Innovation at the Edges: The role of Innovation Drivers in South West Sydney

M. Cristina Martinez-Fernandez, Tavis Potts
Marc Rerceretnam, Merete Bjørkli
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AEGIS is a designated Research Centre of the University of Western Sydney. The Centre aims to be a national and international leader in the study of industrial dynamics, organisational innovation and improvement, science and technology, knowledge systems, and the role of government policies in these areas. The research agenda is currently focused on the technological, industrial, scientific, and business institutions and policy mechanisms that underpin innovation and development. The defining feature of the Centre is that its research programs incorporate three levels of analysis at national and international levels; at regional levels; and at sectoral and organisational levels.

Dr Cristina Martinez-Fernandez, Senior Research Fellow
Cristina has a PhD in Planning & Urban Development from UNSW which she received in 2001. Previously she has a Bachelor of Psychology, and a Doctorate in Psychology from Salamanca University in Spain, a Grad.Dip. in Industrial Psychology from UNED Madrid and a Masters in SME Administration from Communidad Madrid. Cristina was awarded with the ANZRSAI Academic thesis award in 2003 for her contribution to urban and regional science studies. She has worked in Spain and Poland as an economic development consultant and as a researcher for the Hunter Regional Development Organisation prior to joining AEGIS. Her principle research interests are economic development, urban and regional development and planning and the regeneration of industrially declining city/regions. While in AEGIS Cristina’s research focuses on knowledge and the spatial analysis of innovation. She has lead the OECD and ARC Linkage ‘Knowledge Intensive Service Activities’ (KISA) project as well as a number of grants in partnership with local, state and federal agencies.

Dr Tavis Potts, Postdoctoral Fellow
Tavis joined AEGIS as a Postdoctoral Research Fellow in December 2004. His doctoral research was on ‘Sustainability Indicators in Marine Capture Fisheries’, examining the role of indicators and policy systems as tools to progress towards sustainable fisheries. Through the research, a ‘best practice model’ for indicator systems development was established. The research involved two expeditions to Macquarie Island and the Antarctic and contribution towards research and policy on illegal fishing, international law, and policy. The themes of sustainability policy, reporting and innovation continue to be a major influence in Tavis’s research. At AEGIS he working with local government on sustainability issues, addressing the field of regional development and innovation and developing methods in multi-disciplinary environmental research.

Dr Marc Receretnam, Senior Research Assistant
Marc is an early career academic having recently completed his Ph.D. (Economic History) at the University of Sydney. He also completed a Master of Arts (History) degree at the University of New South Wales and a Bachelor of Arts (Communications) degree with the University of Technology, Sydney. His professional experience extends over several areas with expertise in social, political and economic developments in Singapore, Malaysia and the Southeast Asian region as a whole. In the last decade and a half, he has worked on a variety of social and political issues and has cultivated extensive links with various political parties and non-government organisations in the Asia-Pacific region.
Marc is an elected Local Government Councillor to a Sydney metropolitan council and plays a noteworthy role in Sydney’s ethnic community scene.

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Executive Summary

• The study applied the concept of ‘Innovation Ecosystems’ (IE) to the analysis of the Macarthur region in South West Sydney. Specifically it explored three IE: knowledge intensive dynamics, environmental dynamics and social dynamics. The research questions investigated are:
  o What innovation drivers are identified by firms/organisations as important for innovation and development?
  o What knowledge intensive activities do these firms/organisations do?
  o How important are environmental dynamics for innovation of these firms/organisations?
  o How much collaboration is there between firms and regional organisations?

• The study aims to assist local institutions and stakeholders to identify the challenges embedded in the innovation process of their regions via using a set of 8 innovation drivers and 38 innovation indicators. The eight proposed innovation drivers are: Industry Knowledge intensity, Connectivity, Knowledge Generation, Transfer and Integration, Entrepreneurship, Environmental Dynamics, Community Engagement, Liveability, Accessibility.

• The study uses a combined methodology: a horizontal analysis using the ‘Innovation Dashboard’ and a vertical deep analysis using 12 case studies of firms/organisations. On the basis of the relative rankings and indices of the dashboard, the overall ‘Regional Innovation Index’ highlights the diversity of issues that can contribute to regional innovation. Noting the index scores, Campbelltown and Camden obtain similar results and higher ranks (570, 567) over Wollondilly (365). It is interesting to note that the high ranks obtained by Campbelltown and Camden has been obtained from different sub-index results. This leads to the observation that regional innovation drivers originate from many sources and that the keys to a successfully innovative region can be found across several disciplines.

• The majority of the case studies mentioned three drivers of innovation with high importance: knowledge intensity, environmental dynamics and accessibility. Connectivity, entrepreneurship and community engagement were considered of medium importance and knowledge generation, transfer and integration and liveability were considered of low importance. The case study analysis shows that, in average, the use of Knowledge Intensive Service Activities (KISA) by MACROC companies is below what has been observed in knowledge intensive sectors such as software and mining technology services but similar to sectors such as Tourism (see AEGIS KISA forthcoming reports). The relative use of KISA might be related to a lack of providers in the area as the companies stressed their preference of sourcing knowledge intensive services from the local area. Most KISA were provided in-house (a trend that we also have seen in our other KISA studies) but the partners in innovation come from the extended network of competitors, customers, Research and Technology Organisations (RTOs) and regional organisations which indicates that informal collaborative arrangements and connectivity are important areas to pursue for innovation of these firms. The activities requiring a higher frequency of expertise are in the areas of IT consulting, marketing and research and development. Knowledge and innovation partners come from nearby regions, especially Wollongong.

1. Maximum score=1000
• Despite the small number of case studies across the region, the environmental dynamics interview results show a broad cross-section of reporting processes, attitudes and products and outcomes. In relation to environmental reporting, it is clear the process and management plans and informal methods dominate but strategic Triple Bottom Line (TBL) / corporate style reporting needs to evolve. There is a case for the benefits of reporting to be articulated to the different sectors and cross learning encouraged. Regulatory reform would also be a potential option. In relation to the role of environmental dynamics and business success, the data highlights a core problem with developing environmental innovation – most organisations recognise that resource depletion and pollution is a signal of un-competitiveness but are unsure about the means of resolving these issues within the business context and resources constraints. Policy reform, education and incentives to translate this goodwill into action and innovation are recommended. In relation to partnerships for environmental innovation the data suggest areas for the way forward. There is a clear-cut case for inter-firm and organisational collaboration to harmonise and develop approaches.

• Regional collaboration and social dynamics present the most challenging position and potential to contribute to the regional innovation system. The lack of understanding of the elements involved in the social dynamics ecosystem and the lack of know-how of companies in relation to community engagement highlights an area for strategic and policy attention. The analysis of data suggest that the local level is the right level of intervention as the ‘community’ and ‘social’ space seems to be ‘local’ more than ‘regional’, state or national.

• The study raises areas of strategic planning and policy attention. For Campbelltown these include liveability issues and community engagement with some attention also given to environmental dynamics. In particular, liveability issues can relate to attracting the ‘creative class’ and further stimulating creative and innovative regions. For Camden the areas include accessibility issues, knowledge generation and transfer and community engagement to drive further regional innovation. Accessibility is a particularly important issue for the region, especially in the context of public transport and mobility. For Wollondilly the areas include increasing accessibility options, boost industry knowledge intensity, and knowledge generation and transfer. At the MACROC level it is recommended to increase accessibility through the region to connect with the transportation / employment / medical / knowledge hub of Campbelltown.

• Increasing regional connectivity at the industry and community level is necessary to establish channels and flows of information and knowledge so important in innovation processes. Pathways for increasing connectivity include the establishment of a regional innovation forums, formation of business networks and targeting public-private partnerships to promote community engagement. For example, environmental innovation is an area of natural competitive advantage especially because the location of the Sydney Water Catchment in Wollondilly. Recommendations are raised to promote networking activities where the role of environmental issues as a factor in innovation is discussed and where sharing of successful experiences is encouraged.

• The main recommendation from this study is that a ‘regional innovation working group’ be formed to further explore the areas of policy and strategic planning raised by the study and to design pathways of implementation of the recommendations towards increasing innovation in the region.
This project investigates the use of innovation drivers for assessing innovation in metropolitan regions. The study explores innovation drivers through the use of a set of indicators applied to the Macarthur region of South West Sydney. The study is funded by the regional partnerships grants of the University of Western Sydney (UWS) in partnership with the Macarthur Regional Organisation of Councils (MACROC), the Western Sydney Regional Organisation of Councils (WSROC) and the Department of Infrastructure, Planning and Natural Resources (DIPNR).

The study aims to assist local institutions and stakeholders to identify the challenges embedded in the innovation process of their regions via using a set of innovation drivers and indicators. The study first identifies innovation drivers that impact metropolitan regions. The data is then collected separately for each of the target regions. The data is then analysed using the ‘innovation dashboard’ format from where further themes for case study analysis are derived. Case studies of 12 organisations provide further light on the meaning of innovation drivers, knowledge intensity, environmental and social dynamics in the Macarthur region. The study identifies areas of strategic planning and policy attention for the region.

1.1 Background

Innovation is a significant driver of growth and hence one of the main contributors to a productive and prosperous region (OECD, 1999, 2001a, 2001b). Industry growth, job creation, emergent areas of new technology applications and the development of smarter industries all have roots in entrepreneurial and innovative practices (OECD, 2003). Many local and regional government organisations are seeking to make the shift from traditional industries, such as the automotive or food, common or dominant in their arenas to those more closely aligned with the industries of the emerging ‘knowledge economy’, notably IT, new materials, biotechnology and environmental management and engineering.

Local governments have responded in many ways, both within Australia and across the OECD. Some of the strategies developed have achieved greater success than have others. New regional patterns are developing as changes underway in the national economy seep through into local impacts. To cope with such changes and assist regional players to create and maintain a sustainable position in the emerging economy, regional and local governance organisations are seeking the new knowledge needed to understand what may succeed in their regions and what is less likely to be achievable. The Local Government Association, in conjunction with National Economics, has developed a series of annual publications on the ‘State of the Regions’. These assess background conditions, changes and trends, as well as useful initiatives undertaken, in regions around Australia (2000, 2001, 2002). Greater and greater attention is being paid to the development of employment opportunities. Yet no one has any definitive answers and more and more it seems that the traditional approaches to what is loosely called ‘regional development’ need further refinement if they are to be successful over the longer term and on the scale needed.

Despite the now substantial volume of analytical work in many countries, many of the policies put in place at regional and local levels on the basis of the analyses undertaken have had only moderate success. One of the reasons has been that the analysts lacked a coherent framework that made comparative work over time and space possible. This problem has recently begun to gain the attention needed (Feser & Bergman 2000).
A second and critically important problem has been that most of the investigative work on regional innovation and development has proceeded by case studies.

The difficulty has been that the design of case studies tend not to be analytically very powerful and in most cases have proved hard to draw policy-relevant lessons from. As Markusen has noted (1999), analysis of articles appearing over 25 years on regional development reveals that very few analysts used easily replicable methods while some did not reveal much about the methods used and the reliability of the inferences presented in the papers concerned. There has been a general split between those from different disciplinary backgrounds (which can be roughly characterised as more or less economic) in the use of quantitative methods (such as input-output or trade) and qualitative approaches (focused more on relationships between players and emphasised such intangibles as level of trust or collaboration). Indeed, in a very interesting piece of research carried out in Canada, two observers collaborated in the analysis of innovation performance and the problems of a region in Quebec One, using quantitative methods, presented one picture (quite a lot of innovation) while the other using qualitative interviews with players reported a quite different situation (pessimism about innovation levels) (Nimijean & Landry 2000). Perhaps both revealed some aspects of the truth but too often the reader is not presented with the appropriate evidence for what is recommended to policy makers.

Therefore it seems time to take a different approach. Storper, in a wide-ranging paper, has discussed each of the major approaches, both analytical and policy, to the analysis of regional innovation. He comes to the conclusion that an approach which combines some of the input-output insights on agglomerations of activities and some of the qualitative work which looks at regional assets and resources and analyses why some are utilised by regions and some are not is the most useful (1995).

This is a useful development but it too has limitations. The most important of these is that it neglects two critical aspects of the dynamics of spatial development: the interaction of different aspects of activity in the spaces selected for study and the interaction between regions and localities through activities carried out in different but related areas. In any nation, the ‘real’ economy is a space in which many activities compet for scarce resources. Thus, for example, some industries may be headquartered in one city of the nation while their productive activities are located in several others where they compete for labour and other inputs. Similarly, since some companies operate in many arenas (spaces) they may not give to any particular one an exact return for what they take out and use in their productive processes: some regions ‘drain’ others. The drain may be of capital, wages or tax revenues but, perhaps more importantly where the focus is on growth via innovation, the companies concerned may use a disproportionate amount of the publicly provided knowledge generation capacity available to a region seeking to create the new knowledge needed for economic development. On the more positive side, some business activities may involve players in several areas in interacting as clients and suppliers, in one or more supply chains of different lengths and complexity and these interlinkages between spaces can be further developed through targeted local and regional policies that specifically recognise the interconnections. A good study of local and regional economic development therefore must take account of the spread of activities across a broader zone of the economy and a broader space as ‘activities’ cross administrative boundaries. New approaches from the so-called ‘triple bottom line’ (social, economic and environment) need also to be properly integrated so to take into account the influences and opportunities presented by sustainable development.

This report explores a new conceptual framework that examines the importance of innovation in areas not traditionally studied by economic driven research or that play only secondary roles in regional development strategies. These areas explore the dynamics of industry knowledge intensity, environmental factors and social & community factors. The report argues that these areas do not belong to the same innovation system but have distinctive features, governing rules and effects so that each can be considered as ‘regional ecosystems’.

Aegis UWS
While the applied framework informs of the composition of these ecosystems and explores their role in regional innovation the study provides limited information on the interaction of activities from each of the ecosystems due to time and resource constraints. Some of the innovation drivers identified in the paper are noted in the recently released ‘Sydney Metropolitan Strategy’ discussion paper which presents nine directions for the Greater Metropolitan Region that extends from Newcastle to Wollongong. The nine strategies build on seven centres in Sydney West, four regional centres and four corridors for renewal. The strategies, while embodied in triple bottom line approaches remain clustered around the notion of urban development and the management of urban growth (DIPNR 2004).

### 1.2 Methodology of the Study

The project aims to understand the drivers of innovation in metropolitan regions. The study examines the feasibility of a set of innovation indicators from a triple bottom line perspective in the Macarthur region of South West Sydney. The project combines the interaction of economic, social, and environmental factors impacting the region’s innovation potential and therefore its development as suburbs of a metropolitan region. The project applies a combined methodology for assessing regional innovation issues and identifies strategic and policy areas for further attention.

The conceptual framework draws upon the literature and discussions with regional stakeholders. From this stage a set of regional innovation drivers was proposed. In order to analyse these innovation drivers, quantitative indicators were constructed to explore the availability of data. Secondly we built a ‘regional innovation dashboard’ to further analyse the available data to assist policy discussion. Thirdly we conducted 12 case studies of organisations across the selected region. The purpose of the case studies was to explore the importance of the innovation drivers at the firm/organisational level and the use of related activities. The research questions explored are:

- What innovation drivers are identified by firms/regional organisations as important for innovation and development?
- What knowledge intensive activities do these firms/organisations do? Who provide the services used in these activities?
- How important are environmental dynamics for innovation of these firms/organisations?
- How much collaboration is there between firms and regional organisations?

The research was undertaken in four steps:

**Step 1** involved the definition of the conceptual framework through the collection and reanalysis of existing regional and local-level literature and background studies to identify innovation indicators in the region;

**Step 2** involved building an Innovation Dashboard with the data collected from the innovation indicators;

**Step 3** involved conducting 12 case studies where firms and organisations were analysed in relation to the questions specified above;

**Step 4** involved discussions with regional organisations to extract policy conclusions or areas of attention for strategic development of the region.

---

3. The Dashboard is an innovative software application that visualises, ranks and analyses indicator data from different criteria and fields.
1.2.1 Innovation Dashboard

The process of delivering information to decision makers and securing outcomes is an emerging issue for indicator applications. Traditional forms of summarising and presenting indicators has resulted in a lack of policy ‘stickiness’, i.e., indicator initiatives have not had major impact on policy formulations. Constructing environmental indicators that are pragmatic for decision makers cannot rely solely on scientific data. The challenge is to transform the data to produce aggregate information digestible for decision makers but not lose important information or clarity.

Aggregation methods can be mathematical and/or visual (such as indicator matrices and coding). Aggregate measures constructed into an index may be easier for decision-makers to use because it summarises important information in one or a few numbers. However controversy can occur if important information is lost, the message is confused, or the methodology is not clear. In mathematical aggregation, a balance must be found between too much and too little information. In addition, having the component indicators available in a suitable format aids in interpretation of indices. Questioning the make up of the index is a useful procedure in itself as it forces the practitioners to examine the idea of weighting and relative importance of the indicators, and therefore the issues behind them.

Mental aggregation uses methods such as matrices and visualisation tools to promote subjective mental weighting and aggregation of a series of indicators (but aggregation occurs none the less). Subjective approaches are flexible and user friendly, but they are often not replicable or comparable. This can result in different interpretations and affect decision processes. However, several examples exist of the use of subjective approaches that are effective (Potts 2004). It seems to be clear to develop approaches that take into account the quantitative rigor of mathematical aggregation and the flexibility of subjective approaches.

The Dashboard Model is a visually engaging online tool that converts indicator data into nor malised scores and indices, and presents information in the form of a dashboard – similar to the instrument panel of a car or plane. It recognises the need to simplify large lists of complex measures into simpler aggregated measures using visualisation techniques that aid in decision-making (CGSDI 2002). In that respect, the Dashboard is a simple, yet effective means of presenting quite homogenous indicators within a common format. The tool is designed to facilitate understanding by experts, the media, policy makers and the public. It has recently been applied to Australian sustainability issues of the fisheries system (Potts, 2004). The dashboard contributes to an interdisciplinary understanding of a range of issues connected to a topic emphasising thinking about the entire system. In this context it is a useful tool for examining the outputs from the exploration of innovation drivers (ID-MR), examining regional innovation from a broader yet critical perspective, and engaging in debate over the priorities and drivers for regional innovation.

The Dashboard has emerged as a popular method for visualising indicators and exploring complex relationships, official users include (JRC 2004):

- The Province of Milano in Italy;  
- The Province of Manitoba in Canada;  
- Berkeley University;  
- Federation of Canadian Municipalities;  
- United Nation Commission on Sustainable Development.

4. The software can be downloaded from http://esl.jrc.it/dc/
The example of the output of the dashboard is shown below in Figure 1.

**Figure 1: The Dashboard output**

![Dashboard output diagram](image)

Source: JRC 2004

The dashboard converts lists of indicators into a standardised set of performance scores (the colours) and aggregates the scores into a set of sub-indices and an overall index. Using the Dashboard allows for comparison across several dimensions (e.g., social or environmental) for a particular spatial entity (country, region, city) in a simplified and effective format.

**Figure 2: Dashboard Colour Scheme**

Three important methodological issues are considered when observing Figure 1:

- The size of a segment reflects the relative importance of the issue described by the indicator;
- A colour code signals indicator performance relative to others: green means “good”, red means “bad” (see Fig 1);
- The central circle (Policy Performance Index) summarizes the information of the component indicators.

To normalise each set of indicators, the indicator scores for each case study are ranked between the lowest and highest performing values. The lowest indicator in the range receives a 0 score while the highest receives a 1000 score. The other indicators are linearly interpolated between the worst (0 points) and the best scores (1000 points) to obtain a result out of 1000 based on their rank. A colour is applied to the score based on its ranking relative to the scores within that indicator set. The allocation of the colour depends on the position of the indicator or index in the database (that is, the valuation is relative to the position of the score). Performance is displayed through a seven-colour code ranging from dark red (a ‘bad’ score) to yellow (‘average score’) to dark green (‘best’ score). This colour coding can provide for rapid assimilation of performance at each scale of the assessment (Potts 2004).
The aggregate score for each policy field is obtained by a process of weighted summation of the indicator ranking results. The choice of weights is arbitrary, and the Dashboard model automatically assigns equal weights to each indicator\(^5\). This is done for all components, and then each component is aggregated to form the overall Policy Performance Index (the final tier or centre circle in Figure 1). A detailed analysis of the underlying techniques and econometric tests can be found in Hardi and Semple (2000). The final aggregated index is useful for examining and comparing cases but should be used with caution when extrapolating to real contexts.

The Dashboard has several functions for analysis. The two primary approaches used in this analysis will be:

- Act as a ‘policy performance barometer’ examining the performance of a single policy field across several regions / cases. For example, the practitioner could examine the environment field (and its component indicators) across several jurisdictions or cases on the basis of the indicator rankings.
- Analyse the performance of a region / case study across several policy fields and an overall index. For any one region, the user can see a snapshot of the results of the indicators and dimensions. For example, the Western Sydney region could be examined across several policy fields such as environment, economy, social, infrastructure, and governance. The visual ability of the dashboard allows for an ‘instantaneous snapshot’.

1.2.2. Case Studies

Twelve case studies were selected according to a series of indicators comprising size of the organisation, sub-region, phase of company life, industry sector and having an innovation or industry award (see Table 1 below). The case studies broadly represent the diversity of organisations in the MACROC area but do not represent all the industry or institutional sectors of the region; neither is a statistically significant sample of the total number of organisations in the region. When possible comparisons have been made between organisations that have an innovation award and those that do not. A summary of each case study is presented in Appendix A.

Table 1: Case Studies Characteristics

<table>
<thead>
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<tr>
<td>Case G (30)</td>
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<td><strong>Camden</strong></td>
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<td>Case H (2)</td>
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</table>

\(^5\) Refer to Jollands et al (2003) for a detailed discussion on the issue of weighting and aggregation methods.

\(^6\) The life cycle can be divided into four stages: start-up (< 6 months), entrepreneurial (up to 2 years), professional management (2-5 years) and expansion (> 5 years, more complex structure).
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Wollondilly

<table>
<thead>
<tr>
<th>Case</th>
<th>Industry</th>
<th>Ownership</th>
<th>Management</th>
<th>Expansion</th>
<th>Access</th>
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<td>Expansion</td>
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<td>N/A</td>
</tr>
</tbody>
</table>

1.2.3 The Area of Analysis: The Macarthur region of Western Sydney

The area of study is the Macarthur region of Sydney comprising the areas of Campbelltown, Camden and Wollondilly. Although these areas present commonalities for a regional analysis, their differences highlights areas of particular attention at the micro level that are difficult to observe if the macro-level analysis is applied. The analysis presented in this report is both based in a micro-focus in each of the Macarthur regions and a macro-analysis of the MACROC region as a whole.

The Macarthur region of South West Sydney consist of three adjoining Local Government areas: Campbelltown, Camden and Wollondilly. The region is located approximately 1 hour from the Sydney CBD (North), 1 hour from the city of Wollongong (South) and 2 hours from Canberra (West) (see Fig 3). It covers an area of 3,067 square kilometres and has a population of approximately 240,000 residents. The population density is 0.74 persons per hectare. Projected population growth is estimated to be around 41 per cent by 2021 and reaching to 58 per cent a decade later. There are approximately 17,600 businesses and the region contributes approximately $5.8 billion to NSW’s GDP. About 68 per cent of the population 15-years and over participates in full-time employment.

![Figure 3: The Macarthur region](http://www.macroc.nsw.gov.au/about_archive.asp)

Campbelltown had a rapid population growth between 1970 and 1990 and has transformed itself to the urban city it is today. The 2001 census data estimated the total population of Campbelltown to be 150,885. Population growth between 1991 to 1999 was 4.8 per cent.

---

Campbelltown is 77 hectares in size and consist of 29 suburbs that range from the more wealthy to the severely disadvantaged. Accordingly 26.3 per cent of households earn less than $500 per week while 56 per cent earn more than $800 per week.11 While the unemployment rate of the Sydney CBD was 6.1 percent in 2001, the average unemployment rate for Campbelltown was 10 per cent. There are three industrial estates and business parks in Campbelltown. Their focus is on manufacturing, wholesale trade, construction and distribution.12 In 2002 there were 48,696 properties classed as residential, 1921 Business A properties and 141 Business B properties (this included 175 main street properties) and 68 farmland holdings. There is a major regional hospital, university, two TAFE campuses and substantial tourism industry. Campbelltown has a comparative advantage in the Macarthur region regarding the diversity of industries in its area. This is coupled with a skilled labour force equaled to only by Camden.14 The LGA does also have strong education, health and retail infrastructure.

Camden has doubled its population between 1991-2001; from 23,425 people in 1991 to 45,685 in 2001 and is the fastest growing LGA in the Macarthur region. Between 1991 and 1999 its population grew an impressive 42.6 per cent. The Camden LGA is 91.09 hectares in size. It was a rural area until recently but new urban developments are transforming the LGA. During the last 10 years whole new suburbs have surfaced such as Narellan Value, Mount Annan and Curran’s Hill. The suburbs in Camden are more homogeneous than in Campbelltown with most residents being young families with children and mortgages. There are two industrial Parks in Camden; Smeaton Grange and Sydney Orbital Park. Camden also has a strong infrastructure in education and health. Camden’s unemployment rate is 5.0 per cent with 18.3 per cent of Camden-based households earning less than $500 per week and 68.3 per cent earning over $800 per week. Camden’s economic comparative advantage lay in its highly skilled labour force.

Wollondilly is still a quiet rural area with farms and orchards. It consists of 16 small towns and villages, the largest town being Tahmoor with 4,400 people. Between 1991-1999, Wollondilly’s population increased by 10.4 per cent. The LGA has an area of 2560 km2, with 727 km2 hectares of local open spaces and reserves. More than fifty percent of the LGA consist of national parks and sensitive water catchments lands. The main industries in Wollondilly are coal mining, dairying, orchards and poultry. In the 2001 census data it was estimated that the total population of Wollondilly was 38,856. Weekly earnings among Wollondilly-based households varied with 23.2 per cent earning less than $500 per week and 60.4 per cent earning over $800 per week. At the level of industry structure, manufacturing is the strongest sector in the region. Some industry features of the region are provided in Table 2 below.
Innovation at the Edges: The role of Innovation Drivers in South West Sydney

Table 2: Macarthur Industry

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<thead>
<tr>
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<tbody>
<tr>
<td>Wollondilly</td>
<td>1,347</td>
<td>13.4</td>
<td>5.2</td>
<td>5.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Camden</td>
<td>1,456</td>
<td>8.7</td>
<td>9.4</td>
<td>8.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>4,308</td>
<td>19.2</td>
<td>9.1</td>
<td>10.9</td>
<td>1.5</td>
</tr>
</tbody>
</table>


The area was selected for the study because the rapid transition it has undergone over the last 50 years from a rural community to an urban complex. The region also still conserving areas of rural character while the management of growth constitutes a significant challenge for planning for sustainable development. The area is also at the urban frontier of Sydney posing questions about the connectivity of the region to the main Sydney transit corridors. All these challenges frame the analysis of innovation undertaken in the study.

1.3 Limitations of the study

The study has several limitations. First of all the statistical data collected has been limited by time and resources constraints. Several data sets are spread across local, state and national jurisdictions or are not available at all. Secondly the set of innovation indicators is not a full list for metropolitan regions but an exploratory list for the area under analysis. Third, the number of case studies is small and do not represent all economic sectors of the regions under analysis. The results allow for improved tuning of both the research questions and the analytical methods for a further study to be designed with a higher number of metropolitan regions.

The study has not intended to provide a regional profile of the MACROC area. Instead it applies a novel methodology for policy analysis of horizontal and vertical analysis of regional innovation drivers. For a regional profile of the area see the studies by Fagan, Dowling and Langdale (2003), Randolph and Holloway (2003) or visit the MACROC website21.

Dashboard caveats

Several caveats must be considered when using the Dashboard for analytical approaches and policy development. They include:

- Indicators. The quality of the Dashboard depends on quality of the underlying indicators. Since the method uses a system of ranking to allocate performance colours within a set of indicators, any outputs form the Dashboard can only be considered in the context of the indicator set. No indicators, no dashboard!
- The Dashboard relies on a series of geographical cases as the basis of comparison. More cases in the Dashboard result in increasingly detailed ranking results and outcomes. For example, the United Nations sustainability Dashboard used 60 indicators across 230 countries. This exploratory project uses 36 indicators across 3 LGAs – leading to a limited analysis. With 3 cases (and the aggregation methodology) the differences between the indicators are much more pronounced.

However, in the context of examining the utility of this tool for the spatial analysis of innovation 3 cases is sufficient. Further research should expand the cases to a significantly larger set.

- The collection of data for the ID-MR was a complex and difficult task. Data for many of the indicators exists in a variety of local, state and national jurisdictions in a variety of databases and locations. In addition, many of the indicators have incomplete data or use differing methodologies. In the context of this exploratory research, the lack of data highlights the critical need for information to manage and implement regional innovation strategies.
- The relative ranking of the indicators and regions by the Dashboard is a tool that allows for examination of the interaction of policy fields and systems. Rankings are based on the indicators provided and are relative to the indicator results. They should not be interpreted as a definitive outcome for the region but as a tool for influencing debate and capturing the attention of policy makers. It aims to highlight issues that need policy attention and further in-depth analysis. A ‘red light’ indicates that particular indicator sits in the lowest ranking, a ‘green light’ indicates a higher ranking.
- The use of quantitative data was useful to have a broad picture of some of the features of the area but clearly insufficient to understand the importance of knowledge, environment and social dynamics for regional innovation, where the needs are for regional organisations to build their innovative capabilities and fill the gaps in current policy programs that assist organisations in pursuing innovation. The assumption we made is that regional innovation is highly dependant on the three discussed ecosystems as they affect firms, organisations and the community.

1.4 Overview of the report

The paper is divided into five chapters. Chapter one introduces the theoretical background of the study, discusses the methodology in detail as well as the limitations of the study.

Chapter two after this introduction presents the conceptual framework of the project. In this chapter three scenarios (innovation ecosystems) for regional innovation are discussed. These innovation ecosystems are: knowledge intensity dynamics, environmental dynamics, and social dynamics. A set of eight innovation drivers for each scenario is discussed and thirty eight indicators presented.

Chapter three discusses findings from the analysis of innovation indicators using the ‘innovation dashboard’, a specialised software application tool that assist strategic and policy analysis of quantitative indicators. The chapter presents conclusions on the use of the dashboard.

Chapter four presents key findings from 12 case study organisations looking at their understanding of the proposed innovation drivers, the role of knowledge intensity, the role of environmental dynamics and the role of collaboration and social dynamics.

Chapter five presents the synthesis of key findings and emergent strategic and policy themes.

The interview discussion guide and summaries of the case studies are presented in appendices.

Our conceptual framework is based in the view that economic or industry factors alone cannot explain why some regions are innovation intensive while others stagnate. In particular, we argue that three different critical systems for regional development can coexist in any certain space: knowledge intensity, environmental and social. While our understanding of the interaction of the first two (knowledge and environment) is starting to be discussed in the literature (Bellami et al, 2003), the understanding of the dynamics of the latter (social) and of its effects on regional development is still somehow in its early days. This study tries to un-pack some of the drivers of innovation that belongs to each of these systems. We refer to these systems as regional ‘innovation ecosystems’ due to their complexity, different indicators and different role in regional innovation. The innovation ecosystems expand triple bottom line approaches with a focus on innovation22.

The notion of regional ‘innovation’ relies on knowledge-based approaches that ‘innovation’ performance relies on the willingness and ability of firms and institutions to interact and hence share and exchange knowledge (OECD, 2002). However this approach needs to expand to the reality of cities and regions and the unit of analysis and need to consider how ‘learning’ is embodied in the innovation process at the regional level (OECD, 2001). The taxonomy of innovation as process (technological and organisational) and product (goods and services) (Edquist et al, 2003) is therefore limited for explaining regional innovation. We explore in this paper regional innovation from a different perspective, based on systems of activities from the knowledge, environment and social dynamics (see Figure 4).

Innovation System

Knowledge intensity

Environmental

Social

22. The conceptual framework of the ‘Innovation Ecosystems’ has been presented at different international meetings; notably the ANZRSAI 2004, the ACSP 2004 and Beyond Declarations 2005. Discussions at these meetings have focused on the understanding that ‘innovation lenses’ bring to triple bottom-line debates and the need for expanding our knowledge of the role and functioning of the ‘social ecosystem’.
In order to gain a better understanding of the role of these systems, innovation drivers were identified for each ecosystem from an analysis of the literature and after discussions with regional bodies. These innovation drivers are not an exhaustive list of what may drive innovation in a certain space. It is rather an identification of elements that can point to themes and issues that might need policy attention and a more in-depth analysis. Table 3 below shows the proposed innovation drivers.

Table 3: Innovation Ecosystems Drivers (IED)

<table>
<thead>
<tr>
<th>Innovation Ecosystems Drivers</th>
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<tbody>
<tr>
<td>1. Industry Knowledge intensity</td>
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<tr>
<td>2. Connectivity</td>
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<tr>
<td>3. Knowledge Generation, Transfer and Integration</td>
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<tr>
<td>4. Entrepreneurship</td>
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<tr>
<td>5. Environmental Dynamics</td>
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<tr>
<td>6. Community Engagement</td>
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<tr>
<td>7. Liveability</td>
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<td>8. Accessibility</td>
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</tbody>
</table>

The eight IED were identified by analysing the literature on innovation and regional development indicators and discussing the results with regional development agencies operating in the area of analysis. Each IED may be identified by several indicators. Below is provided an explanation on each of the proposed innovation drivers and the selected indicators.

2.1 Industry Knowledge intensity

Knowledge Intensity refers to the intellectual inputs and outputs as they appear in industries of all types and sizes. A growing body of literature is focusing on the role that Knowledge Intensive Business Services (KIBS) and Research and Technology Organisations (RTOs) have as intermediaries of knowledge and the role that Knowledge Intensive Service Activities (KISA) has in understanding innovation processes. KIBS are among the fastest growing and most dynamic sectors of modern economies. Recent economic studies have found higher levels of reported innovation and expenditures on innovation-related activities among manufacturing SMEs who interacted with KIBS than among those who did not. The same applies to those KIBS: they were more innovative than those that do not engage in such interactions. These results point out the critical outcomes in terms of innovation resulting from the interaction of SMEs in formal or informal activities with knowledge providers (OECD 2001, Miles, 2003). Knowledge intensity refers also to the role of professionals in combining intelligence and creativity that results in continuous innovation.

Recent studies on the knowledge economy are un-packing our understanding of the transformation now underway in our society. This transformation is based fundamentally on human intelligence, knowledge and creativity as discussed in Florida’s latest work, ‘The Rise of the Creative Class’ (2004). Under the heading of the Creative Class, Florida amalgamates those occupations that deal essentially with creative work and includes scientists, engineers, artists, musicians, designers and knowledge-based professionals. According to Florida, people in these occupations constitute the ‘talent’, that is, the creative capital of a place. The model of economic growth he proposes refers to the three T’s: Technology, Talent and Tolerance. We readily accept Technology as a driver of societal transformation with its associated areas of innovation and high-technology.
To include the notion that Talent and especially Tolerance are also drivers in this process, gives us a new way of understanding the development of cities. Florida’s work points out that places that are open and tolerant attract a diverse range of people (from ethnic, sexual orientation and ideological backgrounds), giving those places an edge in making them better at generating new ideas (Florida, 2004).

The following four indicators have been selected as a preliminary indication of industry knowledge intensity in each of the areas examined:

a) Percentage of employees in manufacturing;
b) Percentage of employees in knowledge intensive business services (KIBS);
c) Percentage of employees in cultural and recreational industries;
d) Percentage of employees in health.

The area under analysis has high concentration of manufacturing business and employees (Fagan et al 2003), a sector where knowledge intensive activities can assist with the transformation of ‘old industries’ into ‘knowledge intensive industries’.

2.2 Connectivity

Connectivity refers to the importance of interaction and engagement in the access and use of knowledge and in the process of innovation. In fact, much knowledge travels through networks of organizations and institutions that are geographically close (Martinez-Fernandez, 2001; Maskell, 2001; Audrestsch, 1995). In Australia, it is therefore often important for firms and organisations located close to universities, research institutes, Co-operative Research Centres (CRCs) or the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to maximise their information concerning products and services developed by local knowledge-intensive institutions. If they do not, that knowledge may remain unused or underused.

However, spatial proximity might not be the only key factor for sharing, transforming and adopting knowledge. Multinational corporations, for instance, have learnt to locate their R&D departments in one country while diffusing and adopting the knowledge developed to the rest of their facilities around the world. This means that geographic proximity does not automatically imply that the different parts of the regional innovation system will generate, share, transform and adopt knowledge. Special measures might be needed to ensure that knowledge circulates through the system, creating new opportunities for players that otherwise would not have access to specialised information, skills or technology.

Recent research argues that firms are increasingly dependent on the direct involvement of institutions to stimulate innovation and thus competition (Landabaso 1997; de La Mothe & Paquet 1998; Cooke 2001). A strong, regionalised innovation system is one with systemic linkages between the sources of knowledge production (universities and research organisations), intermediaries (government and private innovation services) and firms (Cooke 1995). Local proximity becomes critical when the relationship between the firm and the scientist involves the transfer of new economic knowledge. The increased importance of innovative regional clusters as an engine of economic growth has led policy-makers to focus on cluster solutions instead of old solutions based on the regulation of the industry.

Connectivity has also a global dimension where ‘places’ with common industry activities are linked (e.g regions in India and Silicon Valley or mining areas in Australia with Chinese regions).

Business networks, clusters and development networks are the selected indicators of connectivity for the study regions:
a) Number of business networks;
b) Number of industry clusters;
c) Number of development networks.

Business networks are described as “pathways by which people and organisations come together to exchange ideas, solve problems or form partnerships” (Kanter, 1996). Industry clusters are defined as concentrations of highly specialized skills and knowledge, institutions, rivals, related businesses, and sophisticated customers in a particular nation or region (Porter 2000). Development networks are strategic alliances of firms/organisations from the private sector, the public sector and the non-profit or civic sector with the objective of the socio-economic development of a certain territory, usually where they live and work. This type of network acts like a non-profit organisation and may adopt legal forms such as ‘consortium’ (Sabety & Griffin 1996; Martinez-Fernandez 1999). The three definitions refer to different grades of connectivity and interrelations by the regional organisations. Together forms a powerful index of regional connectivity.

2.3 Knowledge Generation, Transfer and Integration

Knowledge generation, transfer and integration refer to the availability and interaction with education and training organisations as major drivers of innovation in firms. In a recent study Acs (2003) uses a large innovation database to test whether university research labs were important for firm innovation. He found evidence that small firms take greater advantage of knowledge spillovers from universities than large firms, for whom corporate R&D is a more important source of generating and commercialising innovation. Acs found that geographic proximity between universities and corporate laboratories within a state clearly serve as a catalyst to innovative activity for firms of all sizes but especially for small firms. Acs argues that small firms have the advantage of small management structures free of bureaucratic constraints that ultimately allow innovative activity flourish. Innovation in small firms does not occur in a dedicated R&D department (as in large firms) but it is often placed at the heart of their competitive advantage.

A certain space benefits from the geographical proximity of ‘knowledge’ producers having a direct effect on innovation. Knowledge is a non-rival good because it can be used by one agent without limiting its use by others. Technology in many cases is partially excludable because it is possible to prevent its use by others with legal methods such as patents and commercial secrecy. However, no method can put boundaries to such a thing as information so it can be suggested that industrial R&D may generate technical spillovers via mobility of highly skilled personnel between firms, and by interactions among actors in an innovation system bounded by geographic proximity. The implications of knowledge spillovers being positively impacted by ‘proximity’ might mean that new producing inputs are not evenly distributed across space and so regions might not grow at the same rate. Theoretically this implies that geographical proximity might be a relevant unit of observation of knowledge spillovers (Acs, 2002).

The study of all knowledge functions in a certain space is beyond the analysis of this study but the selected indicators below will inform of some of the characteristics of knowledge generation and diffusion. One of the major drivers of innovation in many industries is the availability of knowledge-generation and training organisations. This is especially relevant here because of the location of one UWS campus (in Campbelltown) and several other knowledge-intensive service providers. However information on Research and Technology Organisations are found at a lesser extent than in the North and East part of Sydney. The selected indicators are:
a) Number of Master and PhD students in the regions;
b) Proportion of science / engineering / IT based postgraduates;
c) Number of students from UWS cooperative programs working in industry;
d) Number of university – industry partnerships.

2.4 Entrepreneurship

The argument that knowledge spills over a geographical space especially when network structures are available has important implications for entrepreneurship as available information and knowledge is the basis for recognising ‘opportunities’ that can be profitably exploited. Thus, those regions with more ‘available knowledge’ might present more opportunities to be pursued by entrepreneurs than regions where ‘knowledge’ is not produced or available (Acs, 2002).

Entrepreneurs and the spillovers from the commercialisation of new Knowledge add value to the new wave of innovations and entrepreneurs and a succession of innovation can generate self-sustaining economic growth (Romer 1986, 1993, 1994; Geroski 1994). Thus, the analysis of innovation in a place cannot be dissociated from an analysis of its entrepreneurial activity.

Indicators of entrepreneurship are not easy to find and time constrains have limited this indicator to:

- The mean number of business start-ups 1999-2004.

Other indicators for future research include the number of start-ups that continue in business after 5 years, start-ups per industry sectors, age breakdown of the entrepreneur and number of jobs created by the start-up and per industry sector.

2.5 Environmental Dynamics

Planning for regional development is increasingly taking account of the environmental dynamics that underpin regional economies and drive innovative policy and technological development. The role of sustainability is recognised as a key element of a ‘successful region’ with the environmental dynamics contributing to the development of liveable spaces, growth in knowledge economy and high technology jobs, and the conservation and restoration of natural capital in the face of resource scarcity and degradation. As noted in Beer et al (2003) improved sustainability at the regional level can benefit regional economies by providing a stable resource base for production, lowering production costs by reducing inputs and reducing waste and pollution, creating new markets, and employing more people in new knowledge intensive environmental industries.

This exploratory project contributes to a broader view of innovation and its potential drivers in the context of regional development. Governments, private enterprise and the community are increasingly aware of the role that environmental dynamics play in contributing to regional innovation and sustainable development. Issues concerning natural resource use and scarcity (especially water resources in the Sydney region), energy use and climate change, population growth and urban restoration are often critical elements within policy debates, the media, and in planning. Environmental issues have evolved to become significant drivers of technological, process, policy and civic innovation. In addition it is hypothesised that the environmental dynamics of a region contribute a role in generating human and social capital – an important part of developing the knowledge economy as noted above in 2.1 Industry Knowledge Intensity.
Several issues arise when investigating environmental dynamics as an innovation driver. Awareness is often a key driver of technological and process innovation within public and private organisations. The rise in concern over the future of water resource use in the Sydney Metropolitan Region is a recent example of awareness driving a multiplicity of responses including regulatory and policy reform by government and the creation of new markets for technology that addresses water conservation issues. In this regard, other innovation drivers such as knowledge intensity (ID-1) and knowledge generation, transfer and integration (ID-3), will combine with environmental dynamics to create the conditions for innovation. Often increasing awareness will result in regulatory reforms and potentially increased financial burdens for private enterprises. Innovative practices that reduce resource inputs and outputs can only benefit such organisations.

The environmental management industry, a key knowledge intensive business service, is growing rapidly and is seen as a critical enabling sector for mainstream industry to build internationally competitive businesses. The industry is enhanced by the strong research base and connectivity with RTOs (e.g. CSIRO and the CRCs). Latest estimates indicate that the Australian environmental protection market is worth some 16 billion per annum employing 146,000 people in some 5700 businesses. The industry is growing at 3% per annum and is accessing a global industry market valued at $1000 billion\(^{23}\). In terms of regional development, the environmental management industry is both a source of innovation for public and private firms and a source of employment. Outcomes can result in significant economic savings, efficient energy and resource use, lower waste management costs, lower regulatory burden and occupational health costs (Geiser & Greiner 2001). In addition sustainability innovation programs can build partnerships between community groups, regulators, industry and RTOs and spin off the social capital that is required for economic growth.

An analysis of all environmental dynamics and drivers within a given space is beyond this study. However the exploratory indicators below attempt to examine the role of environmental dynamics in an innovation context and contribute to the policy debate. They include:

a) Waste Generation;
b) Recycling;
c) Commercial water use;
d) Residential water use;
e) Total water use;
f) Greenhouse emissions;
g) Pollution licences & breaches;
h) Local Government Expenditure in Environmental Management.

Other indicators to be explored in future research include improved regulatory effectiveness measures, community attitudes, sustainability R&D and investment, greenhouse emissions by sector, renewable energy use, water conservation measures, species at risk, water quality, urban green space, bicycle ownership, persistent toxic pollutants, and contaminated / remediated lands.

2.6 Community Engagement

The emerging literature suggests that social capital and community engagement is an important factor in the development of regional innovation strategies (OECD, 2003). Social
capital, the building of trust and engagement within and between communities, despite being difficult to measure, is critical for promoting the social aspect of sustainability, and in fact building environmental and economic sustainability throughout a region.

This indicator refers to the capacity of industry and institutions interaction with the broader community. Traditionally this has been the domain of local governments and ‘industry’ was part of the community as a provider of jobs but not always as a ‘partner’ in the community development processes. Time constraints and limitations on available information restricted the collection of quantitative data to two available indicators of institutional community engagement:

a) Number of council funded community organisations;
b) Funding attached to these organisations.

Industry interactions are explored in the case studies. Future research to address social capital indicators at the local and regional levels is critical. Indicators could include participation rates, volunteering, and number / funding / types of community organisations.

2.7 Liveability

This indicator refers to the capacity of a city/region to offer spaces and opportunities for quality human behaviour. New debates are moving from the economic drivers of industry development as the important factor of regional growth to the development of places to live, play and learn.

Limited by time and resources constrains we have chosen the following life style facilities/services and socio-economic measures as indicators:

a) ABS Socio-economic index;
b) Mortgage stress;
c) Museums and libraries;
d) Recreational expenses per capita;
e) Community service expenses per capita;
f) 10-year population growth;
g) Crime index;
h) Unemployment;
i) National parks in LGA.

The list is exploratory and not exhaustive of what can indicate ‘liveability’ in a place. Other indicators that could be included in further research are health, affordable and public housing, design of buildings and assets, green streets, open spaces for community interaction, cycling and walking spaces, learning spaces, civic facilities, services to the elderly, services to children, services to the handicapped and spatial GIS information.

2.8 Accessibility

These indicators refer to the community mobility options, health access and education access within the region. In terms of driving regional innovation and sustainable development, accessibility indicators represent personal and community mobility, access to services and the ability to grow and expand. Classical issues such as transportation are part of this driver but also issues such as Internet usage that give access to latest specialised knowledge and connects the region with the global ‘community’. A consistent and regularly updated set of indicators is not available at the local government or regional level; however the issues are generally recognised as important ones for regional development and appear in 5-year census collections. Over time, related and linked sustainable development and innovation information may emerge.
This study attempts to address some of the issues in this area, however time and information constraints limited the study to the following measures:

- Internet use at home;
- Hospitals and Community medical facilities;
- GPs in LGA;
- Share of jobs taken by MACROC residents;
- Percentage of people who use cars to get to work;
- Percentage of people who use trains to get to work;
- Percentage of people who use buses to get to work.

Other indicators of accessibility that should be considered for future studies include broadband/unwired connections, transit corridors, the linkage of towns and suburbs to these transit corridors, the quality and attractiveness of the local transport system, how this system connects people to different places and how flexible it is to adapt to events and opportunities for community interaction.

### 2.9 Summary

The conceptual framework of the study identifies eight innovation ecosystem drivers for the knowledge intensity, environmental and social ecosystems interacting in a certain space. The following table presents the indicators chosen for analysis of the innovation drivers.

**Table 4: Innovation Drivers’ Indicators**

<table>
<thead>
<tr>
<th>Innovation Ecosystems</th>
<th>Drivers</th>
<th>Indicators</th>
</tr>
</thead>
</table>
| Knowledge Intensity   | 1- Industry knowledge intensity | - Percentage of employees in manufacturing;  
- Percentage of employees in knowledge intensive business services (KIBS);  
- Percentage of employees in cultural and recreational industries;  
- Percentage of employees in health. |
|                       | 2- Connectivity | - Number of business networks;  
- Number of industry clusters;  
- Number of development networks. |
|                       | 3- Knowledge generation, transfer and integration | - Number of Master and PhD students in the regions;  
- Proportion of science / engineering / IT based postgraduates;  
- Number of students from UWS cooperative programs working in industry;  
- Number of university – industry partnerships. |
|                       | 4- Entrepreneurship | - The mean number of business start-ups 1999-2004. |
| Environment           | 5- Environmental dynamics | - Waste Generation per capita;  
- Recycling per capita;  
- Commercial water use;  
- Residential water use;  
- Total water use;  
- Greenhouse gas emissions;  
- Pollution licences & breaches;  
Local Government Expenditure in Environment Management |
Over time, regularly reported, integrated and linked sustainable development and innovation information must emerge at the local and regional levels. This study attempts to address some of the issues involved in collecting indicators for regional sustainable innovation and related ecosystems. A lack of integrated data sets and suitable information has been identified as an ongoing problem, particular in the dimensions of connectivity, knowledge generation / transfer / integration, entrepreneurship, and community engagement. In addition, individual indicators within environmental dynamics (water use and greenhouse emissions), liveability (facilities and social capital), and accessibility (internet and broadband accessibility, health indicators, sustainable transport) are required to be harmonised and refined at local scales. Crossing all dimensions is the need for stakeholder participation and agreement of a regularly reported set of sustainable innovation measures that are linked to decision making (and decision makers) in the region. The above set, while limited by time and resource constraints, contributes to this important process.

<table>
<thead>
<tr>
<th>Innovation Ecosystems</th>
<th>Drivers</th>
<th>Indicators</th>
</tr>
</thead>
</table>
| Social                | 6- Community engagement | - Number of council funded community organisations;  
                        |                     | - Funding attached to these organisations. |
|                      | 7- Liveability       | - ABS Socio-economic index;  
                        |                     | - Mortgage stress;  
                        |                      | - Museums and libraries;  
                        |                      | - Recreational expenses per capita;  
                        |                      | - Community service expenses per capita;  
                        |                      | - 10-year population growth;  
                        |                      | - Crime index;  
                        |                      | - Unemployment;  
                        |                      | - National parks in LGA. |
|                      | 8- Accessibility     | - Internet use at home;  
                        |                     | - Hospitals and Community medical facilities;  
                        |                      | - GPs in LGA;  
                        |                      | - Share of available jobs in MACROC region;  
                        |                      | - Percentage of people who use cars to get to work;  
                        |                      | - Percentage of people who use trains to get to work;  
                        |                      | - Percentage of people who use buses to get to work. |
Despite the limitations of the innovation driver indicators in chapter 1, we have applied the Dashboard to examine its effectiveness in delivering improved information and analysis for decision makers. Future work will refine and expand the indicator set and the cases. Results in this section are discussed for each of the innovation drivers.

3.1 Industry Knowledge Intensity

The data for the Industry Knowledge Intensity indicators is presented below in Table 5 and the Dashboard analysis in Figure 5. The figures indicate employees working in the region.

Table 5: Industry Knowledge Intensity

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Employees Manufacturing 2001</th>
<th>Employees BFBS</th>
<th>Employees health</th>
<th>Employees cultural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Journey to work 2001</td>
<td>Journey to work 2001</td>
<td>Journey to work 2001</td>
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</tr>
<tr>
<td>Unit</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Wollondilly</td>
<td>13.4</td>
<td>5.2</td>
<td>5.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Camden</td>
<td>8.7</td>
<td>9.4</td>
<td>8.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>19.2</td>
<td>9.1</td>
<td>10.9</td>
<td>1.5</td>
</tr>
</tbody>
</table>


Figure 5: Dashboard for Industry Knowledge Intensity

Note: For interpretation of colours please refer to Fig 2 in methodology section (page 10).

Figure 5 presents a snapshot of the industry structure for the Macarthur region. In terms of informing policy, Campbelltown is ranked the highest for Industry Knowledge Intensity. Its overall index ranks as ‘good’.

---

24 Business Finances and Business Services
The index is a result of high ranks in employees in health, BFBS, and manufacturing— a likely feature of its high population. A key feature however is the lack of culturally based employees – a key link in innovative activity highlighted by Florida (2004). Camden’s results are quite interesting. Despite being ranked low in terms of manufacturing employees, it displayed high rankings for cultural, health and BFBS employees. This presents potential policy options for industry development in the regions, especially in the ‘creative class’ professions. Wollondilly displayed the most potential for promoting industry knowledge intensity. It ranked in the middle for manufacturing employees but lowest in the other indicators. This is likely due to the rural nature of the municipality with a small population.

The dashboard for this driver includes the percentage of manufacturing employees because manufacturing has been identified as one of the high innovative industries in Australia (Toner et al, 2004) and because BFBS employees indicates the knowledge intensive business services infrastructure for manufacturing innovation. In this way it is interesting to note the lowest level of BFBS employees in Wollondilly and a moderate level of manufacturing that potentially could benefit from a broader offer of knowledge intensive business services.

### 3.2 Connectivity

There is a clear need for improved quantitative and qualitative information on connectivity issues for regional innovation. During this study it was difficult to locate and collect indicator information on the number of business networks, industry clusters, and number of development networks. Table 6 displays the information collected for connectivity. The dashboard was not included in this analysis due to a lack of quantitative data for visualisation. However it is included in the final index. Issues relating to connectivity are further explored in the organisational case studies.

**Table 6: Connectivity Indicators**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Business networks</th>
<th>Industry Clusters</th>
<th>Development networks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of networks</td>
<td># clusters</td>
<td># dev networks</td>
</tr>
<tr>
<td>Wollondilly</td>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Camden</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>n/a</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: AEGIS interview data

Connectivity is regarded as a critical element in the knowledge economy (Amin & Cohendent 2004) and this study indicates that this is an area that requires attention by regional development organisations. *Programs to support the development of networking activities in this region would have a positive impact on its development.*
3.3 Knowledge Generation and Transfer

The knowledge intensity indicators of the region are presented in Table 7 and the Dashboard analysis in Figure 6.

Table 7: Knowledge Generation and Transfer Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Postgraduate qualifications in region</th>
<th>Science based Postgrads (science, eng, IT)</th>
<th>Number of Uni / Industry partnerships</th>
<th>Coop program students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>% (over 15 post school qual)</td>
<td>%</td>
<td>Partnerships / region</td>
<td># students</td>
</tr>
<tr>
<td>Wollondilly</td>
<td>1</td>
<td>25.8</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Camden</td>
<td>1.1</td>
<td>20.1</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>0.9</td>
<td>28.6</td>
<td>4</td>
<td>25</td>
</tr>
</tbody>
</table>

In terms of knowledge generation and transfer, Campbelltown ranked the highest in the index. The ‘good’ ranking of the municipality for Knowledge G&T would likely relate to the proximity of the University of Western Sydney campus in the area and the concentration of students and knowledge infrastructure. Interestingly, the proportion of over 15 year olds with postgraduate qualifications is the lowest in the Campbelltown region at 0.9%. However these proportions are comparable in the LGAs (Table 7) and contrasts with the Sydney average of 2.9% (Randolph and Holloway 2003). This could suggest that the MACROC region is falling behind the rest of Sydney in terms of its higher education profile. Despite the low proportions, Campbelltown still counts 1004 postgraduate students. Camden counts 368 and Wollondilly 264 postgraduates, with Campbelltown having 60% of the MACROC total (Randolph and Holloway 2003). Of the 1004 postgraduate students, 28.6% are of a science, IT or engineering degree. Despite high ranking in Uni / Industry partnerships, there is still a low overall number of partnerships (Table 7) in Campbelltown. Camden had mixed rankings across the indicators, but these results display that progress towards knowledge generation and transfer is occurring. Of the 368 postgraduate students in the region, approximately 20% were of a science, IT or engineering basis – significantly lower than Wollondilly and Campbelltown. Wollondilly displays the potential for knowledge generation and transfer development with a good stock of science based postgraduates, and the clear potential for the development of Uni / Industry partnerships and cooperative program students.
In fact, the indicator data highlights the opportunity for significant investment in University / Industry partnerships and cooperative programs across the Macarthur region.

These figures show Campbelltown can be considered as the knowledge hub in the region, drawing students and knowledge workers from across MACROC.

### 3.4 Entrepreneurship

As highlighted in Chapter 2, indicators of entrepreneurship were difficult to find within the time constraints of this project. As a result we were limited to the following indicators of business starts (Table 8). This research highlights the need to collect and disseminate quantitative indicator on entrepreneurship throughout the Macarthur region. With a single indicator the Dashboard is not presented but still contributes to the calculation of the overall index.

From the data it can be observed that Camden sustained the highest number of business start-ups across a 4-year mean in the region, followed closely by Campbelltown and more distant by Wollondilly.

Table 8: Business Register Start ups (1995-2003)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wollondilly</td>
<td>192</td>
<td>257</td>
<td>184</td>
<td>272</td>
<td>243.0</td>
<td>229.60</td>
</tr>
<tr>
<td>Camden</td>
<td>322</td>
<td>383</td>
<td>355</td>
<td>444</td>
<td>383.0</td>
<td>377.40</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>349</td>
<td>338</td>
<td>315</td>
<td>426</td>
<td>353.0</td>
<td>356.20</td>
</tr>
</tbody>
</table>

Figure 7: Business Starts 1999-2004 by LGA.
3.5 Environmental Dynamics

The Environmental Dynamics indicators and dashboard are presented in Table 9 and the Dashboard analysis in Figure 8 below.

Table 9: Environmental Dynamics Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Waste generation</th>
<th>Recycling</th>
<th>Greenhouse emissions</th>
<th>Total H20 use</th>
<th>Commercial industrial water use</th>
<th>Water residential</th>
<th>Pollution licences / breaches</th>
<th>EM and health expend per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>kg Per capita</td>
<td>kg/capita per annum</td>
<td>tCO2-e per household</td>
<td>mL/annum</td>
<td>kl/property/annum</td>
<td>kl/property/annum</td>
<td>%</td>
<td>$ per capita</td>
</tr>
<tr>
<td>Wollondilly</td>
<td>218.8</td>
<td>59.9</td>
<td>14.8</td>
<td>4842</td>
<td>5291.0</td>
<td>82.0</td>
<td>21.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Camden</td>
<td>215.6</td>
<td>209.4</td>
<td>18.2</td>
<td>6385</td>
<td>255.0</td>
<td>87.0</td>
<td>10.0</td>
<td>15.1</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>201.6</td>
<td>186.8</td>
<td>23.9</td>
<td>17034</td>
<td>398.0</td>
<td>77.0</td>
<td>42.0</td>
<td>11.3</td>
</tr>
</tbody>
</table>

Figure 8: Environmental Dynamics Dashboard

The collection of environmental indicators across the Macarthur region was a complex task, due to the diverse sources of data across jurisdictions and the short time frame of the research. The indicators reveal a series of opportunities for innovation, and serve to inform practitioners of the nature of the environmental dynamics within the region. The indicators are based on several environmental issues that are driving policy reform and decision-making. Future research may investigate additional process indicators that deal with the uptake of environment related innovative activity by organisations and firms and sectoral responses to resource efficiency. This issue is specifically dealt with in the interview results.

26. Waste per capita was seen as a more effective policy indicator than total waste production, based on the NSW Department of Local Government reports on waste per capita for local government areas. Per capita waste measures are tied to waste reduction programs that focus on individual actions. Campbelltown has the lowest per capita indicator, but due to population size, produced over 30 million tonnes of waste in 2002. Camden produces 10.3 million tonnes and Wollondilly 8.5 million tonnes (DLG 2003).
Camden is ranked the highest under the environmental issue index. Looking at the indicators, Camden ranked the highest in environmental expenditure per capita, had the least amount of pollution licence breaches, and a relatively high level of community recycling. Commercial and industrial water use per property was relatively low, as was the total water use of the region. Greenhouse gas emissions per household were fair, ranking in the middle of the 3 regions. Opportunities for innovation lie in the residential use of water and residential waste.

Both Wollondilly and Campbelltown were ranked at similar levels with the index – a ranking of average. However the rankings were obtained on the basis of different indicator results as seen in Figure 8. In Wollondilly, waste, recycling and commercial / industrial water use was the key environmental issues presenting opportunities for innovation and reform. Interestingly, Wollondilly had the least overall water use for the municipality, but the highest commercial industrial water use out of all the regions. This suggests that industrial water use occupies a significant proportion of the community water, and is based on heavy water users such as agro-industry. The opportunities for water related innovation are clear in this area.

In Campbelltown, greenhouse gas emissions, total water use, and pollution licence regulation present opportunities for innovation. Interestingly, despite residential and commercial / industrial water use being ranked at high levels, total water use was high at 17000 mL per annum – a likely product of the high population levels within the municipality. Waste and recycling in Campbelltown were ranked at good levels, with the municipality producing the least amount of waste and a relatively high level of recycling.

Clearly improved indicators are required to make detailed and accurate assessments of environmental dynamics within the study area. However, what the dashboard displays is that there are opportunities for environmental related innovation in the Macarthur region. A message from the Dashboard suggests that the issues facing each region are heterogeneous and a ‘one size fits all’ approach may not necessarily be the most effective way to address environmental innovation activities. This may be particularly relevant when resourcing issues call for priorities to be established. For example, according to the Dashboard, Wollondilly could potentially focus upon waste management issues and commercial/industrial and residential water conservation.

3.6 Community Engagement

The collection of accurate indicators to describe social capital and community engagement is at an early stage. Parameters to measure social capital are not well defined and are patchy across all jurisdictions. It is a priority of future research to address these information gaps, in collaboration with organisations and agencies that are moving forward in this area.\(^{27}\)

In the context of time constraints and limitations on available information we restricted the collection to two proxy indicators in Table 10. Wollondilly is ranked the highest in terms of the number and funding of community organisations.

\(^{27}\) For example the Australian Bureau of Statistics is beginning to develop social capital indicators at the Commonwealth and State level.
Table 10: Community Engagement

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Number of council funded community orgs (org/LGA)</th>
<th>Community org funding ($/LGA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>AEGIS Survey 2004</td>
<td>Annual Reports 2002/03</td>
</tr>
<tr>
<td>Wollondilly</td>
<td>56.0</td>
<td>42000.0</td>
</tr>
<tr>
<td>Camden</td>
<td>17.0</td>
<td>25724.0</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>16.0</td>
<td>19450.0</td>
</tr>
</tbody>
</table>

Source: Local Government Annual Reports 2003 and AEGIS Survey 2004

Figure 9: Community Engagement Dashboard

3.7 Liveability

The pilot indicators that were selected to examine liveability are presented in Table 11 and in the Dashboard format in Figure 10.

Table 11: Liveability Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mortgage stress</th>
<th>Museums / libraries</th>
<th>Socio-economic index</th>
<th>Crime</th>
<th>Recreation S</th>
<th>Community S</th>
<th>Pop. Growth</th>
<th>Unemploy’t</th>
<th>Nat. Parks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>Mortgage stress</td>
<td>Number of museums / libraries</td>
<td>ABS socio-economic index</td>
<td>Crimes in LGA</td>
<td>recreational expenses</td>
<td>10 year pop growth</td>
<td>Unemployment</td>
<td>National parks in lga</td>
<td></td>
</tr>
<tr>
<td>Wollondilly</td>
<td>38.80</td>
<td>4.00</td>
<td>1003.10</td>
<td>2201.00</td>
<td>44.70</td>
<td>34.80</td>
<td>2.01</td>
<td>4.60</td>
<td>58.50</td>
</tr>
<tr>
<td>Camden</td>
<td>41.10</td>
<td>9.00</td>
<td>1042.90</td>
<td>2344.00</td>
<td>51.70</td>
<td>27.30</td>
<td>6.24</td>
<td>3.60</td>
<td>16.70</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>36.90</td>
<td>8.00</td>
<td>969.50</td>
<td>5155.00</td>
<td>49.40</td>
<td>57.80</td>
<td>0.25</td>
<td>10.20</td>
<td>1.60</td>
</tr>
</tbody>
</table>

28. Note that the Australian average for the socio-economic index in 2001 is 994 (ABS 2001).
Liveability refers to the capacity of a city/region to offer spaces and opportunities for human behaviour that enhances the experience of life. New debates are moving from the economic drivers of industry development as the important factor of regional growth to the development of places to live, play and learn. This ties in with the discussion by Florida of the ‘creative class’ and developing a different view of what factors influence spatial development. The key to success according to Florida is to develop a world-class people climate and a strategy to attract and retain creative individuals (Florida 2004).

Liveability is a highly subjective topic, and consequently, it is quite difficult to develop quantitative indicators for this driver. A community’s view of liveability may be completely different to another. Among the many factors that influence liveability, this study has selected nine proxy indicators. The function of the Dashboard in this context is to promote discussion on what liveability actually means. We accept that liveability is a complex topic not easily approached by proxy indicators.

The Dashboard analysis highlights different stories. Camden ranked high on the index, resulting from low unemployment, low crime, and a high socio-economic index, facilities and population growth. We have interpreted population growth as a positive factor because in medium/high-density environments the infrastructures for knowledge economies are likely to develop. However when high population density is combined with poor infrastructure, a lack of sustainability can result. Camden ranked the lowest for mortgage stress but examination of the figures in Table 11 display a close range. Wollondilly was ranked next according to the index and benefited from relatively low crime, low unemployment, an abundance of national parks and moderate population growth. Campbelltown was ranked the lowest in terms of the liveability index, a result of higher levels of crime and unemployment, low socio-economic index, population growth and national parks. Interestingly, Campbelltown was ranked the highest in community and recreational expenses.

On the basis of the Dashboard analysis it appears that Camden and to some extent Wollondilly are the growth regions for the regional population, attracted by its liveability features. However Campbelltown is providing a source of knowledge infrastructure and services for the regional populations.

29. The socio-economic index is produced by the Australian Bureau of Statistics under the regional profiles and contains a function that aggregates issues such as income, occupation, and education statistics.
30. Mortgage stress is incurred when 30% of income is spent on mortgage or rental payments (REF)
These figures, as highlighted by the dashboard, identify areas of attention for strategic and policy analysis for the three LGAs.

### 3.8 Accessibility

Accessibility refers to the physical mobility and health and technological reach within the region. Classical issues such as transportation are part of this driver but also new technologies such as broadband that give access to latest specialised knowledge. Time and information constraints enabled seven indicators to be collected for this driver, further research is needed to develop more indicators that accurately reflect the issue of accessibility within the region.

The pilot indicators that were selected to examine accessibility are presented in Table 12 and in the Dashboard format in Figure 11.

#### Table 12: Accessibility Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Internet use at home</th>
<th>Hospitals and health centres</th>
<th>GPs in LGA</th>
<th>Share of jobs for MACROC residents</th>
<th>Car to work</th>
<th>Train to work</th>
<th>Bus to work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>%</td>
<td># in LGA</td>
<td># in LGA</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Wollondilly</td>
<td>18.80</td>
<td>2.00</td>
<td>8.00</td>
<td>5.70</td>
<td>68.40</td>
<td>1.70</td>
<td>0.30</td>
</tr>
<tr>
<td>Camden</td>
<td>20.00</td>
<td>2.00</td>
<td>41.00</td>
<td>9.40</td>
<td>69.60</td>
<td>1.90</td>
<td>0.70</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>18.40</td>
<td>5.00</td>
<td>118.00</td>
<td>26.50</td>
<td>61.80</td>
<td>10.0</td>
<td>0.80</td>
</tr>
</tbody>
</table>

#### Figure 11: Accessibility Indicators Dashboard

In this case the Dashboard clearly highlights the role of Campbelltown as a source of medical, employment and transport accessibility (in combination with knowledge infrastructure in 3.4.3). Campbelltown had a significant proportion of the regional jobs (26.5%) over the other
LGAs. In addition, Campbelltown has the highest number of hospitals / community facilities and practicing general practitioners, clearly related to its population size. 10% of people living in Campbelltown used the train to get to work as opposed to 1.9% and 1.7% in Camden and Wollondilly respectively. This is supported by the figures showing less people used their cars to get to work in Campbelltown (61.8%) compared to Camden (69.6%) and Wollondilly (68.4%). As a proxy for public transportation issues, the dashboard and data suggest that public transport options are poor in Camden and Wollondilly, leading to high relative car use. It is evident that in a 3 case ranking the differences between indicators are pronounced. For the bus figures, all scores show low use (under 1%) with a close range (Table 10). However the Dashboard method ranked Campbelltown and Camden as good and Wollondilly as poor. A similar issue occurs with internet use at home (www). This highlights the need for more cases to be ranked in the Dashboard and the need to examine the data with the visualisations.

Campbelltown appears to be a regional accessibility hub drawing in the populations from the other LGAs. This has ramifications for innovation policy development, especially in the context of population growth occurring in Camden and Wollondilly. Increasing accessibility through the MACROC region to connect with the transportation / employment / medical / knowledge hub of Campbelltown is an area of attention for regional innovation development.

3.9 Conclusions

Regional Innovation Index

One advantage of using the Dashboard approach is the ability to create indices based on the differing policy components (such as environmental dynamics or Knowledge Generation and Transfer) and further aggregate them into an overall policy performance index. Keeping in mind that the Dashboard is only as effective as its component indicators, creating and displaying the indices allows for a examination of the key issues in a visual format across all areas of concern. This can be useful outcome for summary assessments for the media, the public or policy makers. If further detail is required (as is often the case) the indices can be ‘deconstructed’ down to the component indicators as performed in the above figures. The creation of an index actually results in the creation of new forms of information, but this information needs to be interpreted carefully in the context of the indicator measurements. Notwithstanding the ongoing debates over aggregation, the creation of an overall index serves the purpose of an additional analysis tool, examining system relationships, and providing condensed summary information for decision makers.

Below we have generated experimental Dashboard indices with the ID-MR. For each region all the policy fields can be simultaneously examined and an overall ‘Regional Innovation Index’ obtained. As identified in the methodology section ‘Dashboard Caveats’ this analysis was based on limited indicators and cases but aims to show the utility of the dashboard as a tool for identifying, prioritising and examining the complex mix of factors that can drive regional innovation. Figure 12 displays the innovation driver fields and the policy performance index for Campbelltown, Camden and Wollondilly. Below the indices are the overall scores for each LGA, out of 1000. The index is created by weighted averaging of the sub-indices (refer to the Dashboard methodology above for detail on the calculation of this figure). Weightings for the components are set equally in the absence of a consensus of the weighting protocols.
Figure 12: Regional Innovation Index for Campbelltown, Camden & Wollondilly

On the basis of the relative rankings and indices, the overall ‘Regional Innovation Index’ highlights the diversity of issues that can contribute to regional innovation. Noting the index scores, Campbelltown and Camden obtain similar results and higher ranks (570, 567) over Wollondilly (365). It is interesting to note that the high ranks obtained by Campbelltown and Camden have been obtained from different sub-index results. This leads to the observation that regional innovation drivers originate from many sources and that the keys to a successfully innovative region can be found across several disciplines. Despite the underlying limits of the indicators and 3 case studies, this approach is inherently useful for stimulating policy debate on priorities for developing innovative regions. Use of the Dashboard did result in being able to build up a picture of the issues that are faced in developing and implementing regional innovation strategies.

Campbelltown obtains a high ranking for the innovation drivers suggesting that it is well placed for contributing to regional innovation. The dashboard displays the key advantages of the region are in knowledge generation, industry knowledge intensity, entrepreneurship and accessibility – key components of innovative regions. This highlights the role of Campbelltown as a regional hub of activity for education, knowledge and accessibility to services, jobs and mobility – often drawing upon the populations of Camden, Wollondilly and the surrounding LGAs. The dashboard results highlight one of the key problems with generating an index – important information can be lost in the aggregation process. Fortunately the dashboard clearly shows the underlying sub-indices, and in the case of Campbelltown, areas of policy attention include liveability issues and community engagement with some attention also given to environmental dynamics. In particular, liveability issues can relate to attracting the ‘creative class’ and further stimulating creative and innovative regions.

Camden was ranked in a similarly high position but for quite different reasons. Camden ranked high in the fields of liveability, environmental dynamics, entrepreneurship and industry knowledge intensity. This pattern suggests that Camden has significant ‘quality of life’ features that make it an attractive place to live, evidenced by the liveability population growth figures in Table 11 above. Camden also has many new businesses starting up and is strong in industry knowledge intensity. According to the dashboard result, Camden should focus on accessibility issues, knowledge generation and transfer and community engagement.
to drive further regional innovation. Accessibility is a particularly important issue for the region, especially in the context of public transport and mobility.

Wollondilly has the most to gain from developing drivers of innovation. On the basis of the indicator set it ranks 3rd overall in the regional innovation index. In the fields of connectivity and community engagement Wollondilly performed well, but these are fields where data was scarce or difficult to obtain. To develop a increasingly innovation intensive region, Wollondilly needs to increase accessibility options, boost industry knowledge intensity, and knowledge generation and transfer.

The use of the dashboard

The Dashboard is useful for examining different policy outcomes and scenarios that relate to the development of innovative regions. The means of visualisation of indicators adds a new dimension to analysis and can encourage debate and understanding of the inter-linkages between innovation drivers. Our observations on using the dashboard include:

• **Visual tool is useful for presenting heterogenous indicators but complimented by the tabled data.** The dashboard ‘roses’ allow for effective communication of ranks within the dataset, and allow for the rapid assimilation of the results across the data range. This ‘snapshot’ approach is useful for policy discussion and stakeholder involvement. However, our experience in analysing the dashboard results shows that having the quantitative data available is also very useful, especially for specific issues and measurements. They are complimentary approaches that together provide for an effective analysis.

• **Highlighted the need for improved data systems, collection and information for regional innovation.** Using the dashboard and questioning some of the assumptions and results has highlighted the need for improved data and indicators for regional innovation drivers in MACROC and Western Sydney. In particular improved information was need in the fields of Connectivity, Knowledge Generation and Transfer, Entrepreneurship, Connectivity, and Community Engagement. In addition specific indicators that relate to innovation need to be developed for Environmental Dynamics, Accessibility and Liveability.

• **Analysis is limited by 3 cases.** The dashboard model works primarily by ranking indicators and indices relative to a number of case studies. With only three case studies, relative rankings have a narrow range and can distort the results between indicators. With the dashboard methodology, in any series of indicators the highest is given 1000 points (green), the lowest 0 (red) and the rest of the scores interpolated. With three cases, even indicators that are closely grouped can appear distorted in the visualisation. The solution here is to increase the number of case studies to reflect a better range of indicators. Future work should examine a number of LGAs, for example, all the LGAs in greater western Sydney, the Sydney metropolitan region or NSW. More cases will also allow for improved analysis and comparison of regional innovation driver differences and relative performance.
Examining policy fields (ID-PMR) across each region and overall performance / index for each region is useful and innovative. Despite the debates over constructing and using aggregate indices, examining each policy field individually across each region and creating an index allows for informed debate over the linkages and drivers for local and regional innovation. Examining different weights within the fields and the indices is another level of analysis that needs agreement and development. Encouraging informed debate and decision making is a positive outcome that is at the core of the Dashboard. Improved indicators and more cases will reflect increasingly accurate analysis. The Dashboard used in this research was an initial approach with limited information but displayed the usefulness of the approach for policy discussion.

What is the ideal scale for analysis – local government area or regional? This study raises questions that relate to the appropriate scale for regional innovation analysis. The Dashboard analysis focuses upon the LGA, the level at which disaggregated statistics are generally available across a range of policy fields. The local scale allowed for LGA relevant innovation issues to be examined. However several indicators revealed that policy issues were relevant at the MACROC regional scale, for example, Campbelltown acting as a source of accessibility and knowledge generation. It is clear that many innovation driver issues operate at the regional scale, future research must take this into account and compare regional performance. However, the local scale is critical for setting innovation policies including environmental management, knowledge generation and employment. The dashboard (and an appropriate set of indicators) should therefore aim to integrate local and regional scale analysis.

Horizontal analysis versus vertical analysis. The use of the dashboard also raises questions about the use of horizontal analysis of quantitative data in combination with vertical, in-depth analysis of particular areas of further investigation. The use of quantitative data and the dashboard analysis provides an useful broad horizontal picture of some of the features of the area of analysis but insufficient to understand where the needs are for firms and organisations to build their innovative capabilities and where the gaps in current policy programs and policies are to assist organisations in pursuing innovation. Where the dashboard provided a horizontal analysis of the innovation drivers, case studies of firms and organisations provide a more vertical analysis in some of the areas of policy attention indicated by the dashboard. The study is conclusive in that the use of a combined methodology (quantitative and qualitative) is needed for the analysis of regional innovation systems, as these methodologies alone do not provide an analysis at the level of complexity required.
4. Key Findings from the case studies

The dashboard analysis highlighted some areas of policy and strategic attention to achieve regional innovation. The case studies provide an in-depth analysis of the role of innovation drivers from a firm/organisational perspective. The information provided by the case studies analysis address issues of public-private partnerships (PPP) to achieve regional innovation. The importance of PPP for achieving sustainable communities is addressed by the Baton Forum and is the theme of a national conference focusing on working partnerships for sustainability. A first step in designing successful PPP for regional innovation is to understand the role firms and organisations foresee for proposed innovation drivers. Results from this analysis are discussed in this section.

4.1 The understanding of innovation drivers

The majority of the case studies made reference to three highly important drivers of innovation: knowledge intensity, environmental dynamics and accessibility. Connectivity, entrepreneurship and community engagement were considered of medium importance and knowledge generation, transfer and integration and liveability were considered of low importance (see Table 13).

Table 13: Innovation Drivers in the Macarthur Region

<table>
<thead>
<tr>
<th>Innovation Drivers</th>
<th>High Importance</th>
<th>Medium importance</th>
<th>Low importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge Intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Connectivity (Network)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Knowledge Generation, Transfer and Integration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Entrepreneurship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Environmental Dynamics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Community Engagements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Liveability (life-style)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Accessibility (mobility and choices)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)

32. Knowledge Intensity: activities and inputs requiring intelligence and high application of knowledge and skills.
33. Connectivity: the importance of interaction, activities and engagement to networks, other companies and research institutions etc.
34. Knowledge Generation, Transfer and Integration: capacity to produce knowledge inputs that can be transferred and then integrated in other organizations.
35. Entrepreneurship: capacity of start up and organisations commercialising products or and services.
36. Environmental Dynamics: Environmental factors contributing to the development of liveable spaces, growth in knowledge economy and high technology jobs, and the conservation of natural capital in the face of resource scarcity and degradation (e.g. pollution treatment technology)
37. Community Engagement: capacity to interact with the broader community (e.g. interaction with community organisations).
38. Liveability: capacity of a city or region to provide spaces for human behaviour impaction on life.
39. Accessibility: accessibility and mobility within the region (e.g. transport or mobile communication).
In relation to knowledge intensity as a driver of innovation, both manufacturing and service companies cited this as a critical factor in driving business and keeping up with innovation goals. In the case of manufacturing companies, knowledge is needed to run the complex machines and to allow for improvements in the production process. One company highlighted how they travel the world to acquire new manufacturing technologies – in their eyes, a key to success. In the services industry, industry knowledge is critical to their operations. One of these companies admitted one way in which they kept up with the industry was to maintain contact with other companies within the same sector, as well as industry associations and through the use of the Internet.

Environmental dynamics was rated highly followed by knowledge intensity. Especially in the Wollondilly area, environmental issues are critical because the region has Sydney’s water catchment. A public organisation noted how ‘we have greater responsibilities because we are looking after everyone’s water. This issue has a strong impact on agriculture use, housing, growth, etc.’ A company specialising in carpet products considered environmental dynamics as a competitive advantage pivotal for its business. They stated; ‘we are over the stage that it is only a cost, it is driving our business success. It is a good business model for us. It drives best practices and continual innovative behaviour at the operational level.’ This driver was originally forced upon the company by the expectations of clients, society and regulations. Another company mentioned how environmental issues are an emergent trend when only 10 years ago it was accorded low importance.

Accessibility was ranked third in importance as an innovation driver. One organisation noted how accessibility is important to contact more people, more quickly and more easily - ‘it is a key to retain people, as well as bringing other people in’. Accessibility usually related to transportation but also included broadband facilities and access across the region. Access to the Sydney area was important but so was access to other centres such as Wollongong and Port Kembla. This was especially so for areas like Wollondilly.

Several companies also noted community engagement as another important driver of innovation. In one case it was compulsory for all staff to be involved in community organisations. Therefore it was seen as more of a driver of day-to-day business and close to the core competencies than a one-off activity. Another company referred to important links made through charitable organisations that helped widen their access to a larger network of professionals and companies. One large company incisively noted that ‘10 years ago we did not care about community engagement but during the last few years it has become a key part of our sustainability agenda. We are expending more and more time on engaging with the local community’. Another company mentioned how they find themselves in ‘a small town mentality, everybody talks to everybody else and our firm reputation is extremely important’.

Liveability is considered important for quality of life but it was not considered of high importance for innovation.
4.2 The role of knowledge intensity

In order to understand the level of knowledge intensity of participant organisations, companies were asked about their knowledge intensive service activities (KISA) – of their existence and their importance to the innovative process. KISA is defined as the production and integration of service activities (technical and non-technical) undertaken by firms in manufacturing or service sectors, in combination with manufactured outputs or as stand-alone services. KISA can be provided by private enterprises or public sector organisations. Typical examples include: Research and Development (R&D) services, management consulting, Information Technology (IT) services, human resource management services, legal services such as Intellectual Property (IP)-related issues, accounting, financing, and marketing services (OECD 2003).

The role of KISA is critical for the firm innovation process as these activities carry specific knowledge and expertise provided in-house or with external knowledge providers. KISA have an innovation effect both in the ‘receiver’ firm and in the ‘producer’ firm. These effects go beyond the firm to other different organisations which may be part of the learning and network space of the firm. For a detailed review of KISA in innovation see Martinez and Miles (forthcoming).

Table 14: Use of knowledge intensive service activities (KISA)

<table>
<thead>
<tr>
<th>Knowledge Intensive Service Activities</th>
<th>High Importance</th>
<th>Medium Importance</th>
<th>Low importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IT Consulting Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Marketing Related Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Research and Development Activities 40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IP Related (legal and accounting) Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Management Consultancy Related to Organisational Aspects of Product Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Engineering Consultancy Related to Product and Process Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Employment Agency (supply of specific personnel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Strategic and Business Plan Development related activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Environmental Impact Consulting Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Community Consultancy Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. New Product/Service Development Consultancy Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Relationship building (federal, state, regional local) for policy awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)

The activities ranked highly important were IT consulting activities, Marketing related activities, and Research and Development activities. Other activities that were considered of medium importance were IP related (legal and accountancy and intellectual property), strategic and business plan development, community consultancy, new product/service development and relationship building for policy awareness.

40. Includes data collection
Despite environmental dynamics being considered highly important for innovation, the use of environmental impact consulting activities was low. This result might be industry related and exacerbated by the small number of case studies. MACROC councils are acknowledged as promoting strong environmental regulations and innovation which gives an environmental footprint to the area. For example one successful KISA initiated by Councils has been the ‘cleaner production program’ (part of an state funded education program), aimed at providing training for councils and firms. Camden Council, for instance, has been named as having very progressive pro-environment policies regulating the building industry although associated consultancy might be outsourced to service providers outside the MACROC area.

The activities considered of high importance were also regarded critical for the capabilities of the firms and instrumental in their innovation process. When these organisations were asked where they source services that contribute to their KISA, the majority response showed a heavy reliance on in-house services. In many cases these in house services were also run in conjunction with the private sector (see Table 15).

Table 15: Sources of Knowledge Intensive Services

<table>
<thead>
<tr>
<th>KNOWLEDGE INTENSIVE SERVICES</th>
<th>In House</th>
<th>Local or Regional Organisations</th>
<th>State / Federal Governments</th>
<th>Universities / RTOs CSIRO</th>
<th>Private Sector Businesses (KIBS)</th>
<th>Industry Associations / Networks</th>
<th>Other (international)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IT Consulting Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Marketing Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Research and Development Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IP Related (legal and accounting) Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Management Consultancy Services Related to Organisational Aspects of Product Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Engineering Consultancy Services Related to Product and Process Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Employment Agency (Supply of Specific Personnel) Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Strategic and Business Plan Development Advice / Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Environmental Impact Consulting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. New product/service development Consultancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)
Research and Development (R & D) was noted as having input from international organisations more than from Knowledge Intensive Business Services (KIBS). The majority of cases, IT consulting services, strategic and business plan development services, and new product/service development services were mostly handled in-house. It was noted that ‘when the expertise is critical to the company it is better to have the expertise in-house’.

These cases would source external providers through networks and industry associations. Sometimes it is after recommendations on practices or through existing providers of services. Sometimes the experts are selected by reputation or after visiting their facilities. As one company noted ‘you can get a reasonable understanding of how they run their businesses just by looking at their business location’. It is notable that knowledge is not drawn in a greater extent from local organisations, government departments or universities/RTOs.

The local area is preferred when sourcing experts. For one company this was important for the business as locals are deemed to have more local knowledge. For another company, choosing locals is also a question of regional development and they will choose locals ‘even if the price is higher than in the city’. One organisation noted that sourcing locals has its disadvantages as some local businesses do not have consulting sales capacities, they have very poor level of relationships for product selling, they have a bad approach to business and no selling skills. Some of the service providers are amateurs without marketing skills or selling skills.

The mix and match of internal and external expertise is managed in different ways. One company has a ‘knowledge champion’ that ‘grabs’ the knowledge. Then a cross-functional ‘breakthrough team’ is formed to interact with the champion and resolve the problem. In other companies the integration is done by project managers via face-to-face meetings with consultants or other organisations. A firm mentioned that the mix and match of expertise is done by senior officers for strategic reasons, because they are the focal point for new knowledge (attending networking functions, conferences, associations). This information will then be passed on to the organisation, be strategically implemented, project based or disseminated during training sessions. In several companies integration of knowledge is done through training programs, daily staff meetings, manuals provided by suppliers of machinery or procedures manuals that act as a knowledge system for the companies. For one agricultural company, integration is a function of ‘on-the-job’ training. The managers train employees over time, and the knowledge is spread out on a daily basis. Another manufacturing company has over the last three years allocated a person to work full-time on knowledge management issues in order to map the competencies within the company – identifying the person/s who possess them. In this same company a ‘knowledge department’ was created to integrate all acquired knowledge, create a database and then supply knowledge in-house when needed.

The size of the organisation seems to influence a great deal how different sources of expertise are integrated. In small or micro companies the owner plays a central role in this process. This result is consistent with other KISA studies in the Software and Tourism industries (AEGIS 2004). The case study organisations were asked where they sell their knowledge intensive services (KIS). Most KIS were sold locally and nationally. Access to international markets were mentioned only within the context of strategic and business plan development consultancy (see Table 16).
Table 16: KIS market

<table>
<thead>
<tr>
<th>Knowledge Intensive Services</th>
<th>Local</th>
<th>Regional</th>
<th>National</th>
<th>Internat</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Related (legal and accounting)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Consultancy Related to Product and Process Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic and Business Plan Development consultancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Impact Consulting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Product/Service Development Consultancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)

The frequency of informal agreements was bigger for innovation purposes than formal agreements (see Table 17). Formal agreements were related to KIBS, public institutions and industry associations while informal agreements involved other organisations within the network space of the firm. These results are also consistent with other AEGIS studies on KISA on software firms where findings highlight the important role of informal knowledge transactions for innovation purposes (AEGIS 2004).

Table 17: Cooperation partners

<table>
<thead>
<tr>
<th>Partners</th>
<th>Formal agreements</th>
<th>Informal agreements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Other firms within the same industrial group (Network)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Competitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Customers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Consultancy Firms (KIBS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Public Institutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Universities and Colleges (RTOs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Industry Associations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Regional Organisations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)

The case study organisations would systematically use formal and informal methods of intellectual property protection within the exception of patents (see Table 18).
Table 18: IP Protection

<table>
<thead>
<tr>
<th>Methods</th>
<th>Sometimes</th>
<th>Systematically</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Trademarks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Copyright</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Patents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Secrecy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Complexity of design</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)

In summary, the average use of KISA by MACROC companies is below what has been observed in knowledge intensive sectors such as software and mining technology services but similar to sectors such as Tourism (see AEGIS KISA forthcoming reports)\(^{41}\) The relative use of KISA might be associated to a lack of providers in the area as the companies stressed their preference of sourcing knowledge intensive services from the local area. Most KISA were provided in-house by the companies themselves (a trend we also see in other KISA studies) but the partners in innovation come from an extended network of competitors, customers, RTOs and regional organisations which indicates that informal collaborative arrangements and connectivity are important areas to pursue for innovation in these firms. The activities requiring a higher frequency of expertise are in the areas of IT consulting, marketing and research and development. Both employees and private business (KIBS) were able to provide services related to the areas above and have good prospects to contribute to innovation in these firms.

Intellectual Property related activities were considered of medium importance although most IP methods are systematically applied by these organisations. IPRs is one of the most important areas of development in the knowledge economy and providers of knowledge services in this field will greatly impact in regional firms and regional innovation as a whole.

Overall, KISA is critical for innovation in firms in both manufacturing and services sectors. It is the therefore important to increase the availability of KISA-related services to enhance the innovation system within the MACROC region. To address this issue more related KIBS in the region will provide the knowledge infrastructure needed to assist present and future needs. This can be achieved through increasing awareness of the role of KISA among firms. This will increase the demand for expertise and therefore stimulate the development of KIBS in the region. It is therefore recommended that awareness activities of the role of KISA in firm innovation be undertaken through networking activities that will also have the effect of increasing connectivity in the region.

4.3 The role of environmental dynamics

In the conceptual framework we argued that environmental dynamics are a critical factor for supporting and enabling innovation and regional development. Our thesis is based on the premise that environmental systems co-exist and interact with knowledge intensity dynamics and social
Environmental dynamics are shaping the innovation agenda as shown in the ID-MR (see chapter 2, conceptual framework). The role of environmental dynamics is particularly acute in the manufacturing and service sectors, and is playing an integrating role between these sectors as knowledge is created and applied to reduce environmental impact. Manufacturing is increasingly contemplating and implementing cleaner production processes. Changes in awareness, increased regulation, and market drivers are allowing increasingly ‘green’ technologies and practices to filter into the manufacturing sector and demonstrate positive environmental outcomes and investment decisions. Geisner and Greiner (2001) note these technologies, after short payback periods, have demonstrated economic savings from efficient resource and energy use, lower waste costs, lower regulatory burden, and lower occupation health costs. However, the awareness and adoption of environmental innovations, while on the increase, is currently uncoordinated and poorly resourced. There is a critical role for knowledge providers and innovators to play in developing implementation strategies.

In terms of regions as a whole, environmental dynamics is a recognised critical driver of regional development. In recent times the concept of regional development has expanded to include a balance of environmental, social and economic outcomes. Resource conservation, liveable communities and ‘brain power’ have emerged as equal players with competitive and strong economies in the regional development equation. An example is the recent Metropolitan Strategy for Sydney discussion paper where environmental dynamics is highlighted as a key principle for regional development alongside urban growth, housing, employment, transport and infrastructure. Water is a critical issue for Sydney with demand outstripping long-term supply. The strategy notes that water consumption has tripled since 1950, and that for the past 5 years water use has exceeded the amount that can be sustainable provided over the long term. Innovation, as the harnessing and implementation of new ideas and technologies has an obvious role to play in delivering sustainable regional development, the creation of new industries and employment, and moving towards resource efficiency in the face of a rapidly expanding population.

The innovation drivers explored are primarily awareness based. In the context of resources being directed at improving regional development, we need to understand the critical issues that are driving innovation, what the issues are based on and how they can be harnessed to improve regional outcomes. The case studies capture important qualitative and empirical information about the organisational perception of environmental dynamics as it relates to innovation and regional development. The issues arising out of the case study interviews were grouped into 3 inter-related themes:

- Issue 1- Environmental reporting in organisations;
- Issue 2- Environmental dynamics and business success, opportunities for innovative practices;
- Issue 3- External Partnerships, innovation products and outcomes.
These issues are explored in detail in this section.

### Table 19: Issue 1: Environmental reporting

<table>
<thead>
<tr>
<th>Case</th>
<th>Industry Sector</th>
<th>EMP42</th>
<th>TBL43</th>
<th>Other44</th>
<th>Other description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case A (3)</td>
<td>Public Organisation</td>
<td></td>
<td></td>
<td></td>
<td>Charter &amp; Organisational Mgt Plan</td>
</tr>
<tr>
<td>Case B (230)</td>
<td>Public Organisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case C (130)</td>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td>Formal performance system and detailed environmental metrics</td>
</tr>
<tr>
<td>Case D (78)</td>
<td>Legal Consulting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case E (150)</td>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td>Compliance reporting</td>
</tr>
<tr>
<td>Case F (23)</td>
<td>Manufacturing &amp; Engineering consultancy</td>
<td></td>
<td></td>
<td></td>
<td>Corporate reports contain some environmental info. Regulatory reports.</td>
</tr>
<tr>
<td>Case G (30)</td>
<td>Development consultancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case H (2)</td>
<td>Environmental consulting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case I (7)</td>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
<td>Management plan &amp; informal</td>
</tr>
<tr>
<td>Case J (45)</td>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
<td>Informal plan</td>
</tr>
<tr>
<td>Case K (92)</td>
<td>Manufacturing</td>
<td></td>
<td></td>
<td></td>
<td>Compliance reporting</td>
</tr>
<tr>
<td>Case L (40)</td>
<td>Real Estate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)  
Note: (...) = number of employees

**Issue 1** is a synthesis of questions relating to environmental reporting. Environmental reporting is a generic term that relates to Environmental Management Plans (EMPs), Triple Bottom Line (TBL) reporting, and other forms of reporting. EMPs are formal process based plans that relate to pollution control, waste reduction, and health and safety. EMPs are tied in with production processes and operational planning. Triple Bottom Line focuses upon a more strategic approach to reporting an organisations impact upon environmental, social and economic systems. TBL is inherently tied to corporate reporting and planning and setting medium to long-term strategies. ‘Other’ relates to the variety of informal approaches that organisations use to transmit information about operations and impacts to the community or relevant stakeholders.

Some interesting trends appear when examining the interview results. EMPs and other informal forms of reporting dominate the environmental reporting approaches. EMPs were focused on manufacturing organisations and 1 public organisation and related to reducing the impact of pollution, reducing waste, and reducing energy and water use. TBL was not a popular approach across the case studies and was limited to a few larger organisations. This could be attributed to the recent nature of this form of reporting and a lack of awareness about the benefits and methodologies of TBL. Most organisations were aware of the need for a form of environmental reporting but the more complex TBL with integrated socio-economic metrics was not on the organisational radar screen.

42. Environmental Management Plan  
43. Triple Bottom Line  
44. Other form – Corporate Social Responsibility, SoE, Community Reporting
However most organisations engaged in a form of formal or informal reporting such as compliance with regulations or company management plans. Two of the larger manufacturing firms performed comprehensive EMP, TBL and other forms of environmental reporting and were considered industry leaders in this area. It is interesting to note that the service based industries, despite lacking in environmental reporting likely due to a perception of minimal impacts, often assist in driving the change agenda for manufacturing firms. However, service based industries, at a regional level, do affect environmental dynamics through resource and energy use. Further cases across several sectors such as local government and NGOs would facilitate further understanding of the role of reporting.

### Table 20: Issue 2: Awareness, Business Benefits, and Opportunities

<table>
<thead>
<tr>
<th>Region</th>
<th>Industry Sector</th>
<th>Awareness</th>
<th>Business Success</th>
<th>Opportunities / Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case A (3)</td>
<td>Public Organisation</td>
<td>Yes – pollution, resources</td>
<td></td>
<td>Enormous opportunity</td>
</tr>
<tr>
<td>Case B (230)</td>
<td>Public Organisation</td>
<td>Yes</td>
<td></td>
<td>Both</td>
</tr>
<tr>
<td>Case C (130)</td>
<td>Manufacturing</td>
<td>Yes - CEO</td>
<td></td>
<td>Opportunity – new market opportunities</td>
</tr>
<tr>
<td>Case D (78)</td>
<td>Legal Consulting</td>
<td>Yes – public, penalties</td>
<td></td>
<td>Opportunity - prosecutions</td>
</tr>
<tr>
<td>Case F (23)</td>
<td>Manufacturing &amp; Engineering consultancy</td>
<td>Yes</td>
<td></td>
<td>Opportunity – regulatory compliance</td>
</tr>
<tr>
<td>Case H (2)</td>
<td>Environmental consulting</td>
<td>Yes – business</td>
<td></td>
<td>Opportunity – creating business</td>
</tr>
<tr>
<td>Case I (7)</td>
<td>Agriculture</td>
<td>Yes – water</td>
<td></td>
<td>Not relevant</td>
</tr>
<tr>
<td>Case J (45)</td>
<td>Agriculture</td>
<td>Yes – chemical use</td>
<td></td>
<td>Minor opportunity. Our water mgt.</td>
</tr>
<tr>
<td>Case K (92)</td>
<td>Manufacturing</td>
<td>Yes – CEO driver</td>
<td></td>
<td>Both</td>
</tr>
<tr>
<td>Case L (40)</td>
<td>Real Estate</td>
<td>Yes</td>
<td></td>
<td>Both</td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)

**Issue 2** is a synthesis of questions that relate to awareness, business success and opportunities for organisations. In terms of regional innovation, linking environmental dynamics to awareness, business success and opportunity is critical for investigating the ‘innovation potential’ of regional organisations, if environmental related innovation is on the agenda, and what projects are being pursued by organisations across sectors.
The case studies reveal several potential trends. Awareness focussed on how sustainability has changed for the organisation over 5 years. All cases expressed a medium to high-level awareness of environmental dynamics. The variation lies in how the issues are interpreted and what drove the awareness. Public organisations were focused on resources and conservation, in manufacturing firms awareness was driven by eco efficiency issues such as water, energy use and waste and the related economic drivers. Interestingly the CEO was a pivotal point for creating awareness in the organisation. Other firms such as legal and consulting had awareness driven by the advent of increased regulations and business opportunities.

In terms of business success almost all the organisations considered that environmental dynamics was important for future success. This is an important consideration as translating environmental dynamics into business success is critical for developing innovative activity and contributing to regional development. The opportunities that are created from environmental dynamics was not as clear-cut. Certainly environmental dynamics was predominantly seen as an opportunity as opposed to a threat, but this opportunity was interpreted through the organisations core business. There was a perceived uncertainty about the specific opportunities that were available for organisations and therefore the cases focused on their core business.

The message from this issue is that organisations, public and private, have a high awareness of environmental dynamics and specifically relate it to the success of their businesses. However, there is an element of uncertainty and direction in terms of translating this awareness into innovations and commercial outcomes. A leadership role does exist for other successful organisations to transmit knowledge over how this can be achieved. Strategies and programs targeting connectivity of organisations and networking activities will facilitate the transfer of knowledge on environmental opportunities for innovation.

Table 21: Issue 3: External Partnerships, Innovation Products and Outcomes

<table>
<thead>
<tr>
<th>Region</th>
<th>Industry Sector</th>
<th>Partnerships</th>
<th>Innovation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Product</td>
</tr>
<tr>
<td>Case A (3)</td>
<td>Public Organisation</td>
<td>RTO45</td>
<td>No</td>
</tr>
<tr>
<td>Case B (230)</td>
<td>Public Organisation</td>
<td>Community &amp; Govt.</td>
<td>-</td>
</tr>
<tr>
<td>Case D (78)</td>
<td>Legal Consulting</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case E (150)</td>
<td>Manufacturing</td>
<td>Government</td>
<td>Yes – water and energy efficiency</td>
</tr>
<tr>
<td>Case F (23)</td>
<td>Manufacturing &amp; Engineering consultancy</td>
<td>Private orgs.</td>
<td>Yes – energy efficiency</td>
</tr>
<tr>
<td>Case G (30)</td>
<td>Development consultancy</td>
<td>Yes – core business</td>
<td>-</td>
</tr>
<tr>
<td>Case H (2)</td>
<td>Environmental consulting</td>
<td>Yes</td>
<td>Yes – software and tools</td>
</tr>
<tr>
<td>Case I (7)</td>
<td>Agriculture</td>
<td>No</td>
<td>Yes – water efficiency</td>
</tr>
<tr>
<td>Case J (45)</td>
<td>Agriculture</td>
<td>No</td>
<td>Yes – water efficiency</td>
</tr>
<tr>
<td>Case L (40)</td>
<td>Real Estate</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Source: AEGIS case studies interview data (2004)

45. Research and Technology Organisation e.g. CSIRO or a CRC
**Issue 3** looks at some of the partnerships and outcomes that are based on environmental dynamics and innovation and explores some of the means by which future innovative practices and regional development can occur. Despite some uncertainty in the ‘how’ several organisations are leading in terms of partnerships and outcomes, the data suggests that there are clear opportunities for collaboration, education, and cross-fertilisation of ideas and experiences over environmental dynamics.

In terms of partnerships, there was limited activity across the cases except for manufacturing and public organisation and this can be affected by the size of the manufacturing firms involved. A range of partnerships were developed by these organisations including RTOs, government, private and community partnerships. The interview data suggests that environmental partnerships are generally immature but their importance has been recognised by all organisations. In certain cases (cases C, G, K) partnerships are recognised as core business and lead to positive outcomes.

For outcomes, there were specific product innovations in manufacturing and agriculture that relate to resource efficiency. Specifically, manufacturing sectors had the most comprehensive and technical innovations for water, waste, pollution and energy reduction. Consulting firms had developed innovative software tools for environmental management. For process outcomes, manufacturing was leading with the development of process-based innovations – primarily information tools and management systems for monitoring and reducing environmental impact.

In summary, despite the small number of case studies across the region, the environmental dynamics interview results show a broad cross-section of reporting processes, attitudes and products and outcomes. In relation to environmental reporting, it is clear the process and management plans and informal methods dominate but strategic TBL / corporate style reporting needs to evolve. There is a case for the benefits of reporting to be articulated to the different sectors and cross learning encouraged. Regulatory reform would also be a potential option. In relation to the role of environmental dynamics I business success, the data highlights a core problem with developing environmental innovation – most organisations recognise that resource depletion and pollution is a signal of un-competitiveness but are unsure about the means of resolving these issues within the business context and resources constraints. There is a clear need for policy reform, education and incentives to translate this goodwill into action and innovation. In relation to partnerships for environmental innovation the data suggest areas for the way forward to operationalise environmental innovation, there is a clear-cut case for inter-firm and organisational collaboration to harmonise and develop approaches. In the analysed companies knowledge for environmental innovation is drawn from regional, national and international sources, sometimes linked to branch dependence of mother company overseas. It is recommended the promotion of networking activities where the role of environmental issues as a factor in innovation is discussed and where sharing of successful experiences is encouraged. Lobby of regulatory reforms and diffusion of specific programs to minimise environmental impact will also have a strong long-term impact on environmental innovation in the region.

### 4.4 The role of collaboration and social dynamics

Collaboration among industry-regional organisations is very limited in the area. Out of 12 cases only 4 to 5 collaborated with regional organisations. In addition only 5 collaborated with the University of Western Sydney (UWS). The organisations with high interaction did so with UWS, technical colleges, the Department of Planning and Natural Resources and various local chambers of commerce. The type of interaction is both formal and informal but with informal interactions predominating.
One organisation noted a big fragmentation in the region and how ‘wonderful it will be to have a collective mindset’. Most of the firms observed how linkages to other organisations in the region would bring further advantages to business by providing a useful network to learn from. Another company highlighted the possible benefits from a register of industry-focused practitioners (e.g. university practitioners and decision makers) would be very useful. This company noted how the different professionals in the region could meet on a project-by-project basis but not meet to interchange knowledge or discuss issues that affect industry and the region. In addition several other companies observed difficulties in dedicating more time and resources to link with the knowledge institutions in the region. Links with universities are appear not to be limited by the geographical boundaries. Many organisations had links with universities in Wollongong and Newcastle, using them as knowledge providers.

Collaboration and community engagement are considered increasingly important as drivers of innovation although the elements involved and their effects on firm innovation or in the regional innovation system as a whole are poorly understood. Respondents also indicated that accessibility issues (transport and broadband) were considered of high importance because this impacted on their connections with broader markets of goods and knowledge at the regional, national and international level.

Most respondents understood ‘community engagement’ to involve interaction with charitable organisations. Hence their role in this arena was primarily seen as ‘providers of funding’ than as partners in community development. Collaboration with regional organisations was limited to MACROC, TAFE, UWS, DIPNR and various local chambers of commerce. These collaborative relationships were not seen as regional development partnerships but as specific issues with regulatory frameworks where regulatory frameworks might be in place. Overall there was a lack of knowledge of what to collaborate about, with whom and for what purpose. This was despite of the fact that some organisations held industry or innovation awards and were more sensitive to the role of community engagement and social dynamics in general. For example, for one of the most innovative case studies (case E) the issue of community engagement was seen as strategic for their business development and a mandatory activity for certain employees. To address this issue and the lack of technological practical knowledge about how to engage with the community, this firm uses a KIBS to provide guidance. This lack of knowledge within these firms results in a perception than more time and resources are needed to achieve successful interaction. This could result in discouraging interaction as such an initiative could be perceived as being too difficult with limited company resources. The analysis of these case studies suggests that the ‘social dynamics ecosystem’ is oriented towards the immediate local community where the firms are located.

In summary, regional collaboration and social dynamics present the most challenging position and potential to contribute to regional innovation systems. The lack of understanding of elements involved in the social dynamics ecosystem and the lack of know-how of companies in relation to community engagement highlights an area for strategic and policy attention. The analysis of data suggest that the local level is the right level of intervention as the ‘community’ and ‘social’ space seems to be ‘local’ more than ‘regional’. It is therefore recommended that the councils of Wollondilly, Campbelltown and Camden work together with the firms and organisations in their LGA to reach a higher level of industry-community engagement and social collaboration that will add value to the regional innovation system as a whole.
4.5 Summary

In average the use of KISA by MACROC companies is below what has been observed in knowledge intensive sectors such as software and mining technology services but similar to sectors such as Tourism (see AEGIS KISA forthcoming reports). The relative use of KISA might be related to a lack of providers in the area as the companies stressed they prefer to sourcing knowledge intensive services from the local area. Most KISA were provided in-house (a trend that we also have seen in our other KISA studies) but the partners in innovation come from the extended network of competitors, customers, RTOs and regional organisations which indicates that informal collaborative arrangements and connectivity are important areas to pursue for innovation of these firms. The activities requiring a higher frequency of expertise are in the areas of IT consulting, marketing and research and development. Knowledge and innovation partners come from nearby regions, specially Wollongong.

Despite the small number of case studies across the region, the environmental dynamics interview results show a broad cross-section of reporting processes, attitudes and products and outcomes. In relation to environmental reporting, it is clear the process and management plans and informal methods dominate but strategic TBL / corporate style reporting needs to evolve. There is a case for the benefits of reporting to be articulated to the different sectors and cross learning encouraged. Regulatory reform would also be a potential option. In relation to the role of environmental dynamics and business success, the data highlights a core problem with developing environmental innovation – most organisations recognise that resource depletion and pollution is a signal of un-competitiveness but are unsure about the means of resolving these issues within the business context and resources constraints. There is a clear need for policy reform, education and incentives to translate this goodwill into action and innovation. In relation to partnerships for environmental innovation the data suggest areas for the way forward to operationalise environmental innovation, there is a clear-cut case for inter-firm and organisational collaboration to harmonise and develop approaches. In the analysed companies knowledge for environmental innovation is drawn from regional, national and international sources, sometimes linked to branch dependence of mother company overseas.

Regional collaboration and social dynamics present the most challenging position and potential to contribute to the regional innovation system. The lack of understanding of the elements involved in the social dynamics ecosystem and the lack of know-how of companies in relation to community engagement highlights an area for strategic and policy attention. The analysis of data suggest that the local level is the right level of intervention as the ‘community’ and ‘social’ space seems to be ‘local’ more than ‘regional’, state or national.
5. Conclusions

This study focuses on analysing innovation drivers of a peripheral metropolitan region in South-West Sydney. Specifically the study explores three Innovation Ecosystems (IE): knowledge intensive dynamics, environmental dynamics and social dynamics. The research questions investigated are:

- What innovation drivers are identified by firms/organisations as important for innovation and development?
- What knowledge intensive activities do these firms/organisations do?
- How important are environmental dynamics for innovation of these firms/organisations?
- How much collaboration is there between firms and regional organisations?

The analysis of a region in terms of ‘innovation ecosystems’ provides a different perspective of the areas of attention for policy development or the instruments that local and regional institutions can provide to the community to develop an ‘innovation-intensive region’. The applied framework is considered useful for understanding, analysing and building capacity for regional innovation and development. The study has limitations in relation to the innovation indicators used – more data is needed and more comparative examples. The study also is limited in the understanding of how the three ecosystems interact, and specially, more data is needed from community and regional organisations for a better understanding of the functions of the social innovation ecosystem. While the studied organisations relate environmental dynamics to knowledge intensity, social dynamics were more disconnected from the discussions and no clearly linked to socio-economic development or to business development apart from the ‘vision’ of some firms in relation to the importance of this ecosystem for the future.

The study uses a combined methodology. Where the dashboard provides a horizontal analysis of the innovation drivers, case studies of firms and organisations provide a more vertical analysis in some of the areas of policy attention indicated by the dashboard. The study is conclusive in that the use of a combined methodology (quantitative and qualitative) is needed for the analysis of regional innovation systems, as these methodologies alone do not provide an analysis at the level of complexity required.

The study was conclusive about the importance of knowledge intensity, environment, connectivity and accessibility as the key drivers of innovation for the Macarthur region. Synthesis of key findings and areas of strategic and policy attention are discussed in this chapter.

5.1 Synthesis of key findings

Regional Innovation Indexes

One advantage of using the Dashboard approach is the ability to create indices based on the differing policy components (such as environmental dynamics or Knowledge Generation and Transfer) and further aggregate them into an overall policy performance index. On the basis of the relative rankings and indices, the overall ‘Regional Innovation Index’ highlights the diversity of issues that can contribute to regional innovation. Noting the index scores, Campbelltown and Camden obtain similar results and higher ranks (570, 567) over Wollondilly (365)47.

47. Maximum rank score is 1000
It is interesting to note that the high ranks obtained by Campbelltown and Camden have been obtained from different sub-index results. This leads to the observation that regional innovation drivers originate from many sources and that the keys to a successfully innovative region can be found across several disciplines.

Campbelltown obtains a high ranking for the innovation drivers suggesting that it is well placed for contributing to regional innovation. The dashboard displays that the key advantages of the region are in knowledge generation, industry knowledge intensity, entrepreneurship and accessibility – key components of innovative regions. This highlights the role of Campbelltown as a ‘regional hub’ of activity for education, knowledge and accessibility to services, jobs and mobility – often drawing upon the populations of Camden, Wollondilly and the surrounding LGAs.

Camden ranked high in the fields of liveability, environmental dynamics, entrepreneurship and industry knowledge intensity. This pattern suggests that Camden has significant ‘quality of life’ features that make it an attractive place to live, evidenced by the liveability population growth figures.

Wollondilly has the most to gain from developing drivers of innovation. On the basis of the indicator set it ranks 3rd overall in the regional innovation index. In the fields of connectivity and community engagement Wollondilly performed well but these are fields where data was scarce or difficult to obtain. Issues of knowledge intensity, knowledge transmission, entrepreneurship and accessibility are areas in need of attention.

**What innovation drivers are identified by regional organisations as important for the region’s development?**

The majority of the case studies mentioned three drivers of innovation with high importance: knowledge intensity, environmental dynamics and accessibility. Connectivity, entrepreneurship and community engagement were considered of medium importance and knowledge generation, transfer and integration and liveability were considered of low importance. In relation to knowledge intensity as a driver of innovation both manufacturing and service companies mentioned it as a critical factor to drive the business and keep up with the innovation goals. Environmental dynamics was widely noted as of high importance only after knowledge intensity. Accessibility was the third driver nominated of high importance for innovation. One organisation mentioned that accessibility is important to contact more people, more quickly and easier; ‘it is a key to retain people, as well as bringing other people in’. Accessibility was regarded in relation to transport to the area but also broadband facilities across the region. Access to the Sydney area was important but equally was the access to Wollongong and Port Kembla especially in the case of Wollondilly organisations.

**What elements of knowledge intensity are present in the region?**

The study found that the use of knowledge intensive service activities (KISA) was limited to IT consulting, marketing related and Research and Development as activities considered of high importance for innovation purposes. The provision of services for these activities was mainly in-house and in collaboration with the private sector when external expertise was sourced from outside the firm/organisation. The sourcing of expertise was mainly from the local area and through the use of referrals and networks. In the Wollondilly sub-region the local area extends to Wollongong more than towards Sydney, including the use of the University of Wollongong instead of using the UWS Campbelltown campus. This particular ecosystem indicates that the functional region for knowledge intensive dynamics extends south to an area within a 30 minute driving distance and hooks into
the big coastal city of Wollongong and the Port Kembla harbour.

Connectivity to other business and networks is considered an important factor for business development. The studied firms indicate the use of informal arrangements with innovation partners such as other firms within the same industry group, customers, competitors, Research and Technology Organisations (RTOs) and regional organisations. Formal agreements drive the collaboration when KIBS, public institutions and industry institutions are used.

**How important are environmental dynamics for innovation in the region?**

The ID-MR highlighted a series of environmental issues that inform innovation in local and regional areas. While these indicators were not conclusive as they were limited by time and resources constraints, they highlighted the importance of environmental information in regional innovation strategies and form the basis of issues that need to be considered by organisations. Further research is needed on locally and regionally significant measures that directly relate to innovation capacity and progress. Indicator measures need to move towards innovation-based investments, R&D, and actions as opposed to issues. In addition, future indicators need to inform of the links between knowledge economy outcomes, knowledge intensive industries and environmental dynamics. The indicators presented in this study however do illuminate the need for improved information on environmentally related innovation and how it can drive commercial competitiveness and progress towards the ‘double-dividend’ of efficiency and new markets.

The case study results indicate that environmental dynamics are critically important for innovation in the MACROC region. There is recognition within organisations that environmental dynamics are emerging as a factor within business success, leading to increasing efficiencies in resource use, reduction in waste, creating competitive organisations, and opening new markets. This view has been reinforced by the expansion of environmental reporting activities but is by no means a universal view across the region. There is a clear need to translate this view into operational and practical outcomes for business and establish mutual learning and knowledge generation outcomes. Environmental innovation is potentially a growth area for organisations and a driver of local and regional innovation. The presence of progressive environmental policies in the MACROC councils indicates the importance of this innovation ecosystem for local institutions.

**How much collaboration is there between industry and regional organisations?**

Collaboration among industry-regional organisations is very limited in the area. Out of 12 cases only 4 to 5 collaborated with regional organisations. Also the maximum number of projects is five with the University of Western Sydney (UWS). The organisations with high interaction with firms were UWS, technical colleges, the Department of Planning and Natural Resources and the various local chambers of commerce. The type of interaction is both formal and informal but with informal interactions predominating.

Collaboration and community engagement are considered increasingly important as drivers of innovation. This was despite the fact that elements involved and their effects on firm innovation or in the regional innovation system as a whole is still poorly understood. Respondents also indicated that accessibility issues (e.g. transport and access to broadband) were considered of high importance because they impacted on their connections with broader markets of goods and knowledge at the regional, national and international levels.

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48. Number of collaboration links.
Most firms refer to engagement with the community as a driver which has rapidly changed in the last 5 years. In the past, industry would not have considered it a priority to engage with the community. However nowadays it is a compulsory activity for some and is considered strategic for the development of the businesses. Overall, the engagement with regional organisations is very limited and not significant in most cases. The firms consider community engagement with charitable organisations but not necessarily engagement with regional networks of organisations to promote the development of the region.

5.2 Areas of Policy and Strategic Planning

This study reveals differences between the three innovation ecosystems in the regional innovation system. These different ‘spaces of activity and influence’ give rise to policy questions on the promotion of knowledge intensive industries and environmental innovation, and the integration of social dynamics in the region.

*The main recommendation from this study is that a ‘regional innovation working group’ be formed to further explore the areas of policy and strategic planning raised by the study and to formulate pathways of implementation of the recommendations.* This working group could include MACROC and WSROCA representatives, council economic/strategic planners, representatives from industry and community organisations, relevant state agencies representatives and relevant academic staff from UWS. The innovation-working group could meet regularly to pursue the following emergent areas of policy dialogue for designing pathways towards increasing innovation in the region:

- **Areas of specific attention for Campbelltown include liveability issues, community engagement, and environmental dynamics. In particular, liveability issues can relate to attracting the ‘creative class’ and further stimulating creative and innovative regions. Campbelltown is well positioned for this goal as per its established industrial base.**

- **Areas of specific attention for Camden include accessibility issues, knowledge generation and transfer, and community engagement to drive further regional innovation. Accessibility is a particularly important issue for the region, especially in the context of public transport and mobility. Camden is highlighted as a ‘place to live’ but more and better links with other areas of metropolitan Sydney are needed.**

- **Areas of specific attention for Wollondilly include increasing accessibility options, boosting industry knowledge intensity, and knowledge generation and transfer. Preserving the rural lifestyle of Wollondilly is important but more and better links to the rest of the Macarthur region and to the main Sydney transit corridors are needed. Without increasing and innovating accessibility for this area it will be difficult to boost its knowledge intensity.**

- **At the MACROC level it is recommended to increase accessibility through the region to connect with the transportation / employment / medical / knowledge hub of Campbelltown. Accessibility and suburban connectivity is an issue for each of the suburbs of the MACROC region, not just for the main towns.**

- **Environmental innovation is an area of natural competitive advantage. It is recommended to promote networking activities where the role of environmental issues as a factor in innovation is discussed and where sharing of successful experiences is encouraged. Lobbying for regulatory reforms, incentives and diffusion of specific programs to minimise environmental impact will**
also have a strong long-term impact on environmental innovation in the region. Identifying funding and support institutions for environmental innovation will enable businesses and organisations to access sources of expertise and support in order to develop environmental innovation and eco-efficiency initiatives.

- Funding and managing the collection of local and regional sustainable innovation indicators which should include regular review processes and involvement of stakeholders should be undertaken initially by local/regional agencies but increasingly using public-private partnerships frameworks.

- Increasing regional connectivity at the industry and community level is necessary to establish channels and flows of information and knowledge so important in innovation processes. The following pathways are suggested:

  - Regular stakeholder innovation forum / panel consisting of government, industry, environmental non-for-profit organisations and community members. The goal is to review sustainable innovation mechanisms, establish participatory initiatives, and a pool of knowledge and ideas for regional planning. An output would be an agreed reporting document that would go to every stakeholder in the region. MACROC might be the appropriate organisation to host the forum.

  - Activities to support the development of industry networking activities or the establishment of business networks would intensify the development of knowledge intensive service activities (KISA). Specific targeting of awareness activities of the role of KISA in firm innovation would influence the development of knowledge intensity in the region.

  - The councils of Wollondilly, Campbelltown and Camden could intensify their activities with the firms and organisation in their LGA to reach a higher level of industry-community engagement and social collaboration that could result in public-private partnerships for innovation.

The methodology used in this study has been useful for analysing the role of innovation at three levels of complexity in the MACROC region: knowledge, environment and social. It is recommended that further research cover all areas of the Sydney Metropolitan Region to complement and contrast the findings from this report.
References


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Innovation at the Edges: The role of Innovation Drivers in South West Sydney


Appendix A: Case Studies Summaries

Case Study A

Background Information

Case Study A is an Economic Development Officer overseeing a region encompassing three Local Government Areas. This position/organisation was created by the three Councils which also come under the jurisdiction of the NSW government. There are 3 full-time employees working under this appointment.

1. Innovation Drivers
The organisation places a strong emphasis on Knowledge intensity, Connectivity, Knowledge generation, Entrepreneurship, Environmental dynamics and Education. According to the interviewee low achievement levels in the region and poor high school completion rates have an impact on commercialisation and economic development. With regards to knowledge intensity and federal politics/policies have a far stronger impact on the region than local politics. It was therefore deduced that connectivity was needed at both local and federal levels of authority. Community engagement and accessibility appear less pivotal only attaining a level of medium importance. Liveability and entrepreneurship rated poorly.

The organisation also feels it contributes to its local region in the following ways:
- It has created a unique value for the area.
- Rebranding the region and emphasising it’s strengths and opportunities.
- Aiming to lift the education finishing rate.
- Enlarging the skilled labour force in the region.

The organisation also rates the following highly with regards to building a successful product/process innovation or business:
- Land
- Labour; skilled and professional services. There is a regional shortage of skilled labour and high unemployment among the young.

2. Knowledge Intensity
The Knowledge intensive activities used were primarily Marketing, R & D, Strategic & business plan development, New product/service development, Data collection and Relationship building/policy awareness - all rated highly.

Information Technology (IT) consulting and Community consultancy were deemed of medium importance. While on the lower end of the scale, IP, Management consultancy, Engineering consultancy, Employment and Environmental impact consulting were awarded low priorities.

Most knowledge intensive services (KIBS) were done in-house. Environmental Impact Consulting was outsourced to a local or regional organisation while R & D and Engineering consultancy were farmed out the Australian Bureau of Statistics.
Outsourcing to external services was done mainly via people in the local area. Being a local ‘political’ organisation, they had to make sure they gave local businesses the priority. In other cases, a request for tender was utilised. The interviewee noted the quality of local service providers was very low, particularly in relation to product marketing.

Of the few services that were outsourced, all were done within Australia. Two providers were located in the Local Government Area (LGA) and another nationally. Integration of internal and external services was done rather informally, to the satisfaction of the organisation.

Knowledge is assessed and assimilated via Council structures. They meet up with the various General Managers from the three Councils. This is then reported to a joint board. The board is made up of three mayors and several councillors who meet every second month.

Formal cooperative arrangements with consultancy firms like the CSIRO, Councils, Universities and RTOs, and Regional Organisations like the GWSEDB predominate. Informal ties constituted dealings with other firms, competitors and industry associations.

Copyright, trademark and registration is the primary formal safeguard against competitor infringement. Secrecy was also used informally to protect in-house expertise.

3. Environmental Dynamics
The organisation had no environmental management plan (EMP). However sustainability is rated highly due to expected regional GDP and population growth and their claimed recognition of employment and environmental sustainability. In spite not having an EMP, they still regarded environmental issues as an “enormous opportunity”.

They did not adopt a social and/or environmental perspective nor does it use the ‘Triple Bottom Line Approach’ 49, although they were keen to emphasise how their three shareholder Councils do have comprehensive social and environmental management plans. They are working on an Economic Development Plan and with the CSIRO on a ‘TWIN CAMS’ project.

4. Collaboration
The organisation places great importance on formally collaborating with the UWS, GROW and DIPNR. Medium level importance interaction was granted to the Western Sydney Regional Organisation of Council (WSROC), Greater Western Sydney Economic Development Board (GWSEDB) and the various Business Enterprise Centres. The Australian Business Ltd and the Australian Industry Group were only accorded low priorities. They work on current projects with WSROC, GWSEDB and UWS.

No indication of whether the organisation had any on-going links with national or international institutions was given, nor did they indicate any wish to enhance these links if they did exist.

49. A Triple Bottom line approach is the reporting of a series of environmental, social and economic indicators, either within the corporate plan or an external document. The indicators can relate to internal or external issues that affect the company. Also the Global Reporting Initiative comes under the Triple Bottom Line approach.
Case Study B

Background Information

Case Study B is a Local Government Council in a primarily rural-based area. The Local Government Council is an arm of the NSW State government.

1. Innovation Drivers
The Council places a strong emphasis on Knowledge intensity, Connectivity, Environmental dynamics and Accessibility. They only place ‘medium importance’ on Knowledge generation, Entrepreneurship, Community engagements and Liveability. The Council did not place low importance on any issue. The Council also emphasised the importance of all knowledge drivers and sees a need to integrate different spheres.

The biggest driver at the moment is housing growth and the Council expects this will continue for at least another 15 years. They expect a large growth in the number of residents and dwellings in this period, but in the meantime will focus on rural residential living.

Accessibility also rates highly mainly due to poor telecommunications coverage in the LGA. Only one-third of the shire has mobile phone coverage. At the moment they have an arrangement with a broadband provider for an appraisal of the area. There is a strong demand for broadband services from local industry largely due to the fact that much of their market is located in the Sydney basin.

A high number of new residents migrate from Sydney mainly for an improvement in their quality of life, safety and security. All residents prefer commuting to nearby cities or towns but appear unwilling to work and travel to Sydney.

The Council feels the following points are required for a successful product/process innovation:

- Due to the sensitivity of the water-catchment in their LGA, all council services are strongly influenced by environmental concerns. This attitude has flowed on to the private sector with several companies specialising in the chemical treatment of stormwater.
- Idiosyncrasy of various rural communities – various communities are spread out over 14 towns. They deal with a variety of values and expectations. They therefore cannot offer a single service for all communities. They integrate services across distance and individual needs of communities.

2. Knowledge Intensity
In this category, IT, Marketing, Management consultancy, Data collection and Relationship building for policy awareness activities rated highly. IP, Strategic and business planning, Environmental impact consulting and Community consultancy were deemed of medium importance. On the lower end of the scale, R & D, Engineering consultancy, Employment and New product/service development were regarded low priorities.

Five Knowledge Intensive Services were outsourced to private sector businesses (KIBS). In this area Marketing, Management consultancy, Employment, Environmental impact consultancy and
New product/service development were given to external entities. Two local/regional companies handled IP and Engineering services while one industry association taking on New product/service development.

Issues relating to IT, R & D, Strategic and business planning and Environmental impact consulting were handled in-house.

No services were sourced nationally or internationally. Both internal and external service providers were coordinated by council appointed “breakthrough teams”.

Formal relationships existed with a cross-council body, consulting firms, public institutions and regional organisations. Informal ties existed with universities/colleges, industry associations and regional organisations.

The Council used registration, trademarks and copyright to protect knowledge developed in-house. Patents are never used.

3. Environmental Dynamics
   The firm does have an Environmental Management Plan (EMP). They have a significant plan on vegetation, water ways and the protection of natural wildlife.

The Council rates sustainability issues extremely importantly. It also provides social and/or environmental information and takes a ‘Triple Bottom Line Approach’ which it includes in its official reports. Their external relationships are also determined by sustainability issues such as with Sydney Water and Sydney Catchment, unfortunately both organisations do not work well with each other on this issue.

4. Collaboration
   The Council is part of a cross-council program that works toward the betterment of the entire region. There are no industry-based networks in this LGA.

The Council collaborates with many regional and LGA-based organisations. Most significantly they appear to place great importance on dealings with a cross-council organisation, TAFE, DIPNR, local Chambers of Commerce, Sydney Water and Sydney Catchment. They placed ‘medium importance’ on interaction with Greater Western Sydney Economic Development Board, UWS and GROW. Their relationship with WSROC, NSW Premiers’ Department, Greater Western Sydney Regional Organisation of Chambers, Greater Western Sydney Regional Tourism and Business Enterprises Centres rated poorly. Most organisational links were had on a national level with the exception of the New Zealand Society.

Better connections with universities is seen as a positive, but the application of specialised skills and knowledge is yet to be worked out at the Council level.
Case Study C

Background Information

Case Study C is a manufacturing company and is located in Picton, NSW. They are a private company, owned internationally with 130 employees. The business sees itself as being in a number of positions in relation to the product/service life cycle; in the creation, manufacturing and standardisation phase. The company also sees itself in the ‘expansion’ phase of its life cycle.

1. Innovation Drivers
The company places a strong emphasis on environmental/sustainability dynamics and market competition. They believe their strong environmentalist base contributes to cost effectiveness and this gives them an edge on market rivals.

However knowledge intensity, connectivity and community engagement appear less pivotal only attaining a level of medium importance. At the lower end of the scale Knowledge Generation, Transfer and Integration, Entrepreneurship, Liveability and Accessibility were given a low priority.

The company also feels it contributes to its local region in the following areas:
- Participates in Local Government and State Government groups eg. MACROC
- Fund and participate in local community programs
- Employees encouraged to take part in these same programs
- Contribute to local employment and knowledge to business groups.

The company also rates the following capabilities highly with regards to building a successful product/process innovation or business:
- Need to keep abreast of learning and current business thinking
- Feel people and process go hand in hand to develop human capital
- Taking cues from nature – utilising bio-mimicry and industrial ecology in products

2. Knowledge Intensity
Only one knowledge intensive activity rated highly; Research and Development (RD). Marketing, intellectual property (IP), strategic and business plan development, environmental impact consulting, data collection for support work and relationship building for policy awareness were deemed of medium importance only.

At the lower end of the scale, IT consulting, IP, management consulting, engineering consulting, employment agency contact, community consultancy activities and new product/service development were relegated as low priorities.

On the surface the firm appears to handle most services with 9 out of the 11 stipulated services handled in-house. However on closer inspection 6 areas were partially farmed out to external service providers obviously in an attempt to lessen workload, costs or to widen expertise. Of these marketing, R & D, IP, engineering consultancy, employment, strategic/business plan development and environmental impact consulting were partially sourced out. Only new product/service consultancy and IT were exclusively handled in-house.
External service providers are relied upon for advice and recommendation on practices. These providers were usually linked up via business contacts/relationships, ‘hook-ups’ or contracts and tend to be used for tailored reasons. In choosing these service providers, the firm stated the importance of working with like minded organisations.

There is a good mix of service providers located regionally (western Sydney), nationally and internationally. A total of 8 providers were international while 8 were Australian-based. Only one was located in the Local Government Area. Taking into account the companies varied and often mixed reliance on internal and external providers, the company has appointed a Quality Management and an Environmental Management System to oversee this complicated process.

The company’s sale of knowledge intensive services is concentrated in the following areas:

- Engineering Consultancy Services related to Product and Process development
- Strategic and Business Plan Development Advice
- New product/service development consultancy
- Environmental Impact consulting

Engineering consultancy, Strategic business plan development and New product/service consultancy are only sold and marketed nationally and internationally. However Environmental Impact Consulting covers all parts from the local right up to international areas.

In keeping with the multiplicity of relationships (eg. external service providers), this firms appears to have a varied mix of formal and informal links with external partners. While it may only claim to have loose informal links to other competitors in the same industry, they have both formal and informal ties with customers, consultancy firms (KIBS), Universities/Colleges, Industry Association and Regional Organisations. All ties with local, state or federal governments were formal.

Safeguards against product or service infringements are done by way of design registration, trademarks, copyright and patents. Occasionally informal methods such as secrecy and complexity of design are also relied on.

3. Environmental Dynamics

The company has a formal environmental management plan (EMP) which was accredited under an ISO program in 1997. They have an extensive reference source for measuring performance indicators for raw material, product and effluent which they measure and monitor.

They have also recently completed a life-cycle assessment for operations in Australia and Thailand - examining key factors like global warming potential, raw material toxicity and even took into account the ‘end of life’ option.

The company recognises 2 sides to sustainability – social and environmental. While they may be very advanced on the environmental sustainability front, they admit they need to ‘catch up’ on the social aspects. They want to implement sustainability across a ‘triple bottom line’. They want to focus on internal and external impacts and opportunities across the board. For example in Thailand, the company aims to boosting morale and therefore attract loyal and skilled staff.

Sustainability is rated very highly. The Green Building Council of Australia has set standards for internal fit-outs. They see this as a very positive move and feel they are well positioned to take advantage of this.

The company has adopted principle guidelines called the ‘7 Fronts of Sustainability’. They also run a
global leadership forum on sustainability. These strategies affect budgeting and corporate planning. The company also uses the ‘Triple Bottom Line Approach’. The international HQ were the first to develop a world first sustainability report from which benchmarks called ECOSENSE and QUEST were derived. ECOSENSE is based on sustainability initiatives from manager to employee level. It deals with energy and water use etc. QUEST relates to process based issues and waste reduction. The firm appears to be very involved in external sustainability projects and partnership.

4. Collaboration

The company is well networked. Collaborative relationships have been struck up with UWS, TAFE, GROW, DIPNR, Australian Business Limited, Australian Industry Group, Greater Western Sydney Regional Organisation of Chambers, Local Chambers of Commerce and Industry, WSROC and MACROC. Relationships varied from informal to formal. The firm has common research projects with other primarily US-based companies, some in different business sectors from their own, others are their suppliers. They also have links with national and international organisations and institutions. Linkages and collaborations are seen as a way to further the company’s business advantage. The company is not linked into a business network but are associated with 4 industry clusters. They are also involved in the Green Building Council on Sustainable Development in the USA, which they claim has created business opportunities.
Background Information

Case Study D is a legal services firm located in Campbelltown, NSW. They are a private company and Australian-owned with 78 employees in Campbelltown alone. It also has offices in the southwest, western suburbs and the Sydney CBD. The business is well-established (38 years) and is deemed to be in the ‘standardisation’ phase of its service life cycle and in the ‘expansion’ stage of its life cycle.

1. Innovation Drivers
The company places a strong emphasis on knowledge intensity, government legislation and knowledge generation, transfer and integration. They only place ‘medium importance’ to entrepreneurship and community engagements and regard issues relating to connectivity, liveability and accessibility of little importance.

The company also feels it contributes to its local region in the following areas:
- Insists all professional staff be involved in community organisations
- Has a work experience program
- Has a traineeship program
- The Law Society has a pro bono scheme for the local area

The company also rates the following capabilities highly with regards to building a successful product/process innovation or business:
- Legal knowledge and training

2. Knowledge Intensity
In this category, relationship building for policy awareness, marketing, legal and accounting (IP) activities rated highly. IT consulting, strategic and business plan development and data collection for supporting work were deemed of medium importance. On the lower end of the scale, management consultancy, community consultancy and environment impact consulting were regarded low priorities.

The company has a long history of outsourcing and appears to depend on a select group of quality local service providers. Much of their work is done ‘face to face’ and find their weak formal links enhances service because they mainly “look after their clients, not deal with internal administration”.

Few knowledge intensive services were outsourced to private sector businesses (KIBS). Only IT services and environmental impact consulting were given to external entities. However issues relating to marketing, R & D, intellectual property, management consultancy services, employment, strategic business plan development and new service development consultancy, were all handled in-house.

Integrating internal and external requirements of something like IT is handled by an in-house employee. This person only handles day-to-day problems and simple maintenance tasks, while the
external service providers are relied on for long-term development of the computer network. All external service providers were either state or national based, none from the LGA or the region.

The firm’s primary product/service is intellectual property related (legal and accounting) services only.

Informal cooperative arrangements with customers, consultancy firms (KIBS), public institutions (councils), RTOs and regional organisations predominate. Formal ties constituted dealings with customers and industry associations like the various Law Societies.

Innovation is primarily generated internally within the firm. The firm has monthly partnership meetings and 6 monthly team management meetings to generate ideas.

Issues regarding the protection of knowledge within any IP related firm is difficult to control. The firm concedes that once a solicitor has been trained there is little they can do to control how this information can or will be used. Internal databases, and marketing databases are protected and are covered by a secrecy agreement. So far the integrity of the firm’s databases has never been compromised in any way.

3. Environmental Dynamics
The firm does not have an Environmental Management Plan (EMP). Paper and toner cartridges are recycled internally only. However legal cases involving environmental issues is seen as a growing opportunity for the firm. There is a growing awareness of environmental issues in the last 6 years. This may have been a result of growing societal and employee awareness of these issues as well as stricter council regulations. The firm does not have a social and/or environmental information or take a ‘Triple Bottom Line Approach’ in any company reports.

4. Collaboration
The firm collaborates with many regional and LGA-based organisations. Most significantly they appear to place great importance on dealings with local Chambers of Commerce. They are involved in many business networks involving the likes of service companies, industry associations and even charities. The firm claimed to have had a hand in the formation of the Macarthur Business Men’s Club, primarily functioning as a business network. They are also involved in a business cluster called the Formal Club and attend monthly meetings of the Macarthur Law Society. They also had more informal relationships with entities such as MACROC, Macarthur Workplace Learning Inc, UWS, TAFE (Western Sydney Institute) and the Business Entreprise Centre. One of the managing partners sits on a Local Government committee. There were no collaborative research nor did they have any significant national or institutional links with organisations. They expressed interest in developing links with regional knowledge institutions/organisations probably via local universities. They already have a student internship program.

There appears to be little importance placed on knowledge acquisition probably because their self-reliance on internally generated research.
Background Information

Case Study E is a privately owned company specialising in producing metal components. The company is located in Campbelltown. It is Australian-owned and has 150 full-time employees (one located near Campbelltown and another interstate). It claims to be in the ‘expansion’ phase of its life cycle. The company was established in 1986.

1. Innovation Drivers

The company claims to place a high priority in these areas and for the following reasons:

- Knowledge intensity – need high level of knowledge and technology to work efficiently with metal.
- Connectivity – connection with UWS helps apply knowledge in an innovative way.
- Accessibility – important to have a fast broadband connection to their other factory sites.
- Technology – allows manufacturing in more innovative ways.

Knowledge Generation, Transfer and Integration, Entrepreneurship, Environmental Dynamics and Community Engagement were rated ‘medium’ importance. Liveability was listed as a ‘low’ priority.

The company did not appear to have a view on whether it contributed directly to the local area.

The organisation also highly rates the following issues regarding building a successful product/process innovation or business:

- Having knowledgeable and skilled workers. This can come via educational qualifications or experience in industry.
- Having the right technology – combination of the correct machinery and software.

2. Knowledge Intensity

The following knowledge intensive activities rated highly:

- IT consulting activities
- Marketing
- R & D
- Data collection
- Relationship building with governments for policy awareness

Intellectual Property (legal and accounting), Management consultancy, Engineering consultancy, Employment, Strategic/Business Plan Development, Environmental Impact Consulting, Community consultancy and New product/service development consultancy were rated of ‘medium’ importance. No item was regarded a low priority.

Six out of ten Knowledge Intensive Services (KIBS) were completed in-house. These were IT, Marketing, R & D, Engineering consultancy, Employment and New product/service development. Of
these, Engineering consultancy and New product/service development were also partially sourced out to external service providers.

Local and regional firms/organisations handled Strategic/Business Plan Development and New product/service development. Environmental Impact Consultancy was farmed out to state or federal government, private firms and Industry associations. Interestingly IP (legal and accounting) appear to be outsourced to three different types of organisations – Universities/RTOs, Private firms and Industry association/Networks. In a similar way, Environmental Impact Consulting is also handled by a mix of State/Federal government agencies, Private firms and Industry associations. Strategic and Business Plan Development was also handled by local/regional organisations and industry associations/networks.

External service providers are sort through the firms own contacts or via industry associations like the Australian Industry Group, who help identify service providers. Collaboration with service providers appears to be done on an ad-hoc basis. If the firm feels it does not have the expertise to handle an issue, then it may engage an external consultant to fill the gap.

Knowledge is assessed and assimilated based on the business needs and strategies. Information and knowledge is discussed at meetings and internal training to help convey this to other people involved in the production process.

Sales were made regionally (within Western Sydney) and nationally.

Formal and informal cooperative arrangements were had with customers, other firms in the industry and competitors.

Copyright is used as a formal safeguard against competitor infringement with the occasional use of patents from time to time. Registration and trademarking are never used. Informally, secrecy and the firms speed to market abilities are also utilised to protect in-house expertise.

3. Environmental Dynamics
The organisation has no Environmental Management Plan (EMP). The company did not appear to have a view on the environmental sustainability.

They do not adopt a social and/or environmental perspective nor does it use the ‘Triple Bottom Line Approach’.

4. Collaboration
The organisation does not place importance on issues relating to collaboration.
Background Information

Case Study F is a privately owned engineering company specialising in the design, layout, installation and maintenance of mechanical equipment for a specific industry. The company is located in Campbelltown. It is Australian-owned and has 23 full-time employees. It claims to be in the ‘creation phase’ of its product/service life cycle and in both the ‘professional management’ and ‘expansion’ phase of its life cycle. The company was established in 1979.

1. Innovation Drivers
The company claims to place a high priority on these areas and for the following reasons:
- Knowledge intensity – providing assistance to clients with different methodologies.
- Connectivity – influences and ideas from customers and other firms benefit the company.
- Knowledge generation, transfer and integration
- Entrepreneurship – actively encouraged among staff. Daily meetings to map out daily progress and develop new efficient work practices.
- Environmental dynamics – particularly relevant when working with clients who deal in environmentally sensitive products.
- Community engagements – actively involved with community. Sponsor and participate with different community organisations.
- Liveability – believe life-style choices are an innovation driver and want to contribute to improving this aspect in region.
- Accessibility – emphasised the importance of keeping communication lines open with client and prospective client base.

They did not indicate any preferences for any items within the ‘medium’ or ‘low’ importance categories.

The organisation also feels it contributes to its local region in the following ways:
- Participate in the ‘Kids for Macarthur Health Area’ program – won the Western Sydney Industry awards 2002/2004 for contributions to the region.
- Helping other non-related companies in the region. Helping small companies to connect with larger ones.

The organisation also rates the following highly with regards to building a successful product/process innovation or business:
- ‘Drive to improve’ – provide training and continuous product and process improvement.
- Need to network with clients.

2. Knowledge Intensity
The following knowledge intensive activities rated highly:
- IT consulting activities
- R & D
- Management consultancy
Innovation at the Edges: The role of Innovation Drivers in South West Sydney

- Engineering consultancy
- Strategic business planning
- Environmental impact consulting
- Community consultancy
- New product/services development
- Data collection

Intellectual Property (legal and accounting) was the only item to rate ‘medium’ importance while Marketing, Employment and Relationship building with government for policy awareness were regarded a low priority.

Seven out of ten knowledge intensive services (KIBS) were done in-house. IT and Employment services was outsourced to a local or regional firm while no services were outsourced to other government bodies, RTOs, private firms, industry associations or any firms located outside Australia.

Finding external service providers is done via reputation, meeting up with them and ‘looking at their business location’ or seeing how well they run their businesses.

Integration of internal and external services were done via training programs, pre-start meetings and helped along with work systems already in place.

All company sales were made across the board; from within the LGA and region, nationally and internationally. All sales emanated from their core business - engineering consultancy services.

Formal cooperative arrangements with customers, public institutions and industry associations predominate. Informal ties constituted dealings with other firms, universities/colleges, consultancy firms and regional organisations.

Registration of design, trademarks and patents are used as formal safeguards against competitor infringement. There were no informal methods used to protect in-house expertise.

3. Environmental Dynamics
The organisation has an Environmental Management Plan (EMP) through its Integrated Management System. Sustainability issues are rated highly and are therefore seen as a possible business opportunity.

They did not adopt a social and/or environmental perspective nor does it use the ‘Triple Bottom Line Approach’. The company is involved in external projects/partnerships related to sustainability with two other firms.

4. Collaboration
The organisation places great importance on collaborating with Wollongong University and TAFE (Western Sydney Institute). The relationship with both institutions was classed as formal and informal respectively.

The Australian Industry Group was accorded ‘medium’ level importance while no western Sydney based organisation was listed in the low priority section. A formal relationship was had with the
Australian Industry Group.

Common research projects are largely run in conjunction with overseas clients of the firm. It also has links with national and international organisations, again linked with their international clients.

They are involved with one informal business network which appears to be based nationally and internationally. It is not involved in an industry cluster or development network. The firm does not see any immediate need to forge links with knowledge institutions/organisation within the region.
Case Study G

Background Information

Case Study G is a development consultancy business located in Campbelltown, NSW. They are a private, locally owned business with 30 full-time employees. The business sees itself as being in the ‘standardisation’ phase within the product/service life cycle. It also sees itself in the ‘professional management’ phase of its life cycle.

1. Innovation Drivers
The company claims to place a high priority on following ID-related priorities and for the subsequent reasons:

- Knowledge Intensity – for computer and surveillance technology.
- Environmental Dynamics – becoming an important part of business due to external forces from clients and governments alike.
- Liveability – a growing demand from clients and society on the whole.
- Accessibility – they need mobile phone access.

The organisation also feels it contributes to its local region in the following ways:

- Contribute to local sports activities.
- Training surveyors in conjunction with UNSW (Faculty of Engineering).
- Sponsors scholarships for new surveyors.

The organisation also rates the following highly with regards to building a successful product/process innovation or business:

- People skills.
- Need for qualified people with appropriate qualifications.
- Common sense.
- New knowledge from net techniques.

2. Knowledge Intensity
Four knowledge intensive activities rated highly; Engineering consultancy, Environmental impact consultancy, New product/service development consultancy and Data collection.

On the other hand, IP related activities and Community consultancy were deemed of medium importance only.

At the lower end of the scale, IT, Marketing, R & D, Management consultancy and Employment, Strategic/Business plan development were relegated as low priorities.

Out of list of eleven Knowledge Intensive Service (KIBS), eight were regarded not applicable to the interviewee. Only Engineering Consultancy services and Data collecting were done in-house. Environmental Impact Consultancy was the only service outsourced to private firms.

The only external service provider used by the firm approached the company in search of business.
This external service provider is located within the Local Government Area of the company.

The company appears keen to develop capacities in-house rather than rely on external service providers which it could potentially see as a business threat.

Knowledge is assessed and assimilated within the firm via their systems quality control practices. They also do a lot of in-house training for new recruits and allow staff two to three seminars annually.

Sales for the firm are solely concentrated in the core business activity of Engineering Consultancy Services, which they sell at the local, regional and national levels. They claim not to have the skills to compete internationally.

Relationships with various partner groups were largely formal. They had formal ties with other firms within the same industry, competitors, customers, consultancy firms, public institutions, universities/RTOs and industry associations.

Safeguards against product/service infringements were done solely by way of copyright.

3. Environmental Dynamics
The company is still developing an Environmental Management Plan (EMP) which it hopes will be operational soon.

Sustainability issues are rated very highly within the company and they see environmental planning as a growth industry. The firm feels that government legislation and regulation drive the growth of this industry.

The firm does not include a social and/or environmental information in their reports, nor do they take a ‘Triple Bottom Line Approach’.

Being involved in their industry, all projects are environmentally-based. They have invested in innovation relating to environmental outcomes largely due to government and societal pressures to do so. As a company, they feel they have largely been reactive to such developments.

4. Collaboration
Important collaborative relationships have been struck up with UWS, DIPNR and local Chambers of Commerce. The relationship with the first two cases was labelled formal and informal concurrently by the interviewee. They had informal ties with the various Chambers of Commerce.

The firm presently has no common research projects with other companies.

The company has links with national organisations such as the Institute of Surveyors, the Institute of Engineers and the CPA (computer software – online teaching). They did not have links with any international organisation or institution.

The company appear unsure on what to expect from links emanating with regional knowledge institutions. An earlier relationship with the UNSW broke down.

They are involved in two business networks, one being the local Chamber of Commerce and the other the Macarthur Club. The company is not involved with any industry cluster, development network, nor do they utilise any one-line training initiatives available at local universities. Some staff go to UNSW and other venues for seminars.
Background Information

Case Study H is an environmental consultant and is located in Camden, NSW. They are a private professional management-based company, owned locally with two full-time employees. The business is well-established and is deemed to be in the ‘standardisation’ phase of its business life cycle.

1. Innovation Drivers

The company places a strong emphasis on knowledge intensity and entrepreneurship. They believe their strong knowledge-base contributes to cost effectiveness and that present and prospective clients recognise their professional expertise for this reason. In turn the company places a strong emphasis on identifying prospective clients.

However knowledge generation, transfer, integration and connectivity/networking appear less pivotal only attaining a level of medium importance. This is also the case with accessibility/mobility.

The company also feels it contributes to its local region in the following areas:

- Source of scientific expertise
- Most organisations are city based – they are a local alternative
- Local operators prefer to deal with local people.
- Member of the chamber of commerce
- Economic development

The company also rates the following capabilities highly with regards to building a successful product/process innovation or business:

- Technical skills and expertise are the main drivers.
- Skills relating to specific knowledge in the environment.
- Experience
- Communicating expertise
- Networking and being available - people tend to come through and discuss ideas. The company works mainly via referrals and on-going projects.
- Capitalising on local initiatives
- Cost effectiveness
- Delivering what the client wants in spite of stifling bureaucracy.

2. Knowledge Intensity

The knowledge intensive activities used were primarily ‘Environmental Impact Consulting’, which rated highly. Information Technology (IT) consulting, marketing, community consultancy and work-related data collection were deemed of medium importance. On the lower end of the scale, research and development (R&D), legal/accounting, management and engineering consultancy, employment, business planning, new product and service development consultancy and government policy awareness and networking were regarded low priorities.

The provisions of knowledge intensive services were primarily done in conjunction with private
sector businesses (KIBS). IT, R & D, legal and accounting, management consultancy, product and process development and employment were outsourced to the private sector. It is noteworthy that these five items were given a low priority in knowledge intensive activities, the firm therefore preferring to outsource them rather than handle it themselves. According to the company, external sourcing of services is done through an existing network of contacts. Only marketing and the core business activity of environmental impact consulting were done in-house.

Service providers were mostly acquired within Australia. Only two providers were located in the Local Government Area (LGA) and none within the western Sydney region. Most services were sourced within Australia and none internationally. Business sales were made across the board at local, regional, state and national levels. Local sales (within the LGA) were centred on engineering consultancy services while other local, regional and national sales were made in both the ‘Environmental Impact’ and the ‘New Product/Service Development’ consultancy areas. No sales were made internationally.

Formal cooperative arrangements with public institutions, RTOs, Industrial Associations and Regional Organisations predominate. Informal ties constituted dealings with customers, other competitors and short-term consultancy arrangements. However both formal and informal links operated when dealing with firms from the same industry.

Copyright is the primary safeguard against competitor infringement. However secrecy, the complexity of the services provided and the company’s ability to quickly deliver these services to the market were informal methods by which they protected expertise developed in-house.

3. Environmental Dynamics
The company had no formal environmental management plan (EMP), but their business plan and company-operating manual did address EMP related issues. Sustainability is rated highly, noting how professional advice on EMP is part and parcel of the service they provide clients. Opportunities accruing from environmental issues are therefore seen as a big opportunity for growing business. They have also invested in environmentally innovative outcomes through their investments and assessment capabilities, usually as part of research for clients. The company does not adopt a social and/or environmental perspective nor does it use the ‘Triple Bottom Line Approach’.

4. Collaboration
The company places great importance on formally collaborating with the NSW state government Dept of Infrastructure, Planning and Natural Resources (DIPNR) and informally with local Chambers of Commerce. It does not have any common research projects with other companies but does have links with four national industry bodies and one international one. There appears to be a strong need for greater contact with knowledge institutions in the region, unfortunately no network, industry cluster or developmental network exist in the region.
Background Information

Case Study I is an agricultural manufacturing company located in Wollondilly, NSW. They are a private family-run business with 7 full-time employees, but can employ up to twenty workers when harvesting. The business sees itself as being in the ‘standardisation’ phase within the Product/Service Life Cycle. It also sees itself in the ‘expansion’ and ‘professional management’ phase of its life cycle.

The farm was started up in 1937 by the present owner’s grandfather but it was only in 1980 that the business became a family-based partnership.

1. Innovation Drivers

The company claims to place a high priority on following ID-related areas and for the following reasons:

- Community engagements – Company sees markets all over region. Need to interact with other growers and involved with local community to a limited degree.
- Accessibility – important for communication and access to important markets.
- Knowledge intensity
- Environmental dynamics

Entrepreneurship and Knowledge generation, transfer and integration is listed as of medium importance. Connectivity is given a low priority.

The organisation also feels it contributes to its local region in the following ways:

- Employment
- Tourism – runs tours several times a year on the farm.

The organisation also rates the following highly with regards to building a successful product/process innovation or business:

- Having to keep up with latest research on the newest varieties of produce.

The company also interacts with 2 agricultural associations.

2. Knowledge Intensity

Only one Knowledge Intensive Activity rated highly; New Product/Service Development Consultancy.

IT, Marketing, R & D, Management Consultancy, Engineering Consultancy, Strategic/Business Plan Development, Community consultancy, Data collection, and Relationship building with federal/state governments for policy awareness, were deemed of medium importance only.

At the lower end of the scale, IP, Employment agency contact and Environmental impact consulting were relegated as low priorities.
The firm only handles two services in-house out of the eleven stipulated services. Most services (a total of four) were outsourced to private firms. One service each, shared out evenly between a state/federal government agency, a local/regional organisation and an industrial association.

IT and R & D are handled in-house, but R & D appears to be also farmed out to a local industry association. Employment, being seasonal for the firm, is handled by a local employment firm on an ad-hoc basis. Strategic/Business Plan development advice is received from government agencies. No Environmental Impact Consulting was sort for by the company.

External service providers are sourced from the local area. Many are found through the local phonebook or by networking through other private businesses.

The company claims the quality of service and their relationship with external service providers is good. However this is dependent on certain aspects such as price competitiveness. They indicated a preference to go with a local firm if there was little difference in price, however when there are large disparities they allow financial considerations to dictate their decisions.

Integration of internal and external service providers activities appear to be done rather informally with little coordination, a practice the company feels comfortable with.

The company did not sell any Knowledge Intensive Services (KIBS).

Relationships with various partner groups were largely informal. Out of the eight indicated areas of contact a total of six were regarded informal. The only formal contact was with firms within the industry or with various produce growing consultants.

Safeguards against product infringements were done by way of trademarks and copyright. Registration and Patents are never used. Informal methods such as secrecy is also relied on.

3. Environmental Dynamics
The company does not have a formal Environmental Management Plan (EMP), but do have an Irrigation Management Plan with works hand in hand with their Quality Insurance Program.

The company did not appear to formally recognise sustainability issues but expressed concerns on their reliance on ‘mother nature’ to get a good harvest and therefore a good business profit. They did not see environmental issues as being a business opportunity.

However the company does see itself as very environmentally friendly, particularly regarding water usage and use of pesticides. They claim this is not the result of concerns for the environment but due to financial and business pressures.

The company does not include social and/or environmental information in their reports, nor do they take a ‘Triple Bottom Line Approach’. They are not involved in any environmentally-based external project or partnership but may have one partnership with a government agency in the near future.

There is one environmental-based innovation initiative that was helped along by the state government
a couple of years ago. This related to irrigation methods and ways to save water.

4. Collaboration
Important collaborative relationships have been struck up with GROW and DIPNR, while medium level relationships were cultivated with MACROC and local Chambers of Commerce. A low priority was accorded to tourism.

No formal collaborative relationships existed but the company had informal ties with MACROC, DIPNR, local Chambers of Commerce and Macarthur Tourism. On-going projects were run in conjunction with GROW and DIPNR.

The company has links with 2 agricultural associations. They did not have links with any international organisation or institution. They placed little importance on forging stronger links with knowledge institution within the region.
Background Information

Case Study J is an agricultural company located in Camden, NSW. They are a private company, part of an international franchise but nationally owned with 45 full-time employees. The business sees itself in the ‘standardisation’ phase within its product/service life cycle. The company also sees itself within the ‘professional management’ phase of its life cycle.

1. Innovation Drivers

The company places a strong emphasis on Knowledge Intensity. They believe their ability to understand aspects of business such as proper time to pick up inventories, intelligent water usage, use of hydroponics and reliance on a computerised system make their environment Knowledge Intensive.

However Connectivity, Entrepreneurship and Accessibility appear less pivotal only attaining a level of medium importance. At the lower end of the scale Knowledge Generation, Transfer and Integration, Environmental Dynamics, Liveability and Community Engagement were given a low priority.

The company also feels it contributes to its local region in the following areas:
- Provides employment for the lower skilled workforce
- Staff training through horticultural-based TAFE courses
- Provide written and oral skills training for a largely non-English language speaking workforce

The company also rates the following capabilities highly with regards to building a successful product/process innovation or business:
- Important to have skilled people at the high end of the business
- Much research is required in growing hydroponic produce
- Need to keep up with the latest equipment and practices

2. Knowledge Intensity

There are 6 knowledge intensive activities which rated highly, they were:
- IT consulting activities
- Marketing related activities
- R & D
- Strategic and Business Plan Development
- New Product/Service Development
- Data Collection for Supporting Work

The following items were assigned to the medium importance section:
- IP Related (legal and accounting) activities
- Management consultancy related to organisational aspects of product development
- Community Consultancy Activities
- Relationship building (federal, state, regional local) for policy awareness
The firm appears to handle most services with 7 out of the 11 stipulated services handled in-house. These services are:

- IT Consulting Services
- Marketing Services
- R & D - Research and Development Services
- Employment Agency (Supply of Specific Personnel) Services
- Strategic and Business Plan Development Advice / Services
- Environmental Impact Consulting
- New product/service development Consultancy

Out of this list of 7 only 1 is partially out-sourced – R & D, which is also handled by an international entity.

Local and regional organisation also played a large role in 3 areas. They are:

- IP Related (legal and accounting) activities
- Management Consultancy Services Related to Organisational Aspects of Product Development
- Engineering Consultancy Services Related to Product and Process Development

Apart from R & D which is outsourced to an international entity, no other services were farmed out in any other category.

Almost all service providers are locally or regionally based.

Many external service providers approach the company soliciting for business. An example of this would be a European-based dealer who contacted the firm. Most other providers come from referrals.

Integration of internal and external service providers’ appear to be deliberated overseen by 2 or 3 people from the firm. No specific plan is followed. Knowledge assessment also appears to be handled in the same manner. For this, a management consultant comes in every second week. The owner then accesses and evaluates informal feedback.

The company claims not to sell knowledge intensive services.

However it has formal knowledge intensive activity cooperative arrangements with the following entities:

- Other firms within the same industrial group (Network)
- Consultancy Firms (KIBS)
- Industry Associations

Of these, industry association came in for a special mention – noting how many are produce grower associations.

Informal knowledge intensive cooperative arrangements exist with the following entities:
Safeguards against product or service infringements are done by the sole use of trademarks.

3. Environmental Dynamics
The company does not appear to have a formal environmental management plan (EMP), but do operate a management of waste water regime involving fertiliser and nutrients disposal on their property.

Sustainability is rated quite highly and environmental issues are not seen as a threat. In fact they see potential in the re-use of waste water.

The company claims there has been an increase in environmental awareness in the last 5 years. This can be seen in their switch to hydroponics 4 years ago. The hydroponics system affectively recycles water which in turn contributes to a commercial saving of 30 per cent to the firm.

The company has not adopted a Triple Bottom Line Approach nor is it involved in any external project or partnership related to sustainability issues.

4. Collaboration
The company has highly important collaborative and formal relationships with the TAFE, Western Sydney Institute.

It had medium level collaborative formal relationships with:
- UWS
- Australian Business Limited
- Local Chambers of Commerce and Industry (in the Liverpool area)

Relationships in the low importance category fell to Macarthur Tourism only. This involved advertising issues only.

The firm does not have common research projects with any company. They also have links with national and international organisations and institutions. The company is not linked with any national-based organisations but is part of an international one. This involved an agent in Germany and a consultant adviser in the Netherlands.

They did not put a strong emphasis on more links with knowledge institutions/organisations.

The firm is involved with 2 business networks; the South Western Networking Group (SWNG). This is largely aimed at small to medium businesses which meet weekly in Lumea. SWNG has approximately 30 members. The firm joined SWNG in May 2004. It is also a member of the Liverpool Chamber of Commerce.

They were also aware of other business networks such as the ‘Camden Chamber of Commerce’ and ‘Bounty’. There were also other networks in the Campbelltown area such as SWAP, Redback, Campbelltown Chamber of Commerce and the Ingleburn Chamber of Commerce.

They are not involved in an industry cluster nor any development network.
Background Information

Case Study K is a manufacturing company and is located in Wollondilly, NSW. They are a private company, nationally owned with 91 full-time employees in the region alone. The business sees itself in the ‘standardisation’ phase within its product/service life cycle. The company also sees itself within the ‘expansion’ phase of its life cycle.

1. Innovation Drivers
The company places a strong emphasis on Knowledge Intensity. Their plant has about $300 to $400 million worth of equipment and need the knowledge to operate them efficiently. They regard knowledge and innovation as a key driver for the business.

However Connectivity, Environment and Community Engagement appear less pivotal only attaining a level of medium importance. At the lower end of the scale Entrepreneurship, Liveability and Accessibility were given a low priority.

They also noted how an innovative climate plays a significant role. This usually comes through in terms of government incentives which can promote innovation, such as tax incentives. There are also other factors like regulations which hamper their progress.

The company also feels it contributes to its local region in the following areas:

• Provide employment for the local area
• Contributes approximately $35m to the local community

The company also rates the following capabilities highly with regards to building a successful product/process innovation or business:

• Important to have an open mind to issues
• Higher education and logical thinking – 15 per cent of staff are university educated
• Run business improvement programs for staff

2. Knowledge Intensity
There are 4 knowledge intensive activities which rated highly, they are:

• R & D
• Engineering Consultancy Related to Product and Process Development
• Strategic and Business Plan Development
• Data Collection for Supporting Work

The following items were assigned medium level importance:

• IT Consulting Activities
• Marketing Related Activities
• Environmental Impact Consulting Activities
• Community Consultancy Activities
• Relationship building (federal, state, regional local) for policy awareness

In the low importance section was:

• IP Related (legal and accounting) Activities
• Management Consultancy Related to Organisational Aspects of Product Development
• Employment Agency (supply of specific personnel)
• New Product/Service Development Consultancy Activities

The firm being a large organisation appear to handle most services, with 8 out of the 11 stipulated services handled in-house. Another 9 are out-sourced to external service providers. These are serviced by between 30 to 40 different companies. The services done in-house are:

• IT Consulting Services
• Marketing Services
• R & D - Research and Development Services
• IP Related (legal and accounting) Services
• Engineering Consultancy Services Related to Product and Process Development
• Employment Agency (Supply of Specific Personnel) Services
• Strategic and Business Plan Development Advice / Services
• New product/service development Consultancy

Most out-sourced services were handled by the private sector with a smattering done by Local or Regional organisation (1) and also by Universities and RTO’s (3). Only 1 job was handled by an Industry Association.

The company uses external consultants because the firm claims not to have specialist knowledge in some areas. The firm tries to keep project management in-house but may hire a specialised construction engineering firm to come up with the best solution for a problem.

Integration of internal and external service providers’ is important especially in relation to quality assurance. Procedures are put in place with one person specialising in one area. The firm believes in pursuing long relationships with external providers. If the person moves, the firm moves with them.

The firm sells knowledge intensive services to the following areas:
• Research and Development Services
• Engineering Consultancy Services Related to Product and Process Development

R & D is sold regionally (within Western Sydney) and Engineering Consultancy is sold nationally. Their engineering group does not work for other companies.

The company has formal knowledge intensive activity cooperative arrangements with the following entities:

• Consultancy Firms (KIBS)
• Public Institutions
• Industry Associations

Informal knowledge intensive cooperative arrangements exist with the following entities:

• Other firms within the same industrial group (Network)
• Competitors
• Customers
• Universities and Colleges (RTOs)
• Regional Organisations

If dealing with other firms or competitors, the firm tends to target organisations with a good technical grounding. They also align customers for incremental innovation and prefer to maintain a long relationship with them.

Safeguards against product or service infringements are handled by getting the product to market before their competitors can catch on. They sometimes register a design, patent or rely on the complexity of their product. They always utilise trademarks and secrecy.

3. Environmental Dynamics

The company does have a formal environmental management plan (EMP) as well as a corporate management plan. Their EMP includes standards, general vision and even identifies businesses they prefer not to get involved with. At the local level it covers standards for dust collection, environmental committees, working of compliances and even codes of conduct.

Sustainability is rated very highly although environmental issues is seen as both a threat and opportunity.

The company claims there has been an increase in environmental awareness in the last 5 years. This change has largely come about because of their new CEO appointed several years ago. They are more aware of, for example, environment, harassment and safety issues.

The company did adopt a Triple Bottom Line Approach about 2 years ago. The firm audits every site and benchmarks every result. This current year they will be focussing on community engagement.

The company is also involved in external projects related to sustainability issues, one of which is a corporate partnership with an environmental entity and concentrates or regenerating areas. They are also involved in projects to encourage indigenous employment and work safety partnerships. The firm views such initiatives as good for business.

They have also invested in innovative (product, process or organisational) processes which recycles and catches rain water. They also specialise in electronically-based dust collecting equipment and are presently looking at ways to reduce waste from steel which has major greenhouse implications.

4. Collaboration

The company do not place a high or medium importance on collaboration. However they do assign a low priority to TAFE (Western Sydney Institute).

They do sponsor community groups such as Wild Life Rescue and a local environmental trust. The firm has specially engaged a consultant to find ways to interact with the local community. At the time of this interview, they planned to have their first meeting in a fortnight.

The firm does have common research projects but not with firms from the same business region. They also have links with 2 national organisations. Dealings with international organisations were made with a French multinational located in Asia – mainly about sharing safety performance information.

They did not put a strong emphasis on more links with knowledge institutions/organisations. They felt there were good reasons for such contact but were restrained by the lack of resources and time.

The firm is not involved with any business network, industry cluster or development network.
Background Information

Case Study L is a real-estate company located in Camden, NSW. They are a private, locally owned business with forty full-time employees. The business sees itself as being in the ‘standardisation’ phase within the Product/Service Life Cycle. It also sees itself in the ‘professional management’ phase of its life cycle.
The company was started about twenty years ago and was one of the first real estate companies in the area.

1. Innovation Drivers
The company claims to place a high priority on following ID-related areas and for the following reasons:

- Knowledge Intensity – Knowledge of real estate market and following market trends are pivotal to business.
- Connectivity – Networking in the industry is extremely important. They also operate on a multi-list basis with other companies.
- Community Engagement – Reputation of the company is largely based on word-of-mouth and so reputation and community views on company is paramount.
- Liveability – Many customers buy properties in area for a positive change in lifestyle and better value for money when buying or renting.
- Accessibility – important for area to have good infrastructure in order to counter negative perceptions.

Knowledge generation, transfer and integration are given medium importance. Entrepreneurship and Environmental Dynamics are given a low priority.

The organisation also feels it contributes to its local region in the following ways:

- Donate to charities and sports clubs.
- They provide advice on property and rental market.

The organisation also rates the following highly with regards to building a successful product/process innovation or business:

- Experience of the staff. They should have good knowledge of the industry and their role in the organisation.
- The position of our offices and their accessibility to the public.
- Ability to get hold of property and regional information quickly – use of computer technology for quick access.
- A good window display, so we can give clients good access to what they are offering.

2. Knowledge Intensity
The company claims to place a high priority on following Knowledge Intensive Activities and for the following reasons:

- IT consulting activities – Important because they have more than one office and information has to be transferred online between offices.
- Marketing related activities – Advertising is pivotal for real-estate businesses.
• R & D - Important for us when valuing a property. Need to research location, street and area. Help them understand where the property sits in the market place.
• IP related - Regarding our licensing, accounting and trust accounting is pivotal part of the business and has to be perfect all time.
• Strategic & Business Plan development – Prepare them for the good and bad scenarios. (also included in medium importance section)
• Data Collection for supporting work – Data and statistics collected over time is important to assist in sales.

Management consultancy (medium and low priority), Strategic/Business plan development, Community consultancy, New product/service development and Relationship building with government for policy awareness, all rated in the medium importance category.

At the lower end of the scale, Management consultancy (medium and low priority), Engineering consultancy, Employment and Environmental impact consulting were relegated as low priorities.

External service providers supply the following areas:
• In-House – Marketing, R & D, IP, Strategic-Business Plan development.
• Local/Regional organisation – IT, Marketing, Management consultancy, Strategy-Business Plan.
• State/Federal government – Environmental impact consulting.
• Universities/RTOs – none
• Private sector business – Marketing, R & D, IP, Management consultancy, Strategic-Business plan, Environmental impact consulting, New product/service development
• Industry association/networks – Marketing, Management consultancy, New product/service development.

The firm farms out a large amount of work to local entities, in some cases over multiple service providers eg. marketing and management consultancy.

Most external service providers are found through internal industry knowledge, knowing who deals with their competitors and via the local media such as the Sydney Morning Herald. Generally many companies will also directly approach the company.

The company claims to have a good relationship with their external service providers. They prefer to work with local building and pest inspectors, surveyors and conveyancing companies because they are more up to date with the area. A large number of them come from the region.

Integration of internal and external service providers’ activities is helped by the use of similar service providers across all their three offices, cutting down on the likelihood of confusion.

Staff is trained internally and externally – some are sent on training courses at the Real Estate Institute or a NSW industry cooperative. When new information comes on hand, like changes in tax laws, the firm attends seminars.

The company sell Knowledge Intensive Services (KIBS) in the Strategic and Business Plan Development advice/services area (real estate), largely in the LGA and the western Sydney region.
Relationships with various partner groups were both formal and informal in most cases. The firm has a formal relationship with the State Agency Cooperative and the Real Estate Institute. Relationships with local Chambers of Commerce were more informal. The only exceptions were that involving Universities and Colleges and Regional Organisations here with no contact recorded.

Safeguards against product infringements were occasionally done via patents. Informal methods such as secrecy and complexity of design were relied sporadically. However the firms edge came with the ‘speed to market’ abilities was a more common way to protect business imperatives.

3. Environmental Dynamics
The company does not have an environmental management plan (EMP).

While this company did not appear to formally recognise sustainability issues it indirectly admitted that if their clientele placed an importance on sustainability issues then the firm would respond.

When asked if the business saw environmental issues as an opportunity or a threat, they responded that this depended on the situation. Population and housing growth can be good for business however limitations on regional water supply can hamper any environmental initiatives.

The company does not include social and/or environmental information in their reports, nor do they use a ‘Triple Bottom Line Approach’. They are not involved in any environmentally-based external project or partnership.

Several environmental-based innovation initiatives have been adopted such as recycling paper, cutting down on electric light usage during daylight hours and limiting reprinting.

4. Collaboration
Only a medium level collaborative relationship was struck up with MACROC. Low level ties existed with UWS, TAFE, DIPNR, Greater Western Sydney Regional Organisation of Chambers, local Chambers of Commerce and industry and the Macarthur Workplace Learning Inc. All relationships were informal, with the exception of DIPNR.

The company claimed to have common research projects with other companies, both in outside of the region.

They also have links with national organisations such as the Real Estate Institute and the NSW Department of Fair Trading. They did not have any links with international organisations.

They appeared to recognise the importance of forging stronger links with knowledge institutions within the region. They are involved in a business network called the Estate Agents Cooperative (EAC) who meet up during Christmas.

The company is not involved in any industry cluster or developmental network.
Appendix B: Interview Discussion Guide © AEGIS, 2004

Background Information

Name of Respondent:
Title:
Company Name:
Address:
Contact Details:
Public / Private:
Main Product / Service:
No of Years Operating:
No Employees (FTE):
Ownership: National: [ ]
International: [ ]

Part 1 – Innovation Drivers

1. Please rank the following innovation drivers according to the importance of the driver to your organisation’s innovation capacity building.

<table>
<thead>
<tr>
<th>Innovation Drivers</th>
<th>High Importance</th>
<th>Medium Importance</th>
<th>Low Importance</th>
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</thead>
<tbody>
<tr>
<td>1. Knowledge Intensity</td>
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<tr>
<td>2. Connectivity (Network)</td>
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<tr>
<td>3. Knowledge Generation, Transfer and Integration</td>
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<tr>
<td>4. Entrepreneurship</td>
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<tr>
<td>5. Environmental Dynamics</td>
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</table>

50. Knowledge Intensity: activities and inputs requiring intelligence and high application of knowledge and skills.
51. Connectivity: the importance of interaction, activities and engagement to networks, other companies and research institutions etc.
52. Knowledge Generation, Transfer and Integration: capacity to produce knowledge inputs that can be transferred and then integrated in other organizations.
53. Entrepreneurship: capacity of start up and organisations commercialising products or/and services.
54. Environmental Dynamics: Environmental factors contributing to the development of liveable spaces, growth in knowledge economy and high technology jobs, and the conservation of natural capital in the face of resource scarcity and degradation (e.g. pollution treatment technology)
2. Please explain the IDs nominated as of ‘high importance’. How and why do they contribute to your organisation’s innovation capability building?

3. Is your organisation involved in Activities related to each of the Innovation Drivers? Please specify the frequency.

<table>
<thead>
<tr>
<th>Innovation Drivers</th>
<th>Very Often</th>
<th>Often</th>
<th>Not Often</th>
<th>Example of activities</th>
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<tr>
<td>11. Knowledge Intensity</td>
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<td>12. Connectivity (Network)</td>
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<td>13. Knowledge Generation, Transfer and Integration</td>
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<td>14. Entrepreneurship</td>
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<td>15. Environmental Dynamics</td>
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<td>16. Community Engagements</td>
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<td>17. Liveability (life-style)</td>
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<td>18. Accessibility (mobility and choices)</td>
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<td>19. Other driver?</td>
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<tr>
<td>20. Other driver?</td>
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</table>

4. What do you think your company contribute to the local area?

5. What capabilities do you think are required for successful innovation of your organisation?

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55. Community Engagement: capacity to interact with the broader community (e.g. interaction with community organisations).
56. Liveability: capacity of a city or region to provide spaces for human behaviour impaction on life.
57. Accessibility: accessibility and mobility within the region (e.g. transport or mobile communication).
Part 2 – Knowledge Intensity

6. Which knowledge intensive activities do you use and how important are they in developing your products/services?

<table>
<thead>
<tr>
<th>KNOWLEDGE INTENSIVE SERVICE ACTIVITIES</th>
<th>High Importance</th>
<th>Medium Importance</th>
<th>Low Importance</th>
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</thead>
<tbody>
<tr>
<td>1. IT Consulting Activities</td>
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<tr>
<td>2. Marketing Related Activities</td>
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<td>3. Research and Development Activities</td>
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<td>4. IP Related (legal and accounting) Activities</td>
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<tr>
<td>5. Management Consultancy Related to Organisational Aspects of Product Development</td>
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<tr>
<td>6. Engineering Consultancy Related to Product and Process Development</td>
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<td>7. Employment Agency (supply of specific personnel)</td>
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<td>8. Strategic and Business Plan Development related activities</td>
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<td>9. Environmental Impact Consulting Activities</td>
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<td>10. Community Consultancy Activities</td>
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<tr>
<td>11. New Product/Service Development Consultancy Activities</td>
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<td>12. Other</td>
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</tbody>
</table>
7. Please indicate which knowledge intensive services activities your company does according to your company life cycle?

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<thead>
<tr>
<th>KNOWLEDGE INTENSIVE SERVICE ACTIVITIES</th>
<th>Start Up</th>
<th>Entrepreneurial</th>
<th>Professional Management</th>
<th>Expansion</th>
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<tbody>
<tr>
<td>1. IT Consulting Activities</td>
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<td>9. Environmental Impact Consulting Activities</td>
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<td>10. Community Consultancy Activities?</td>
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<td>11. Other?</td>
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</table>

Why are these activities important in each stage?

58. Organisation is less than 6 months old
59. Organisation is between 6 months and 2 years old
60. Organisation has formalisation of rules and stable structure
8. Who provides the ‘services’ involved in the activities you noted in the previous question? Please tick all boxes that you need for each line.

<table>
<thead>
<tr>
<th>KNOWLEDGE INTENSIVE SERVICES</th>
<th>In House</th>
<th>Local or Regional Organisations</th>
<th>State / Federal Governments</th>
<th>Universities / PSR* (RTOs)</th>
<th>Private Sector Businesses (KIBS)</th>
<th>Industry Associations / Networks</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IT Consulting Services</td>
<td>□</td>
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<td>2. Marketing Services</td>
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<td>3. Research and Development Services</td>
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<tr>
<td>4. IP Related (legal and accounting) Services</td>
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<tr>
<td>5. Management Consultancy Services Related to Organisational Aspects of Product Development</td>
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<tr>
<td>6. Engineering Consultancy Services Related to Product and Process Development</td>
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<tr>
<td>7. Employment Agency (Supply of Specific Personnel) Services</td>
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<tr>
<td>8. Strategic and Business Plan Development Advice / Services</td>
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<tr>
<td>9. Environmental Impact Consulting</td>
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<td>10. New product/service development Consultancy</td>
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<tr>
<td>11. Other?</td>
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</table>

*PSR= Public Service Research

9. How does your firm source external services? How does your firm interact with the external service providers? Do you collaborate with the service providers in designing the final activity?

10. How is the effectiveness and quality of your relationship with the external service providers? Specifically with the local service providers?
11. **Where were the service providers located?** Please tick one box only for each line.

<table>
<thead>
<tr>
<th>KNOWLEDGE INTENSIVE SERVICES</th>
<th>In House</th>
<th>Local (within your LGA)</th>
<th>Regional (within Western Sydney)</th>
<th>State or National</th>
<th>International</th>
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</thead>
<tbody>
<tr>
<td>1. IT Consulting Services</td>
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<td>2. Marketing Services</td>
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<td>3. Research and Development Services</td>
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<tr>
<td>4. IP Related (legal and accounting) Services</td>
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<td>5. Management Consultancy Services Related to Organisational Aspects of Product Development</td>
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<td>6. Engineering Consultancy Services Related to Product and Process Development</td>
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<tr>
<td>7. Employment Agency Supply of Specific Personnel</td>
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<td>8. Strategic and Business Plan Development Advice / Services</td>
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<td>9. Environmental Impact Consulting</td>
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<tr>
<td>10. New product/service development Consultancy</td>
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<tr>
<td>11. Other?</td>
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</tbody>
</table>

12. How does your firm integrate internal and external service providers’ activities?
13. **Where does your firm sell any of the following knowledge intensive services** to other firms along with your products? Please tick all or any boxes.

<table>
<thead>
<tr>
<th>KNOWLEDGE INTENSIVE SERVICES</th>
<th>Local (within your LGA)</th>
<th>Regional (within Western Sydney)</th>
<th>State or National</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IT Consulting Services</td>
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<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>2. Marketing Services</td>
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<tr>
<td>3. Research and Development Services</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>4. IP Related (legal and accounting) Services</td>
<td>☐</td>
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<td>☐</td>
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<tr>
<td>5. Management Consultancy Related to Organisational Aspects of Product Development</td>
<td>☐</td>
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<tr>
<td>6. Engineering Consultancy Services Related to Product and Process Development</td>
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<tr>
<td>7. Employment Agency (Supply of Specific Personnel) Services</td>
<td>☐</td>
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<tr>
<td>8. Strategic and Business Plan Development Advice / Services</td>
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<tr>
<td>9. Environmental Impact Consulting</td>
<td>☐</td>
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<tr>
<td>10. New product/service development Consultancy</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>11. Other?</td>
<td>☐</td>
<td>☐</td>
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<td>☐</td>
</tr>
</tbody>
</table>
14. What **type of cooperation** arrangements does your organisation have while engaged in Knowledge Intensive Service Activities?

<table>
<thead>
<tr>
<th>KISA PARTNERS</th>
<th>Formal (contracted)</th>
<th>Informal (non-contracted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Other firms within the same industrial group (Network)</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>2. Competitors</td>
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<td>☐</td>
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<tr>
<td>3. Customers</td>
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<tr>
<td>4. Consultancy Firms (KIBS)</td>
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<td>☐</td>
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<tr>
<td>5. Public Institutions</td>
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<td>☐</td>
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<tr>
<td>6. Universities and Colleges (RTOs)</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>7. Industry Associations</td>
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<tr>
<td>10. Regional Organisations</td>
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<tr>
<td>11. Other</td>
<td>☐</td>
<td>☐</td>
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</tbody>
</table>

15. How is knowledge assessed, assimilated and combined within the firm?
16. Does your organization make use of any of the following methods to **protect knowledge developed in-house**? Please tick only one box in any line.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>Never</th>
<th>Sometimes</th>
<th>Systematically</th>
<th>Do not know</th>
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<tbody>
<tr>
<td><strong>Formal Methods</strong></td>
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<td></td>
<td></td>
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<tr>
<td>1. Registration of design</td>
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<tr>
<td>2. Trademarks</td>
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<tr>
<td>3. Copyright</td>
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<tr>
<td>4. Patents</td>
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<tr>
<td>5. Others, please specify</td>
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<td></td>
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<tr>
<td><strong>Informal Methods</strong></td>
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<td></td>
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<tr>
<td>6. Secrecy</td>
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<tr>
<td>7. Complexity of design</td>
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<tr>
<td>8. Speed to market</td>
<td></td>
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<tr>
<td>9. Others, please specify</td>
<td></td>
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</tbody>
</table>

**Part 3 – Environmental Dynamics**

17. Does your company/organisation have an Environmental Management Plan?

18. Does your corporate reporting include environmental and social information?

19. How important does your company / organisation rate sustainability issues in regard to business success?

20. Are environmental issues seen as an opportunity or a threat to your organisation?

21. Has your organisation’s awareness of environmental issues changed over the past 5 years? How has this awareness changed? What have been the drivers?
22. Does your corporate reporting include social and/or environmental information or take a Triple Bottom Line Approach?61

23. Is your company involved in any external projects or partnerships that relate to sustainability?

24. Has your company / organisation invested in innovation (product, process or organisational) in relation to environmental outcomes? (E.g. material efficiency, saving energy or water, reducing waste, cutting compliance costs etc.)

Part 3 – Collaboration

25. Does your company have common research projects with other companies?
   Yes □
   No □

If yes, are these companies within the same sector or different sectors?

Are they within the same region?    Yes □
   No □

26. Does your company collaborate with any of the following institutions / organisations in Western Sydney? Please tick only one option.

   If yes, which type of interaction does your organisation have with these institutions / organisations? Please tick as many options as you like.

<table>
<thead>
<tr>
<th>Organisations</th>
<th>Importance of Interaction (Please tick as many boxes as you like)</th>
<th>Type of Interaction (Please tick as many boxes as you like)</th>
<th>Example of KISA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Sydney Regional Organisation of Councils (WSROC)</td>
<td>□ □ □ □</td>
<td>□ □ □ □ □ □</td>
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<tr>
<td>Greater Western Sydney Economic Development Board</td>
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<td></td>
</tr>
<tr>
<td>Macarthur Regional Organisation of Councils (MACROC)</td>
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<td>□ □ □ □ □ □</td>
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<tr>
<td>University of Western Sydney</td>
<td>□ □ □ □</td>
<td>□ □ □ □ □ □</td>
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</tr>
</tbody>
</table>

61. A Triple Bottom line approach is the reporting of a series of environmental, social and economic indicators, either within the corporate plan or an external document. The indicators can relate to internal or external issues that affect the company. Also the Global Reporting Initiative comes under the Triple Bottom Line approach.
Innovation at the Edges: The role of Innovation Drivers in South West Sydney

<table>
<thead>
<tr>
<th>Organisations</th>
<th>Importance of Interaction</th>
<th>Type of Interaction</th>
<th>Example of KISA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Importance</td>
<td>Medium Importance</td>
<td>Low Importance</td>
</tr>
<tr>
<td></td>
<td>Formal Activities (e.g. board member)</td>
<td>Informal Activities (e.g. sharing information)</td>
<td>Current Projects</td>
</tr>
<tr>
<td>TAFE, Western Sydney Institute</td>
<td></td>
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<tr>
<td>GROW</td>
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<tr>
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<tr>
<td>Australian Business Limited</td>
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<tr>
<td>Australian Industry Group</td>
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<tr>
<td>Department of State and Regional Development, Western Sydney Office,</td>
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<tr>
<td>Penrith Valley Economic Development Corporation</td>
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<tr>
<td>Industry Capabilities Network</td>
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<tr>
<td>Business Advisory Service Inc.</td>
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<tr>
<td>The Greater Western Sydney Business Connection Inc.</td>
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<tr>
<td>Other:</td>
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<tr>
<td>Other:</td>
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</tbody>
</table>

27. Does your firm have any links to other national or international organisations or institutions?
   
   National: [ ]
   
   Yes [ ] Please specify
   
   No [ ]
   
   International: [ ]
   
   Yes [ ] Please specify
   
   No [ ]

28. Would your organisation want to have more links with knowledge institutions/organisations within the region?
   
   Yes [ ] - Why?
   
   No [ ] - Why not?

29. What would you like to change to improve your knowledge acquisition / sharing with the knowledge institutions in the region?

30. Is your company involved in any business network? Which one? When did your company join the network? What are the benefits?

31. Is your company involved in any industry cluster? Which one? When did your company join the cluster? What are the benefits?

32. Is your company involved in any development network (eg institutions lead networks)? Which one? When did your company join this type of network? What are the benefits?

Thank you