectors of the economy are related. For example, steel is an input to the transport equipment manufacturing industry, which has a flow-on effect for the mechanical repairs industry, the transport equipment wholesale industry and the road transport industry. The steel industry itself requires inputs from iron and metal ore mining industries, as well as services such as the electricity industry and road transport industry. In addition to measuring internal relationships between industries, the tables also measure the proportion of an industry's goods or services that are used locally or exported.

3.3.2 EXPORT INDUSTRIES

Export or knowledge-based occupations stimulate long-term growth in the economy because they relate to more than just servicing the needs of the local population. The market for a city's exportable goods can be national or global, resulting in the capture of large pools of external funds, which boost the income of the region. Industries that are driven purely by the local or regional population are dependent on the number of residents and their income levels, which means that there is a limit to total possible demand. Encouraging export industries is beneficial for all sectors of the economy and contributes much more to a city's sustainable economic development than population-driven retail uses.

The Australian Bureau of Statistics (ABS) developed the Australian and New Zealand Standard Industrial Classification (ANZSIC), as the standard classification used in Australia and New Zealand for the collection, compilation and publication of statistics by industry.

Figure 8 opposite gives a snapshot of the export value of a selection of industry categories based on the existing and forecast Greater Curtin employment.

Greater Curtin employment has been forecast using ABS ANZSIC industry categories at a 3 and 4 digit level. National Accounts uses different (broader) industry categories to illustrate the flow of exports. In order to estimate the export value of Curtin's jobs, the relevant ANZSIC industries associated with these jobs have been aligned with the National Accounts industries.

For example, a large proportion of Curtin's growth is projected to occur within the induced business category, which may include ANZSIC industries such as Data Processing and Storage Services or Scientific Research Services. These are both consistent with the National Accounts category titled Scientific Research, Technical and Computer Services.

In Figure 8, export value from National Accounts has been applied to Curtin's industries, and aggregated to an employment category level (including induced business, general business and community services).

The figure shows the export value of each industry’s output per person employed in that industry, total jobs projected for Greater Curtin in that industry type, and therefore the potential total export value of all jobs in the industry.

Figure 8: Estimated Industry Export Value (\$)

Industry – Existing 2011	Jobs 2011	Average Export Value/ Job 2011	Total Exports 2011
University Research	688	\$9,977	\$6,864,319
University Teaching	654	\$7,553	\$4,939,967
University Administration	1,670	\$7,553	\$12,614,288
Induced Business	1,529	\$43,403	\$66,362,604
General Business (knowledge, government)	800	\$4,711	\$3,768,866
Retail/Commercial Services/Entertainment	280	\$7,493	\$2,098,037
Community Services	550	\$509	\$280,189
Other (utilities, transport, public order)	379	\$5,564	\$2,108,689
Total	6,550	\$15,120	\$99,036,959

Industry – Projected 2031	Jobs 2031	Average Export Value/ Job 2031	Total Exports 2031
University Research	2,333	\$9,977	\$23,280,151
University Teaching	1,367	\$7,553	\$10,323,070
University Administration	3,000	\$7,533	\$22,660,398
Induced Business	5,000	\$37,906	\$189,529,549
General Business (knowledge, government)	3,500	\$8,407	\$29,424,488
Retail/Commercial Services/Entertainment	1,900	\$7,414	\$14,085,898
Community Services	1,543	\$744	\$1,148,189
Other (utilities, transport, public order)	1,733	\$15,553	\$26,958,207
Total	20,376	\$15,577	\$317,409,949

(Source: Greater Curtin Master Plan and Pracsys analysis of ABS National Accounts Input-Output)

Average export values for several industry categories change between 2011 and 2031 due to the addition of new 3-digit business types within the broader industry categories. For example, it is expected that Greater Curtin may accommodate future induced businesses related to Curtin Business School in the finance industry that are currently not present within the centre. Changing proportions and the addition of new 3-digit industries in the future will affect the average export, output and GVA values per employee.

3.3.3 OUTPUT VALUE

Figure 9 illustrates output value estimates for Greater Curtin industries based on existing and projected employment. Within Australian National Accounts, output is the total value of all goods and services produced for each industry, and either consumed domestically, used as inputs to other industries or exported. Figure 9 shows total jobs per broad industry category, the average output per employee as derived from a full breakdown of ANZSIC 3-digit industries, and the total estimated output for all Curtin jobs within each industry.

Figure 9: Estimated Industry Output Value (\$)

Industry – Existing 2011	Jobs 2011	Average Output Value/Job 2011	Total Output 2011
University Research	688	\$199,430	\$137,207,984
University Teaching	654	\$97,607	\$63,834,992
University Administration	1,670	\$97,607	\$163,003,726
Induced Business	1,529	\$436,329	\$667,147,038
General Business (knowledge, government)	800	\$180,810	\$144,647,868
Retail/Commercial Services/Entertainment	280	\$125,912	\$35,255,442
Community Services	550	\$58,294	\$32,061,834
Other (utilities, transport, public order)	379	\$130,984	\$49,642,826
Total	6,550	\$197,374	\$1,292,801,709

Industry – Projected 2031	Jobs 2031	Average Output Value/Job 2031	Total Output 2031
University Research	2,333	\$199,430	\$465,337,156
University Teaching	1,367	\$97,607	\$133,396,262
University Administration	3,000	\$97,607	\$292,821,064
Induced Business	5,000	\$395,514	\$1,977,568,819
General Business (knowledge, government)	3,500	\$209,329	\$732,652,999
Retail/Commercial Services/Entertainment	1,900	\$119,144	\$226,372,794
Community Services	1,543	\$76,112	\$117,429,938
Other (utilities, transport, public order)	1,733	\$323,249	\$560,297,849
Total	20,376	\$221,134	\$4,505,876,881

(Source: Greater Curtin Master Plan and Pracsys analysis of ABS National Accounts Input-Output)

3.3.4 GROSS VALUE ADDED

Figure 10 below illustrates gross value add (GVA) per employee in a range of industries, using Australian National Accounts data. GVA measures total output minus the value of goods and services consumed or used as inputs in production. In other words, it is the value of all goods and services produced by an industry less the cost of all inputs (including raw materials) that are directly attributable to their production. GVA per employee is a better measure of labour productivity than total industry output per employee, yet can still incur distortions due to other factors involved in value of output.

Figure 10 shows total jobs per broad industry category, the average GVA per employee, and the total estimated GVA for all Curtin jobs within each industry.

Figure 10: Estimated Industry Gross Value Added (\$)

Industry – Existing 2011	Jobs 2011	Average Output Value/Job 2011	Total Output 2011
University Research	688	\$88,908	\$61,168,872
University Teaching	654	\$68,739	\$44,955,325
University Administration	1,670	\$68,739	\$114,794,179
Induced Business	1,529	\$102,080	\$156,081,035
General Business (knowledge, government)	800	\$88,269	\$70,615,019
Retail/Commercial Services/Entertainment	280	\$52,443	\$14,684,156
Community Services	550	\$32,950	\$18,122,322
Other (utilities, transport, public order)	379	\$52,507	\$19,900,335
Total	6,550	\$76,385	\$500,321,243

Industry – Projected 2031	Jobs 2031	Average Output Value/Job 2031	Total Output 2031
University Research	2,333	\$88,908	\$207,452,568
University Teaching	1,367	\$68,739	\$93,943,340
University Administration	3,000	\$68,739	\$206,217,088
Induced Business	5,000	\$120,912	\$604,562,372
General Business (knowledge, government)	3,500	\$104,360	\$365,261,054
Retail/Commercial Services/Entertainment	1,900	\$49,186	\$93,452,508
Community Services	1,543	\$46,037	\$71,028,059
Other (utilities, transport, public order)	1,733	\$177,696	\$308,006,113
Total	20,376	\$95,696	\$1,949,923,102

(Source: Greater Curtin Master Plan and Pracsys analysis of ABS National Accounts Input-Output)

Within each value measure, it is clear that induced business – which refers to businesses attracted to the university based on Curtin’s existing research strengths – will have the greatest impact on Curtin and the WA economy. Although induced businesses are forecast to contribute the largest number of future jobs within Greater Curtin, the value of the category is also related to its high labour productivity, export potential and output. These high quality and high value industries are those in which WA has competitive advantage, enabling export of goods, services and knowledge, and injection of external funds. As a specialised centre with a knowledge core, it is Curtin’s role to attract and maximise productivity from these high value industries.

3.3.5 WAGES INCOME

Figure 11 contains average weekly wages income for Australian employees in November 2012 by 1-digit ANZSIC industry. Although wages vary within industries and across States and cities, it provides an estimate of the total income potential of employees in these broad industry categories at Greater Curtin. Figure 11 contains average weekly wages, existing and projected jobs, and total potential wages income for each 1-digit ANZSIC industry.

As employees often spend significant proportions of weekly income in or near to their place of work (on lunch, groceries, retail, services and recreation), the success of tenants within the Greater Curtin urbanisation economy will be somewhat dependent on the wages earned by and captured from local employees. Income expenditure will also have flow-on effects to the Perth economy, driving demand for goods and services, job creation and quality of life.

Figure 11: Estimated Industry Wages Income

ANZSIC 1-Digit	Average Weekly Wages	Jobs 2011	Jobs 2031	Total Wages Income 2011	Total Wages Income 2031
Agriculture, Forestry and Fishing	\$1,473	35	370	\$51,554	\$545,004
Mining	\$2,426	64	450	\$155,264	\$1,091,700
Manufacturing	\$1,316	518	1,130	\$681,792	\$1,487,306
Electricity, Gas, Water and Waste Services	\$1,750	0	725	\$0	\$1,268,750
Construction	\$1,608	82	300	\$131,831	\$482,310
Wholesale Trade	\$1,464	52	200	\$76,128	\$292,800
Retail Trade	\$1,028	113	585	\$116,187	\$601,497
Accommodation and Food Services	\$1,003	118	850	\$118,378	\$852,720
Transport, Postal and Warehousing	\$1,534	65	640	\$99,678	\$981,440
Information Media and Telecommunications	\$1,648	52	990	\$85,717	\$1,631,916
Financial and Insurance Services	\$1,652	28	415	\$46,248	\$685,456
Rental, Hiring and Real Estate Services	\$1,356	9	140	\$12,204	\$189,840
Professional, Scientific and Technical Services	\$1,664	1,465	5,183	\$2,437,614	\$8,624,548
Administrative and Support Services	\$1,311	70	330	\$91,763	\$432,597
Public Administration and Safety	\$1,517	575	923	\$872,160	\$1,400,006
Education and Training	\$1,478	2,324	4,367	\$3,434,872	\$6,453,933
Health Care and Social Assistance	\$1,353	466	2,020	\$630,638	\$2,733,666
Arts and Recreation Services	\$1,260	104	553	\$131,009	\$696,614
Other Services	\$1,146	27	205	\$30,947	\$234,971
Total	n/a	6,167	20,376	\$9,203,982	\$30,687,075

(Source: Greater Curtin Master Plan and Pracsys analysis of ABS Census 2011)

As Figure 11 identifies, the potentially largest proportion of total wages income will be associated with the professional, scientific and technical services industries. This is due to the large projected employee population and receipt of the third highest average weekly wage rates. Highest wages are currently attributed to the mining industry, which can be leveraged at Curtin via industry links to the resources precinct. Each of these industry types falls within the induced business category, considered the highest value for Curtin with respect to GVA, exports and output. Finance, and Information, Media and Telecommunications industries also have relatively high average weekly wages, which will create a pool of potential captured expenditure as Curtin moves from a traditional campus environment to a City of innovative and integrated activity.

Figure 12 summarises each of the value measures for Greater Curtin using the existing and projected employment industries, highlighting the large impact and growth potential associated with the master plan development.

Figure 12: Estimated Value Measures

Value Impacts	2011	2031	Difference
Jobs	6,550	20,376	13,826
Exports	\$99,036,959	\$317,409,949	\$218,372,991
GVA	\$500,321,243	\$1,949,923,102	\$1,449,601,859
Output	\$1,292,801,709	\$4,505,876,881	\$3,213,075,172
Wages	\$9,203,982	\$30,687,075	\$21,483,092

(Source: Greater Curtin Master Plan and Pracsys analysis)



[THE] OPPORTUNITIES

3.4 ROLE OF GREATER CURTIN IN THE ECONOMIC DEVELOPMENT OF WA

Universities directly contribute to economic growth by:

- Generating qualified graduates in high productivity professions
- Encouraging labour force participation
- Creating the expertise necessary to design new products and services, evolve business processes and introduce new technologies.

In addition to the standard university functions of teaching students in undergraduate and postgraduate degrees and carrying out academic research projects, universities play a significant role in driving economic growth and development a number of areas, which are explored in the following section.

[1]

INNOVATION

The role of innovation and technological improvements in driving economic and productivity growth has been firmly established in economic theory. In an increasingly globalised economy, a critical aspect of any productivity agenda and the nation's continued economic success will be to unlock future innovations.

Research and development – key functions of universities – are important drivers of innovation. Innovation also reflects the practical and tangible changes at an enterprise level in response to changing economic conditions, to improve profit and to better meet the needs of customers. This may involve designing a new product or service, changing business processes and practices or introducing a new technology.

The interface between business and universities is driving the transition of traditional university campuses to integrated innovation precincts, where academic researchers, private business and government agencies work collaboratively to develop educated workforces and new processes, services and products for the community.

[2]

NETWORKS

These collaborative arrangements arise through the development of knowledge networks. The close physical proximity of the large internal university community enables the development of new ideas through collaboration on problems that span faculties. Networks include academics, researchers and innovators who unite to generate, transfer and commercialise knowledge. University networks also include external links to business, institutions, government and research networks, which can operate intrastate, interstate and internationally. The effectiveness of knowledge networks is directly linked to the number and strength of connections, creating greater potential opportunities for developing export goods and services that solve real-world problems and have widespread commercial application.

In addition, involvement in campus life assists with the transition of students to adulthood and enables the development of friendship and support networks. Graduate networks also carry through to the post-university commercial realm, aiding employment and driving new business creation.

[3]

AGGLOMERATION ECONOMIES

The ability to generate high quality economies of agglomeration is one of the most valuable functions of university centres. Agglomeration economies arise when a significant concentration of firms collocate, creating improved productivity benefits to firms through:

- Input sharing – where similar types of enterprises group together to share labour, sources of capital, entrepreneurial skills, infrastructure and facilities
- Knowledge spillovers – where related firms share technical and commercial knowledge (formally and informally) to enhance their productivity
- Labour market pooling – where skilled workers group together to access high-paying, high productivity jobs – often moving freely between enterprises
- Urbanisation effects – where large agglomerations become their own urban economies, based around high quality amenity supported by dense residential, workforce and visitor populations.

These effects mean that universities can operate as high value locations for knowledge-based business and induced businesses that will benefit from proximity to knowledge, suppliers and clients. The attraction, retention and development of high quality knowledge-based innovative enterprises will be one of the most important drivers of WA's economic performance.

[4]

URBANISATION ECONOMY

The urbanisation economy – the urban fabric and amenity of the place – will generate benefits for Curtin and the wider community that complement Curtin's existing unique localisation catalysts.

A high quality urban environment accommodating goods, services, entertainment, recreation and accessibility aids the attraction and retention of a diversity of user groups – including employees, residents, students and visitors. In a competitive economic environment, Greater Curtin can attract greater numbers of fee-paying international students, attract international researchers bringing new knowledge, and operate as a high quality alternative to the Perth CBD for knowledge businesses. A well-designed urban environment can facilitate spontaneous interaction and knowledge sharing networks, vital for innovation. Provision of retail, food and services creates opportunities for students to work locally and reduces the need for user groups to travel to access amenities. In addition, a high amenity urban environment can contribute to value uplift in surrounding neighbourhoods.

[5]

HOUSING

A diversity of accommodation options is a core component of successful urbanisation economies. Providing study/live/work opportunities improves employment self-sufficiency rates and reduces car-based congestion to other employment centres such as the CBD. Less travel time for resident workers means higher productivity and efficiency, and the diversity of user groups on campus at different times contributes to greater economic activation, retail success and safety. The ability to live on campus in appropriate accommodation encourages more productive students and supportive networks, which can assist with competitiveness and the attractiveness of the university to international students.

[6]

LIGHT RAIL DEVELOPMENT

The establishment of a light rail network as part of Greater Curtin's development will amplify the productivity benefits associated with Perth's specialised university centres. Face-to-face interaction, facilitated by linking Curtin, UWA, Murdoch and the Perth CBD via high quality public transport will strengthen and broaden business and research knowledge networks. Greater connectivity to the CBD improves Curtin's attractiveness to commercial enterprises, and the ability to access work and university by a variety of public transport options makes Curtin more attractive for staff and students.

[7]

SUMMARY OF BENEFITS

The many benefits associated with Greater Curtin's growth and development will have widespread impact for the economy of WA, through the creation and attraction of high quality jobs, innovative businesses, smart people and international students. Employment in high productivity knowledge and export industries generates greater income potential, stronger networks for new innovations and more successful urbanisation economies. In addition, improvements to employment self-sufficiency through live/work/study opportunities contribute to better accessibility, reduced transport costs and greater student and labour productivity.

4.0 CITY ROLE

4.1 INTRODUCTION

It is widely acknowledged that contemporary universities such as Curtin are places of innovation and can be viewed as indicators of a nation's global competitiveness. Across the world, new mixed-use forms of settlement are being designed around universities to support a culture of innovation.

Western Australia is experiencing sustained growth. As of December 2012, the state is home to approximately 2.4 million people. This population is predicted to increase to between 3–3.2 million people by 2026. Between 2011 and 2012, Western Australia's population grew at a rate of 3.5%, the highest rate of growth of any state in Australia and more than double that of the national average. Such high and rapid population growth presents a significant challenge and requires careful consideration to determine how and where to accommodate these new residents, along with the housing, infrastructure, services and jobs they will require.

The consideration of important regional and city planning objectives in the development of a master plan for Curtin will help guide the transformation of the current University from an isolated suburban campus into a major node of urban activity at the heart of a vibrant and diverse community; a new community that can contribute to Western Australia's sustainable growth.

The development of a master plan for Greater Curtin presents the opportunity to fully translate the objectives of both the University and the WA Government to deliver tangible outcomes for their communities.



*PERTH'S FUTURE
HAS NEVER LOOKED
SO BRIGHT*

- ▬▬▬ Perth Central Area
- ▬▬▬ Strategic City Centre
- ▬▬▬ Strategic Specialised Centre
- Regional Centre
- ||○|| Railways
- ▬▬ Major Roads

4.2 ROLE WITHIN THE CONTEXT OF THE CITY

DIRECTIONS 2031 AND BEYOND

Directions 2031 and Beyond provides the overarching spatial planning framework for the Perth and Peel Regions. Within this framework Curtin is one of five Specialised Centres noted in State Planning Policy 4.2 Activity Centres for Perth and Peel (SPP 4.2). These Specialised Centres sit outside the hierarchy of population, retail and business-based centres.

Jandakot Airport and Perth Airport, two of the five, are manufacturing-based centres boasting a significant volume of export-oriented jobs but a low intensity of employment and adverse amenity, which limits their potential evolution into more significant urban centres.

The university-based specialised centres, with relationships to a technology park or a major tertiary hospital have greater potential to expand and achieve an elevated status in the hierarchy of centres.

CAPITAL CITY PLANNING FRAMEWORK

The Western Australian Planning Commission (WAPC) has also produced a Capital City Planning Framework (CCPF) covering Central Perth (defined as an area measuring 12km x 12km surrounding and including the Perth CBD). The CCPF provides a spatial framework to guide future development for the planning of Local Government areas.








The CCPF discusses the concept of a city for knowledge and culture, proposing Perth city centre and the three university-based centres be developed as the key places in which to foster the knowledge and cultural industries within central Perth.

The 'Knowledge Triangle' concept proposes that Perth city along with the specialised activity centres at Nedlands-Crawley, Bentley-Curtin and the Mt Lawley university precincts are considered the primary foundation for the structure of central Perth. These specialised centres form a triangular arrangement around Perth city and can be used to facilitate the establishment of clear patterns of employment, residential accommodation and transport, building on their role as clusters of knowledge and culture through spatial proximity.

Located within the designated Curtin Bentley Specialised Activity Centre, Curtin forms part of a proposed 'Knowledge Arc' connected by light rail to:

- Perth CBD
- West Perth CBD
- QEII, St John of God, King Edward Memorial, The Mount and Sir Charles Gairdner Hospitals
- University of Western Australia (UWA)
- Canning Bridge.



-  Curtin University Boundary
-  Education/Institutional
-  Residential
-  Research and Technology
-  Local Centre
-  Open Space
-  Bentley-Curtin Specialised Activity Centre Boundary

4.3 ROLE WITHIN THE CONTEXT OF THE NEIGHBOURHOOD

Greater Curtin is situated in the heart of a suburban residential community and in proximity to a variety of institutional, recreational and knowledge-based activities, including:

- Bentley Technology Park
- Polytechnic West
- CSIRO
- Canning College
- Clontarf Aboriginal College
- Penrhos College
- Como Secondary College
- Kent Street Senior High School
- Department of Agriculture and Food
- Department of Environment and Conservation
- Collier Golf Course
- Waterford Plaza local shopping centre
- Canning River, Bodkin Park, Centenary Park, George Burnett Park/Reros Park.

CENTRAL METROPOLITAN PERTH SUB-REGIONAL STRATEGY

The Central Metropolitan Perth Sub-regional Strategy (CMPSS) identifies the potential of Bentley-Curtin to improve the physical relationship between the various land uses and to consolidate and diversify the centre. This strategy also recognises the University's increasing profile as a key knowledge-based employment centre and the opportunity to improve public transport connections to Canning Bridge railway station and Cannington.

In this context, the key characteristics which would define the evolution of Curtin into a strategically significant centre of employment are the delivery of:

- Intensity and quality of employment
- Access to high quality transport
- Diversity of activities; ability to deliver and/or improve the performance of the above
- Proximity and connections to other key activity centres and catchments.

BENTLEY-CURTIN SPECIALIST ACTIVITY CENTRE

The Bentley-Curtin Specialist Activity Centre has the potential to provide much greater support for the metropolitan planning objectives of the State Government. The development of the Activity Centre has the potential to create a significant knowledge cluster, a centre for innovation on an international scale, its two main components being Curtin University and the Bentley Technology Park.

The preparation of an Activity Centre Structure Plan is the first step in coordinating and changing the planning scale and land use mix within the Centre. Advice from the Department of Planning is that a draft version of the Structure Plan is expected to be released for public comment in 2014 prior to final endorsement by the WAPC.

The development of the Greater Curtin Master Plan provides the opportunity to make a significant contribution to the development of the Activity Centre Structure Plan, as it covers more than half of the land in the Centre and includes the vast majority of the land capable of being developed.

The Activity Centre Structure Plan, once endorsed by the WAPC, will be the key statutory planning document used to assess development applications submitted on land Reserved for Public Purposes (University) in the Metropolitan Region Scheme (MRS). Therefore ensuring there are strong synergies between a master plan for Curtin and the objectives of the Structure Plan will be critical.

BENTLEY TECHNOLOGY PARK

Bentley Technology Park is Western Australia's premier location for technology driven and innovative organisations dedicated to information technology and telecommunications, renewable energy and clean technologies and life sciences.

It is home to more than 100 organisations including technology-based industry, research and development, academia and support organisations. The Park is an important catalyst for science and technology developments in Western Australia and many of the State's science and technology companies are based there.

Convenient access to innovative infrastructure, technology based R&D, and support services, creates opportunities for strategic linkages and project collaboration for Technology Park tenants within and external to the cluster.



KENSINGTON

SWAN
TAFE

HAROLD
ROSSITER
PARK

BENTLEY
TECHNOLOGY
PARK

EAST
VICTORIA
PARK

CSIRO
ARRC

BENTLEY
TECHNOLOGY
PARK

PENRHOS
COLLEGE

POLYTECHNIC
WEST

COLLIER PARK
GOLF COURSE

CURTIN
UNIVERSITY OF
TECHNOLOGY

COMO
SECONDARY
COLLEGE

KARAWARA

CANNING
COLLEGE

REROS
PARK

CSIRO
AMRC

TRINITY
COLLEGE
PLAYING
FIELDS

WATERFORD

CLONTARF
ABORIGINAL
COLLEGE

CENTENARY
PARK

BODKIN
PARK

CANNING RIVER



4.4 CONTRIBUTION TO SPORT AND RECREATION FOR THE WIDER CITY

Curtin University's existing sport and recreation facilities play an important role in catering for the community both within Curtin and the wider region.

The University's venues are a major event host within the region. It is the State's home of elite and sub-elite hockey, supporting Hockey Western Australia, Hockey Australia's High Performance Program and the Australian Institute of Sport's Hockey Unit. The Perth Hockey Stadium is intended to remain the premier venue for hockey in Western Australia and Curtin University is currently working to strengthen relationships with Hockey Western Australia to integrate the use of their facilities during off-peak times.

Curtin Stadium accommodates a range of community activities, such as indoor ball games and fitness classes for a range of age groups, including the elderly. The venue is able to be configured to accommodate a show court holding up to 2,000 spectators.

The University's existing outdoor facilities host a range of community sporting groups, including rugby league, soccer, cricket, and Gaelic football. The facilities also host a number of other community events, including cultural festivals and charity events.

Curtin University has a strong network of sporting clubs with over 1,600 members, ranging from netball, rugby union, fencing, badminton and martial arts. It also provides a number of social and competitive competitions for students, staff and community, in which more than 3,800 participate, including inter-faculty competitions and evening social sports.

There is great potential to build on the existing partnerships and activities, and enhance the quality, efficiency and functionality of the existing facilities to accommodate more activities, establish new partnerships and develop synergies between sport and health science research and training.



The city is not static; it is a dynamic system in which the key to its long-term health and success, or its intelligence, will be its capacity to adapt to change. Like an ecological system, the key to this capacity is diversity.²

4.5 PLANNING FOR A SUSTAINABLE CITY

SUSTAINABILITY: THE DESIGN AGENDA OF THE TWENTY-FIRST CENTURY

At the turn of this new century concern about the impact of continued rates of urbanisation upon the health of the planet and its inhabitants is refocusing attitudes towards the way we build. The United Nations Earth Summit of 1992 alerted world governments to the environmental and ecological problems associated with continued urban growth and focused international, national and local concern on how we live and grow as a global community.

The complex and interconnected nature of the environments we occupy is now universally recognised, as are our local and international spheres of influence and contribution to climate change. It is widely recognised that the evolution of the 21st Century City must focus on a reduction in its environmental footprint to deliver more sustainable development outcomes.

The Brundtland Commission's 1987 report provided the basic definition of sustainable development.

This has been the premise for emerging policy and behavioural attitudes globally since its release. Importantly, it highlights the significance of intergenerational equity, advocating an approach to development that requires solutions to be considered in the context of their immediate and future impacts and fostering environments that encourage long-term social responsibility. Achieving this goal requires development models capable of physically delivering environments to support and foster community engagement and the adoption of more sustainable patterns of living over time.

Physical issues of size, mix, layout and density, building forms, movement patterns, materials, and resource efficiency are all being considered in the quest to define new models to guide the development of more sustainable urban settlements. The outcomes to date strongly advocate the compact city model: a high-density, mixed-use urban form with integrated public transport, high-quality public spaces, and energy-efficient buildings.

Significant progress has been made in understanding this typology and how it might work; in particular, how renewable energies might be adopted and how materials, water, and waste efficiencies might be managed and integrated into built forms.

^[2] Briggs, G (2005) 'The Intelligent City: Ubiquitous Networks or Humane Environment?', in Jenks, M and Dempsey, N (eds.) *Future Forms and Design for Sustainable Cities*, Architectural Press, Oxford

EVIDENCE-BASED MASTER PLANNING

Urban development outcomes are significantly impacted by the decisions made during the master plan development process. These are historically guided by identified client need, constraints, contextual analysis and stakeholder input.

To better understand and evaluate the myriad of available alternatives for energy use, water use, carbon emissions and enhancing social planning, the Sustainable Systems Integrated Model (SSIM) was utilised. SSIM is an integrated Geographic Information Systems (GIS)-based land use spatial planning tool that optimises the sustainability outcomes of master plans by quantifying environmental, social and cost performance indicators to test and demonstrate their validity.

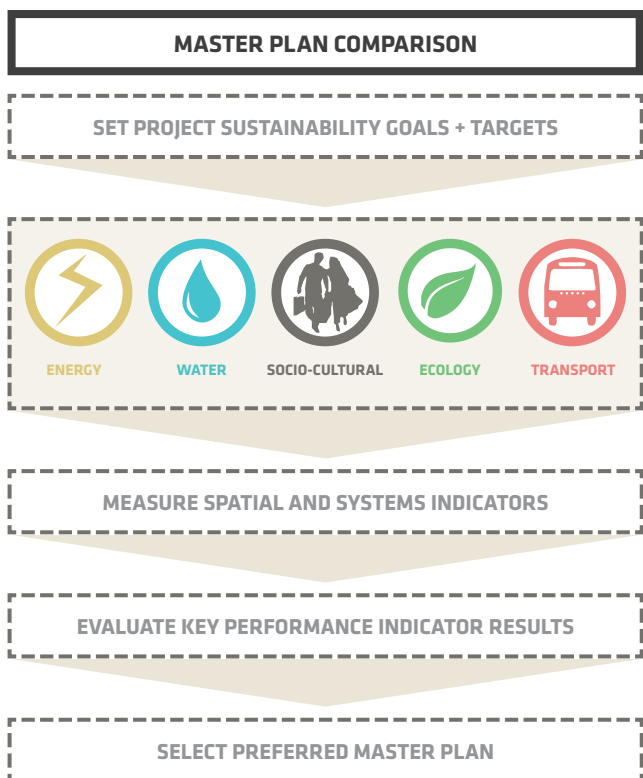
SSIM quantifies and compares a range of sustainability and climate change parameters for a master plan and evaluates the merits of alternative urban form solutions.

A place making audit and land use economics assessment also provides recommendations for the optimisation of the master plan.

As part of the design development process for Greater Curtin, SSIM was utilised to generate additional evidence to assist in developing designs and to model some of the quantitative indicators and qualitative assessment to inform sustainable design direction.

The master plan assessment process uses a framework for visioning and decision-making based on the desired development outcomes. This promotes well-informed and evidence-based decision-making to ensure that development outcomes are better managed and communicated.

SSIM Stage 1 Process Diagram



The framework ensured that the university's priorities, site context, stakeholder inputs and sustainability priorities were well-informed and could be quickly considered and adopted to inform the critical analysis and carried through the development of the preferred master plan and development strategies.

The approach taken has utilised a range of quantitative and qualitative indicators that respond to holistic considerations. The quantitative analysis tool applied the AECOM SSIM, which provides a spatial analysis of the master plan options.

A full summary of the process applied and outcomes is provided in the Greater Curtin Master Plan Sustainability report.



4.6 COMPARATIVE STUDIES OF ACADEMIA

To explore and understand critical physical elements required to deliver an urban campus, a number of precedents have been reviewed for their strategic relevance to Curtin University, including:

- Hong Kong University (HKU) Centennial Campus, Hong Kong
- University of Warwick, United Kingdom
- Queensland University of Technology (QUT), Kelvin Grove Campus, Brisbane, Australia
- University of California (UCLA), Berkeley, United States of America
- Queensland University of Technology (QUT), Gardens Point Campus, Brisbane, Australia
- Illinois Institute of Technology (IIT), United States of America
- Royal Melbourne Institute of Technology (RMIT), Melbourne, Australia
- University of Cambridge, United Kingdom.

The following section summarises the key insights that hold relevance to Curtin University.



<p>INSIGHT</p> <p>1. ENHANCE STUDENT LEARNING EXPERIENCES</p>	<p>RELEVANCE TO GREATER CURTIN</p> <p>Create a place that supports networks of activity, uniting research and practice in a framework of buildings that support a mix of land uses and occupants.</p> <p>Provide flexible and comfortable spaces for study, discussion, collaboration, information access and learning assistance, spaces such as ‘Learning Commons’.</p> <p>These spaces can collectively accommodate up to 2,000 people with some areas accessible 24/7.</p>
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<p>INSIGHT</p> <p>2. ENHANCE THE ROLE AND EXPERIENCE OF THE PUBLIC REALM</p>	<p>RELEVANCE TO GREATER CURTIN</p> <p>Providing opportunities to support and facilitate dynamic learning, provide protection from climatic conditions offer relief from hard urban elements.</p> <p>Focus on connectivity and wayfinding, providing priority for pedestrians with clear, well-defined desire lines and convenient access to high quality public transport.</p>
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INSIGHT

3. DEVELOP A STRONG VISUAL AND EXPERIENTIAL IDENTITY

RELEVANCE TO GREATER CURTIN

Focus on the promotion of innovation occurring in the University, through its manifestation in the physical realm, such as exemplar built elements, displays and infrastructure systems.

Capitalise on the opportunity for development to advance research and delivery of sustainable built form outcomes that are visually and physically tangible so that the campus itself is a demonstration and learning platform.

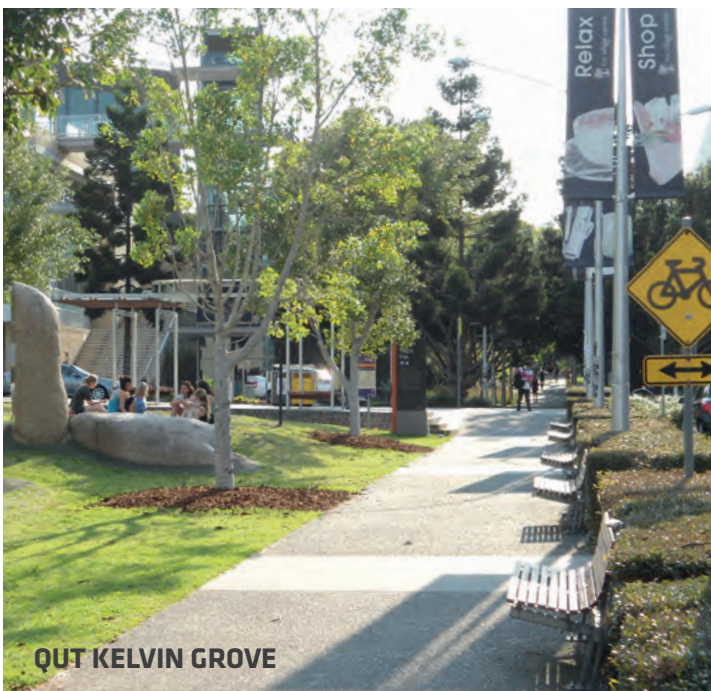
INSIGHT

4. LOCATE AND HARNESS THE EXISTING COMMUNITY ENERGY

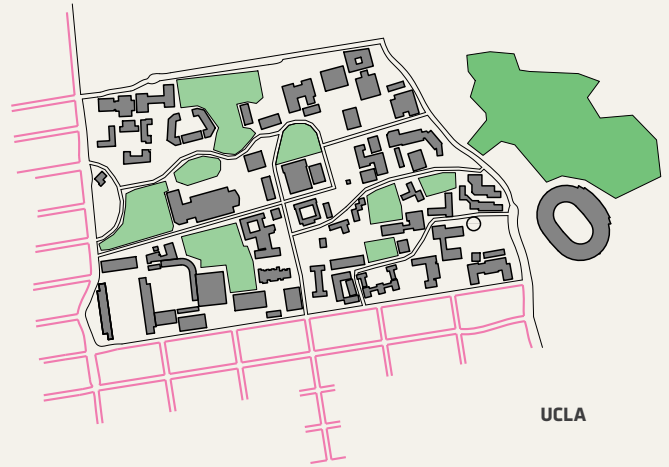
RELEVANCE TO GREATER CURTIN

The opportunity for greater diversification of land use mix and the extension of access to facilities for a wider community has the potential to change the focus for activity, blurring the boundaries between education and a potential 'city' scale role.

Further to the precedent studies, a process of mapping has been undertaken to understand existing and planned focuses of energy at Curtin University to identify the pattern of publicly accessible urban spaces that are emerging and inform the city shaping process for Greater Curtin, effectively guiding the development of strategies to support and enhance these and facilitating greater urban outcomes.



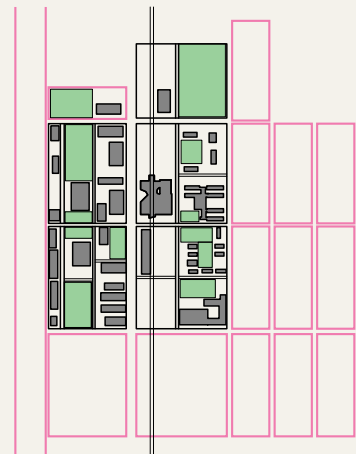
Exploring urban structure and integration



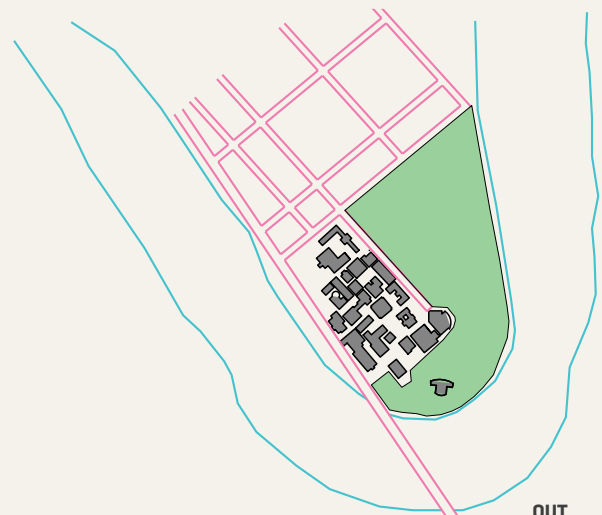
UCLA



RMIT



MIT



QUT

INSIGHT

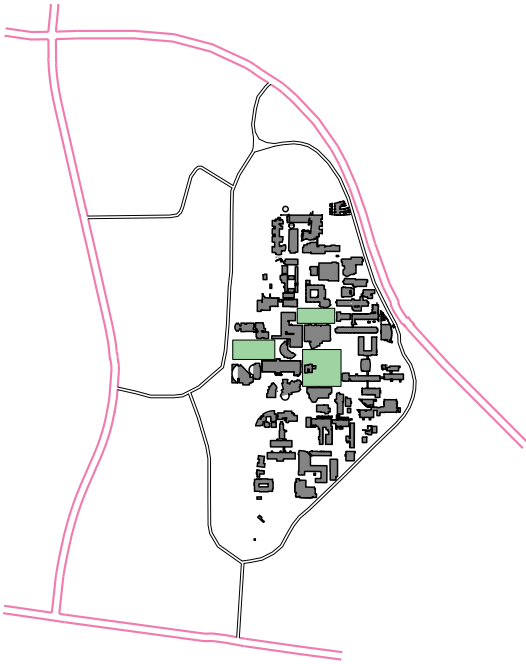
5. CREATE A STRUCTURE THAT SUPPORTS URBANITY

RELEVANCE TO GREATER CURTIN

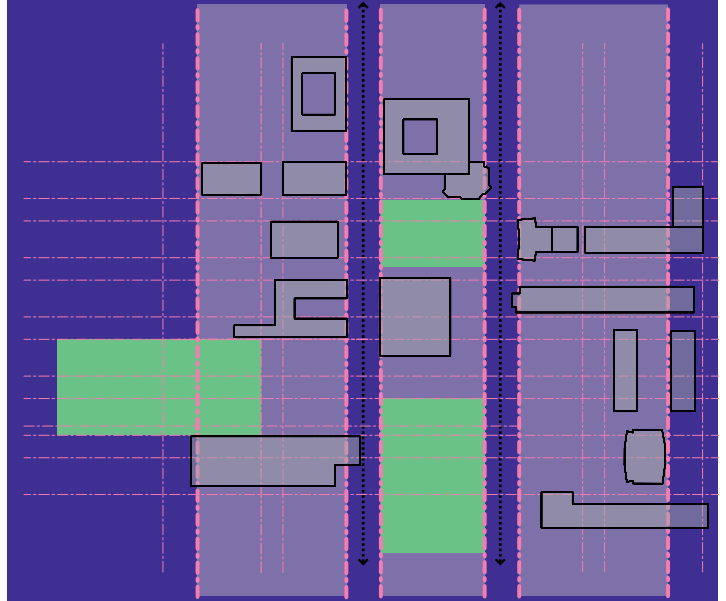
Provide dense groupings of buildings bounding formally structured spaces to concentrate activity, provide passive surveillance, encourage social exchange and foster synergies and partnerships between business and research.

Utilise structure and site topography to enhance the character of the campus and connect it to its surrounding context.

CURTIN



ORIGINAL CAMPUS STRUCTURE



INSIGHT

6. STUDY THE ORIGINAL URBAN FABRIC TO INFORM FUTURE CHARACTER

RELEVANCE TO GREATER CURTIN

Draw on the original planning layout, built form and public realm spaces to identify a possible structural module for application in the development of an appropriate urban grid.

Ensure new buildings and public realm spaces reference the vernacular character of the original campus.





[THE] OPPORTUNITIES

4.7 CITY SHAPING POTENTIAL

In recognition of this broader planning context and the potential for the Greater Curtin Master Plan to contribute to the wider city, at a social, economic and ecological level how could the alternative future look?

[1]

CITY SCALE

- Provide greater support for the metropolitan planning objectives of the State Government
- Create a significant knowledge cluster and a centre for innovation on an international scale
- Create a vibrant and people focused environment on a scale that:
 - Presents Curtin University as a world class university and University City environment consistent with Western Australia and Curtin's international standing and objectives of being highly visible and active in the Asian region
 - Provides an expansion of world class education opportunities for Western Australians and improves the attractiveness of Western Australia as a sophisticated education hub to support the significant education export industry and the flow-on job opportunities for West Australians
 - Is a lively, safe and attractive place for people to work, study, live and recreate with facilities to support these activities drawing the wider community into the University
- Provide opportunities for greater utilisation of the University's Bentley Campus land and other University facilities (both during normal hours and beyond the standard business day) and contribute to Perth residential and community facilities by incorporating residential accommodation to support the activities of Greater Curtin
- Create a Specialised Activity Centre as part of the system of current and future activity centres in Perth that anchors the strategic public and private transport networks, anchoring one end of the potential Knowledge Arc (main concentrations of knowledge economy jobs) formed by Curtin University, central Perth, West Perth, Subiaco, QEII and the University of Western Australia (UWA)
- Become a key transport interchange point, meaning investments in transit within Greater Curtin will benefit residents and visitors, and the general public at a more significant city scale
- Provide a leading example in the Perth context of successful integration of higher-order transit into urban streets.

[2]

NEIGHBOURHOOD SCALE

- Deliver Transit Oriented Development (TOD) outcomes
- Strengthen relationships between adjoining land uses through the exploration of an externally-facing public transport, pedestrian, cycling and street network
- Create a new employment node and central focus for commercial activity
- Create a focus for civic and cultural activities at the heart of the Bentley-Curtin community
- Deliver a vibrant town centre serving an established residential catchment
- Create a catalyst to stimulate urban change in the inner southeast region, encouraging and setting a good example for density uplift and intensification of land uses in the area
- Provide opportunities to diversify residential typologies within the market including choice and price point options
- Achieving investment returns on the lease of land for commercial projects to provide an income stream to the University to invest in or supplement University programs and long-term endowment objectives
- Deliver a strong knowledge-based cluster of activities
- Deliver an exemplar of sustainable urban design outcomes including infrastructure and built form.

[3]

DIVERSIFYING USER MIX

In addition to research, teaching and administrative staff, day students and live-in students, Greater Curtin will accommodate residents, businesses, hospital patients and visitors (business-related, visiting students, international researchers, local retail catchment). Users will access Greater Curtin at different times of day and night, improving activation, success of retail tenancies and safety, and maximising the use of infrastructure. Interaction between different user types can generate new knowledge and experiences and create a diverse and integrated community of learning.

[5]

STRONGER SOCIAL AND BUSINESS NETWORKS (PHYSICAL AND VIRTUAL) – BUSINESSES INPUT TO CURRICULUM

Greater Curtin provides opportunities for businesses to locate within the campus to benefit from access to research and knowledge, particularly in areas in which Curtin has a strong competitive advantage. University-industry partnerships create benefit for both parties, with industry gaining access to students and researchers to assist in solving specific real world needs, and students gaining industry experience and learning from industry experts.

[4]

LEARNING THROUGHOUT LIFE – CONNECTION TO ALUMNI

In addition to school graduates, students attending Curtin will be from all age brackets, with flexible learning arrangements tailored to their circumstances. Stronger connection to alumni maintains networks and generates opportunities for new business development and knowledge commercialisation (Stanford & MIT examples).

[6]

RESIDENTS ON CAMPUS

Residents on campus contribute to greater economic activation, retail success and safety through presence outside of traditional work/study hours and greater spend capture. Residents require access to retail and amenities and form an established local catchment for Curtin's growing urbanisation economy. Residents can also work within Greater Curtin, which improves productivity and employment self-sufficiency rates and reduces car-based trips. The ability to live on campus in appropriate accommodation also encourages more productive students and the presence of supportive networks aids their transition to adulthood.

[7]

INTEGRATED BUSINESSES, RUN BY UNIVERSITY (LOCALISATIONS AND URBANISATION)

A significant part of the university focus will switch from teaching and academic research to the commercialisation of knowledge. In conjunction with a network of partners (potentially businesses located within Greater Curtin, external research centres or industry bodies), university staff will develop new business solutions based around opportunities derived from research. University-industry partnerships will develop new teaching programs for students to maximise productivity and learning, and funnel academic research toward solving commercial problems. Core university functions will integrate and innovate with commercial business functions within Greater Curtin, through the development of shared spaces, a public realm, mixed-use buildings, a city centre core.

[8]

FEWER TRADITIONAL TEACHING STAFF, FEWER ADMINISTRATION

The use of technology (such as online lectures) increases the university's ability to teach large numbers of students with fewer full-time teaching staff. Teachers spend more time on researching and developing new content, facilitating links with industry and real world problems.

[9]

MORE FOCUS ON TECHNOLOGY

Online lectures enable students to access classes at times and locations convenient to them. Traditional lectures in large theatres have been moved online, and lectures take place in labs and industry environments. Explicit knowledge, such as contained in manuals and procedures can be downloaded and reviewed by students prior to lectures, reducing the need for note taking. Classes are smaller and more interactive, with a focus on application of knowledge. Social and professional networks are supported through smart technologies, with the ability to impart up-to-date information (regarding activities, events and news) to all Greater Curtin users. This enables flexibility and efficiency in teaching and learning, and contributes to a highly activated environment.

[10]

HYBRID COURSES, SMALL INTERACTIVE CLASSES


Faculties no longer operate as separate silos, recognising that many problems need multifaceted solutions. This gives students the ability to unbundle and repackage courses to meet their speciality needs. It improves the interaction between faculty researchers, increasing opportunities for collaboration on complex real world problems. Small interactive classes create a more dynamic learning experience, in which students interact with teachers, industry experts and their peers. Increased group activities provide an incentive to attend campus, generating long-term social and business networks and helping to make students more industry-ready.

[11]

URBANISATION ECONOMY TO SUPPORT MUCH LARGER AND DIVERSE USER BASE

With a significant increase in daily users, Greater Curtin requires goods, services, and entertainment and recreation amenities to meet users' daily needs. This is essential for attracting businesses, international researchers and students. A well-designed urban environment facilitates spontaneous interaction and knowledge sharing networks, vital for innovation. Provision of retail, food and services creates opportunities for students to work locally and reduces the need for user groups to travel to access amenities. In addition, a high amenity urban environment contributes to value uplift in surrounding suburbs.

5.0 NEXT STEPS



This document provides a summary exploration of the primary drivers for change that will be influential in guiding the master plan strategies to successfully transform Curtin University's Bentley campus from an isolated suburban campus into a major node of activity and a city wide community asset.

In exploring the objectives of the University and considering these in the context of the future of academia and the shaping of the city of Perth and its region, an understanding of the relevant opportunities for the master plan can be determined.

In particular the opportunity for the master plan to support and facilitate long-term business innovation and economic success for the wider community and the region are key considerations in redefining an urban university framework.

THE FUTURE OF ACADEMIA

The physical framework for the master plan will enable the University to operate in an integrated way with alumni and the wider business and general community to respond to new and dynamic academic models.

Setting in place opportunities to explore a more diversified land use mix and carefully organise activity to maximise opportunities for networks and positive synergies to occur between academia, business and the wider community.

CURTIN AS A BUSINESS INNOVATOR

By structuring the master plan, the opportunity for Curtin to become an innovative and globally competitive knowledge environment and realise its potential as a specialised centre within Perth's Activity Centre SPP 4.2 requires the development of a significant proportion of complementary knowledge and research-based businesses to maximise the value of the existing institutional activities as well as improve its general outward connectivity.

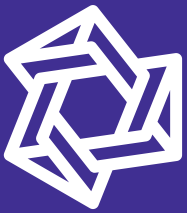
CITY ROLE

In exploring the potential for its city role, within the development of the master plan, a broader understanding of how the land and its development will become an integrated part of the community and create a new heart for the area will be key. In particular exploring how strategies can be developed to extend connections into the wider community to contribute to the improvement and enhancement of established ecologies, amenities, movement networks, community diversity and lifestyle.

The development of the master plan will seek to weave together the different layers of opportunity, of business and commerce, of community and ecologies, delivering an integrated city framework to guide the areas successful and sustainable future growth and ultimately its contribution to Perth and broader community.







**GREATER
CURTIN**

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