

Strategic Serendipity

The art of being in the right place at the right time...
with the right people

September 2011





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time... with the right people**

**A summary of the *Northern Sydney Global Technology
Corridor Clustering study*, with commentary on how
better collaboration can make for a more innovative,
productive and prosperous Australia**

Larry Page and Sergey Brin met at Stanford University in 1995 when Page, 22, a graduate of the University of Michigan, was considering Stanford, and Brin, 21, was assigned to show him around. According to some accounts, Page and Brin disagreed about almost everything during that first meeting. Today they are the multi-billionaire co-founders of Google.

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September 2011

Published by the Australian Business Foundation Limited
ABN 56 067 381 999
Level 12, 83 Clarence St, Sydney NSW 2000, Australia

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Designed & typeset by: Kim Webber, Southern Star Design
Cover design by: Mandos Design Pty Ltd

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Preface

ABOUT THE AUSTRALIAN BUSINESS FOUNDATION

www.abfoundation.com.au

The Australian Business Foundation is a unique business-sponsored, collaborative research body at the centre of a vibrant community involving Australian and international scholars, policymakers, opinion leaders and business executives. Established as a non-profit company, the Australian Business Foundation has for over a decade nurtured evidence-based research into business innovation and sustainability, emerging models of business competitiveness, and opportunities arising from a knowledge economy.

The Australian Business Foundation's pioneering research role has been matched by its ability to interpret and make sense of research findings and translate them into practical action. The Foundation works to bridge the gap between research and those in public policy and at the business coalface who strive to build Australia's capabilities and global competitiveness.

ABOUT THE NORTHERN SYDNEY GLOBAL TECHNOLOGY CORRIDOR CLUSTERING STUDY

This study, *Northern Sydney's Global Technology Corridor: A Scoping Study of Cluster Development*, was undertaken by Macquarie Graduate School of Management, University of Technology Sydney and Bugseye in collaboration with the NSW Government Industry Department (then named the Department of State and Regional Development) and the Australian Business Foundation. The principals for the report were Professor Roy Green, Dean of the Faculty of Business at the University of Technology Sydney, and Kate Hughes, a research associate at the Macquarie Graduate School of Management.

The aim of the Northern Sydney Global Technology Corridor Clustering study was to determine whether businesses in two prominent high technology sectors of northern Sydney are operating as industry clusters, exhibit some limited evidence of clustering or are only an agglomeration of businesses in the same industry in a single geographical location. A further aim was to provide a sound empirical basis for policy intervention to facilitate clustering and to maximise its economic impact.

For more details about this study, please refer to Alok Rahan of the NSW Department of Trade and Investment, Regional Infrastructure and Services at alok.rahan@business.nsw.gov.au.

ABOUT THE AUTHOR

Darren Horrigan was commissioned by the Australian Business Foundation to write this overview paper on the Northern Sydney Clustering study. Darren is a journalist and writer based in Sydney. He covered general news, local government, State politics and crime for *The Sydney Morning Herald* and has been a regular contributor on business and technology to *The Age*, *The Bulletin*, *BRW*, *CFO Magazine*, and *CIO Magazine*. Darren worked in media relations and public affairs for Australian Business Limited, Landcom and Telstra. He is also a former press secretary to the NSW Minister for Police. His corporate writing includes speeches for Alcatel, Microsoft, Teradata and Telstra, and thought leadership articles for American Express, Austrade, Booz Allen, PricewaterhouseCoopers, and Unisys.

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1. Introduction

Take a panorama of that part of Sydney from the northern approach to the Harbour Bridge, through Chatswood and Macquarie Park to Pennant Hills, south to Carlingford, Dundas and Ermington, then east along the Parramatta River back to the bridge. You will see a quintessentially Australian mix of inner-suburbia, light industrial, high street commercial, business centre, technology park and bushland.

Professor Roy Green, Dean of the Faculty of Business at the University of Technology Sydney, and Kate Hughes from the Macquarie Graduate School of Management, took a more focused view of this area for a recent research project. Intrigued by what may lie behind this urban facade, Green and Hughes found a concentration of about 1,560 information and communications technology (ICT) firms and 75 biomedical firms. They wondered what, if anything, might be happening among them.

Is it coincidence that has brought so many high tech companies to this part of northern Sydney? Do firms within this geographic zone interact? Is there a flow of knowledge and ideas between individuals who work here? Can we go as far to say that this grouping of technology firms in this part of Sydney is a dynamic industry cluster?

Green and Hughes say this area, which they dubbed the Northern Sydney Global Technology Corridor, is a region of national significance because the two knowledge-driven industry sectors that have emerged here are both acknowledged by policymakers as critical to Australia's future prosperity.

Their research project, *Northern Sydney's Global Technology Corridor: A Scoping Study of Cluster Development*, sought to develop a methodology to identify clustering activity among geographically co-located businesses in this region; investigate the physical attributes that attract and keep businesses in this region; and examine the level and intensity of clustering in the two high tech sectors that are predominant in this region.

The Australian Business Foundation was a partner in this research, and has produced this paper to promote the study's insights and galvanise debate on the role of industry clustering in increasing the competitiveness and productivity of firms, regions and nations.

Authored by Darren Horrigan, this paper, *Strategic Serendipity: The Art of Being in the Right Place at the Right Time With the Right People*, has three goals.

First, it outlines the work conducted by Green and Hughes, and provides a summary of their findings.

Second, it explains why collaboration and industry clustering are important to Australian businesses, and why our governments and policymakers should be interested in what clusters can achieve.

Third, it goes beyond the study's conclusions to capture the implications of what its findings mean for Australia. This includes commentary on how some current debates — such as those about regional development, investment in infrastructure, and the National Broadband Network — fuel discussion about the economic and social benefits of industry clusters.

It is our intention to provoke fresh questions about industry clusters in an Australian context. We want to show how clusters are not just of theoretical interest to business thinkers and academics, but also how they can achieve tangible results for all Australians. This paper explains the importance of creating new sources of competitive advantage for Australia through fostering dynamic and connected hubs of high-performing industries in vibrant communities.

Some of the central questions we seek to answer include:

How can businesses within the Northern Sydney Global Technology Corridor, and governments, transform what the study found into something of more commercial and social value?

Why should they bother?

Is there a role for our universities in fostering knowledge transfer with and between businesses?

In the late 19th century, Alfred Marshall, the English economist, identified a collection of potteries in the north of England as perhaps the world's first industrial cluster. Economists, political scientists and many others have since wondered why such expertise and infrastructure was concentrated in one place to make it a source of superior competitive advantage for the production of pottery.

There have been many other such clusters, such as the textile, clothing and fashion companies of northern Italy, which became known as the Third Italy; the high tech cluster at Cambridge in the UK; and the most successful clusters of our time, Silicon Valley and Hollywood.

All of these examples combine talent and expertise, through networking and collaboration, which in turn contributes to the creativity, momentum, and critical mass of all the supply chains within these production systems. And they are clearly models for the way many small countries have chosen to proceed, such as Ireland, Finland, Singapore, and Israel. Each has developed competitive clusters around ICT, micro-electronics, medical technologies, and pharmaceuticals.

The big questions for Australia:

Do we have comparable clusters here? If not, is it time we did? Why?

The questions for any country interested in clusters:

Can governments create clusters? Is there a risk of being too specialised? Do clusters constitute favouritism? Are some firms too competitive to co-operate? Is a rural cluster an oxymoron? Will advances in information and communications technologies negate the advantage of proximity? Can clusters serve low income people and places? Do decaying clusters have an afterlife?

The Australian Business Foundation seeks some answers in this paper, and invites further discussion.

2. Agglomeration, a cluster, or something else?

This description of the genesis, questions and methodology of the Northern Sydney Global Technology Corridor Clustering study outlines what Professor Roy Green and Kate Hughes set out to achieve; explains how their findings are a result of academic inquiry and evidence; and provides a summary of the study's conclusions.

THE PURPOSE OF THE NORTHERN SYDNEY GLOBAL TECHNOLOGY CORRIDOR CLUSTERING STUDY

The Macquarie Graduate School of Management, the then NSW Department of State and Regional Development, and the Australian Business Foundation instigated this research on industry cluster development in northern Sydney with the University of Technology, Sydney, and Bugseye, a specialist consultancy that provides strategic research for governments and business.

The subsequent report by Professor Roy Green and Kate Hughes, *Northern Sydney's Global Technology Corridor: A Scoping Study of Cluster Development*, explores the locational drivers, activities and linkages of businesses and research and educational institutions in the information and communications technologies (ICT) and biomedical sectors in this region¹.

Green and Hughes say the genesis of their research was the growing international literature and experience pointing to significant competitive advantage for regions which have a concentration of innovative and entrepreneurial activity. When compared with others, businesses in such regions tended to be in the same or related industries, be in close proximity, have a heightened level of knowledge exchange through customer-supplier relationships and informal networks, and have a greater density of collaborative ventures and enhanced levels of innovation.

This phenomenon, identified as industry clustering, has been a topic of interest to economists ever since Alfred Marshall interpreted the success of "The Potteries" in the north of England at the end of the 19th century as being due to the concentration of locally-generated skill, expertise, relationships and infrastructure in a cohesive industrial district.

Green and Hughes say the analysis of clusters has achieved more recent prominence with the growth of high-tech clusters in regions such as California's Silicon Valley, the Carolinas' Research Triangle in the US, Cambridge in the UK, Sophia Antipolis in France and Munich in southern Germany, as well as in national economies such as Singapore, Finland and Israel.

¹ For details of this study contact: Alok Rahan at alok.rahan@business.nsw.gov.au

The central question for Green and Hughes is whether the geographical collection of businesses in a defined part of northern Sydney is more than an agglomeration and has acquired the attributes of a regional cluster. Their study sought to develop a better understanding of the conditions which drive, or have the potential to drive, successful industry clustering in Australia.

What factors had contributed to the structure and composition of the Northern Sydney Global Technology Corridor as it exists today? What forces had shaped its resident businesses, its industry groupings and associated flows of labour, and its transport connections? What had influenced the region's networks with finance institutions and links to education and training facilities?

Green and Hughes believed that analysing the current state of clustering activities, linkages and networks in the Northern Sydney Global Technology Corridor would allow business, public agencies and others to identify gaps and opportunities in cluster development for the region, and provide some evidence for sound policymaking on clustering in general.

While this study focuses on a corridor of suburbs in northern Sydney, its findings and insights are relevant to anyone championing the economic and social benefits of clustering in their own communities and regions.

WHAT ARE CLUSTERS?

Green and Hughes say industry clusters are often identified as simply a group of businesses in the same industry, or associated activities across a number of industries, located in close proximity. However, their study contends that such agglomerations of co-located businesses are not sufficient to be regarded as a cluster.

In policy and research literature a cluster is characterised as a set of linkages — either horizontal across organisations or vertical through a value chain — which add value through collaboration, networking and other types of interaction.

The distinguishing feature of industry clusters is not just in tangible commercial activities such as customer-supplier relationships, but also in the social infrastructure of these relationships. This includes the level of information flow and knowledge exchange which enable them to achieve competitive advantage in local and international markets.

Green and Hughes say conventional wisdom on clustering and innovation suggests the main attributes of successful clusters are:

- geographical concentration of firms in the same or related industry sectors, with the presence of some large, preferably global firms;
- access to global as well as local markets with supporting infrastructure, particularly transport and communications, and access to finance;
- local capability in firms to source inputs and produce goods and services not only for end use customers but also in supply chains;
- critical mass of innovative activity in local firms and organisations, underpinned by a dynamic and high quality skill base; and
- sourcing of knowledge in firms through interaction with research and educational institutions, as well as with other firms.

These are the criteria Green and Hughes used to evaluate the structure, characteristics and performance of the Northern Sydney Global Technology Corridor.

The key question:

Is the Northern Sydney Global Technology Corridor operating as a dynamic, connected cluster of businesses and other players sharing knowledge and opportunities for maximum economic impact for themselves and the region? Or is it simply an agglomeration of co-located but otherwise self-sufficient and standalone businesses?

WHAT THE NORTHERN SYDNEY GLOBAL TECHNOLOGY CORRIDOR CLUSTERING STUDY DID

The research for the Northern Sydney Global Technology Corridor Clustering study was undertaken on two levels. Initially, as an overview of the whole range of businesses in the Corridor and then in-depth, focusing on the two targeted industries — information and communications technology (ICT) and biomedical technologies (including medical devices and pharmaceuticals).

Green and Hughes say the choice of these industries was primarily due to their current high profile with governments of both developing and developed nations; their potential for linkage with research and educational institutions; the large number of academic and industry-based studies relating to clustering; and the fact that their study would not be an isolated piece of research, but rather, could be used in the future as the basis for comparisons with clusters in other regions.

ICT and biotechnology are considered to be, as the ScienceBusiness Innovation Board said in 2008, “the primary physical manifestation of a knowledge economy.”² The significance of these two sectors to growth in Australia, and globally, was highlighted in recent studies by KPMG in 2008³ and Ernst & Young in 2009. Ernst & Young ranks Australia as the top biotechnology country in Asia and the sixth in the world⁴. Professor Ian Frazer, Director, University of Queensland Diamantina Institute for Cancer, Immunology and Metabolic Medicine (DI), says Australia’s biotechnology industry grew from 190 core biotechnology businesses in 2001 to more than 460 in 2009⁵. Frazer says “a combination of excellent research facilities, innovative scientists, a can-do attitude and a strong but flexible regulatory regime has made Australia a biotechnology powerhouse.”

Green and Hughes say it is widely accepted that ICT is critical to productivity growth, employment and competitiveness. In Australia, ICT accounts for 85 per cent of productivity growth in the manufacturing sector and 78 per cent in services⁶. Sydney and NSW account for 44 per cent of Australia’s ICT businesses, 40 per cent of industry value-add, and over 80 per cent of ICT services export growth over the past decade⁷.

The Northern Sydney Global Technology Corridor study combined data from 39 interviews and two surveys. The researchers interviewed a representative sample of managers in the ICT sector and in the biomedical sector. The interviews provided an understanding of the

² ScienceBusiness Innovation Board; Clustering for Growth: How to build dynamic innovation clusters in Europe, 2008.

³ KPMG; Competitive Alternatives: KPMG’s Guide to International Business Location, 2008. Viewed at <http://www.mmkconsulting.com/compalts/reports/index.html>

⁴ Ernst & Young; Beyond Borders: *Ernst & Young Global Biotechnology Report 2009*

⁵ Professor Ian Frazer; Australian biotechnology is a burgeoning success story. Viewed at Global Alliance of SMEs: http://www.globalsmes.org/news/index.php?func=detail&detailid=548&catalog=27&lan=en&search_keywords

⁶ Australian Bureau of Statistics; 8126.0 - Information and Communication Technology - 2006-07. Viewed at www.abs.gov.au

⁷ Centre for Economic Industry Innovative Research; *Australian Computer Society. The ICT Industry Report: Executive Summary*, January, 2008.

perceived advantages and challenges of locating a business in the Northern Sydney Global Technology Corridor — attributes that were identified by the interviewees and included in a revealed preference survey which had 55 usable responses. The 21 attributes were scaled and then ranked so results could be compared.

The second survey was a questionnaire with 96 usable responses from senior managers or owners of high technology businesses in the Northern Sydney Global Technology Corridor. This survey asked respondents to indicate the type and level of activities their businesses pursued in the region, the type of linkages and interactions, and the knowledge flows.

The approach and sequence of the research by Green and Hughes was designed so they could:

- (1) identify and locate all businesses in the series of business parks and commercial zones along the northern shore of the Parramatta River extending west from North Sydney to Pennant Hills through the use of GIS mapping techniques;
- (2) determine the actual or potential cluster boundaries by mapping the geographic location of businesses in these industries, recognising that they are porous and do not necessarily follow local government area boundaries;
- (3) select two specific technology sectors of interest in this region on the basis of knowledge intensity, growth potential and strategic interest on the part of public agencies, with potential for linkage with research and educational institutions;
- (4) interview business owners or middle-senior managers of businesses in the target industries, from micro to large, from start-ups to long-established businesses, from domestic Australian businesses to multinational companies, from manufacturing and service businesses;
- (5) interview a select number of key informants from industry associations, research groups and tertiary education providers in the region;
- (6) develop survey instruments from the interviews and research methodology to identify locational drivers and current activities impacting on these businesses, including questions from international surveys for comparability;
- (7) identify the level and intensity of business collaboration, innovation and (horizontal and vertical) linkages within these industries;
- (8) compare the activities of ICT and biomedical businesses in the Northern Sydney Global Technology Corridor with documented characteristics of successful clusters, particularly in the US and UK, to determine whether they are functioning, globally-competitive clusters, with strong linkages to research and educational institutions; or are co-located businesses operating as nascent clusters with a limited but recognisable set of clustering activities; or co-located businesses which comprise an agglomeration but exhibit no clustering characteristics⁸.

WHAT THE STUDY FOUND

Having spent five years as Dean of the Business School at the National University of Ireland at Galway, Green understood why many people in Australia believed the collection of companies in the northern part of Sydney had a similar look, if not feel, to the west coast of Ireland.

The Irish had fashioned their agglomeration of technology companies, large and small, into what they called the Atlantic Technology Corridor. Could Sydney's equivalent be a Pacific version?

⁸ Centre for Economic Industry Innovative Research; *Northern Sydney's Global Technology Corridor: A Scoping Study of Cluster Development*, 2009

Both agglomerations might *look* the same, but do they *think* and *act* the same? Do companies in this part of northern Sydney generate the dynamism, competitiveness and outcomes of a cluster? Do they indulge in the same type of productive cluster activity as companies in the Atlantic Technology Corridor, Munich's medical technology cluster, or Silicon Valley?

Green and Hughes discovered they do not. This is the inconvenient truth about their Northern Sydney Global Technology Corridor research.

The study found that the Northern Sydney Global Technology Corridor has some attributes of clustering, but it lacks the higher level and more complex interactions among firms and research and education institutions that are the hallmark of innovative cluster activity overseas. The attributes of the Northern Sydney Global Technology Corridor indicate nascent or emerging clusters in this region, which can be fostered by considered and concerted leadership and intervention by business leaders and public policy makers.

Green and Hughes report five major findings, categorised according to what they say are the essential attributes of clustering:

1. Geographical concentration of firms in the same or related industry sectors, with the presence of some large, preferably global firms

ICT and biomedical technology companies are more prevalent in northern Sydney than any other part of Australia. Over many years, they have had a tendency to co-locate in this region. Many of these businesses are a result of foreign direct investment. They operate as multinational companies with a focus on the Asia-Pacific region. But while these firms are attracted to this location, it is unclear what advantage they make of their proximity to each other.

The study's survey respondents reflected a range of business sizes, from sole traders to businesses with employees in the thousands. About a third of the respondents were multinational headquarters and local subsidiaries, and almost half were Australian companies. Three-quarters of the respondents indicated that their businesses were originally established in the Northern Sydney Global Technology Corridor.

2. Access to global as well as local markets with supporting infrastructure, particularly transport and communications

Green and Hughes say that in general, the ICT and biomedical firms surveyed regard the Northern Sydney Global Technology Corridor as a favourable location for business, with satisfactory supporting infrastructure. The highest priority for firms in these sectors was access to clients or customers. This provided some initial evidence of interaction among firms in the region, although these interactions were predominantly transactions rather than innovative or knowledge-sharing activities.

The primary constraints on the performance of businesses in the Northern Sydney Global Technology Corridor were market demand and increasing competition. The major issue for businesses was sourcing skilled labour, including personnel at management level.

3. Local capability in firms to source inputs and produce goods and services not only for end use customers, but also in supply chains

The pattern of customer-supplier relationships within the region, and externally, indicates substantial local capability, according to Green and Hughes. Although some of the businesses in the region do not source any inputs from within the Northern Sydney Global Technology Corridor, the majority of respondents source at least some of their inputs from the region.

About a quarter of businesses source more than half their goods from overseas markets. This indicates there is strong local capability and a market providing a range of inputs sourced from the Northern Sydney Global Technology Corridor, in combination with products and services from overseas locations and the rest of Australia.

Green and Hughes say outputs from the Northern Sydney Global Technology Corridor follow a similar pattern to business inputs. While most businesses export to overseas markets, almost one-third have no outputs destined for overseas markets. The major proportion of outputs from these businesses is for the local market in the Northern Sydney Global Technology Corridor and the rest of Australia.

These results indicate that the supply chains of these high technology businesses flow *within* the Northern Sydney Global Technology Corridor, pass *through* the region to other businesses in Australia, and *link* to international markets.

4. Critical mass of innovative activity in local firms and organisations, underpinned by a dynamic and high quality skill base

A further element of clustering is the type and extent of innovative activities pursued in a physical location, including new product, service or process development; adaption or adoption of new technologies and activities; and research and development.

The study found that these activities are pursued in the Northern Sydney Global Technology Corridor by about half of the ICT and biomedical firms. This refutes the perception that firms in the region are exclusively engaged in sales and marketing, but it does not demonstrate that innovation is a major component of business activity.

A small but significant group of firms reported no innovative activities, some reported a minimal level of these activities completed elsewhere in Australia, and a slightly higher proportion reported overseas innovative activity. This last finding reflects the presence of multinational and local subsidiary firms in the region.

With regard to skills and qualifications, the majority of businesses in the Northern Sydney Global Technology Corridor's two high technology sectors employ university graduates. While half the respondents estimated that over 50 percent of their employees had a degree, the remainder of the businesses also had a sizeable proportion of graduates in their workforce. However, only 20 percent of businesses recruited people with a first degree and only 1 percent recruited employees at postdoctoral level.

Results from a similar study of innovation in high technology industry clusters in the UK and US⁹ revealed that 45 percent of firms recruited university graduates at undergraduate level, with 15 percent in the USA and 30 percent in the UK employing at the postdoctoral level.

5. Sourcing of knowledge in firms through interaction with research and educational institutions, as well as with other firms

Green and Hughes found that despite the employment of university graduates by many businesses in the Northern Sydney Global Technology Corridor, linkages with universities and research providers were minimal and operated predominantly at the level of informal

⁹ Professor Alan Hughes, Director of the UK Innovation Research Centre at the University of Cambridge, and Professor Andy Cosh, Programme Director for Enterprise and Innovation at the University of Cambridge Centre for Business Research, and Richard Lester, founding Director of the Industrial Performance Center at the Massachusetts Institute of Technology, *International Innovation Benchmarking and Start-Up Businesses*, May 2005

contacts. About a quarter of firms claimed this type of interaction. This was less than half the proportion of UK and US firms reporting informal contacts as a significant type of interaction.

The use of publications and conferences by the UK and US firms were both close to 40 percent, compared with the sample from the Northern Sydney Global Technology Corridor, which reported use of publications at a low 3 percent and conference attendance at almost 15 percent.

Other interactions between business and research and education providers, such as technology licensing, and internships, were also low.

Similarly, while sources of new information and knowledge within the Northern Sydney Global Technology Corridor are diverse, they are more internally focused than in other developed economies. Respondents were given a range of possible knowledge sources and asked to select the top five. Green and Hughes report that the majority indicated that knowledge transfer within the business was the predominant source of knowledge, followed by information gained from customers, and then knowledge gained from suppliers and competitors.

This is not dissimilar to the pattern of results from the survey of UK and US firms. However, other sources of knowledge that were seen as important by the UK and US firms, such as universities and trade associations, were not considered to be important by most respondents in the Northern Sydney Global Technology Corridor. On a list of 21 attributes nominated by those senior business people interviewed for the study as to why they were located in the Northern Sydney Global Technology Corridor, access to research and educational institutions ranked 19.

A third of the businesses in the two high technology sectors that feature in the Northern Sydney Global Technology Corridor are regional head offices and subsidiaries of large multinational corporations (MNCs). They interlink with domestic businesses that service local markets, and participate in global supply chains.

Green and Hughes say there is great potential for value adding, inter-firm linkages both between the MNCs and domestic businesses, as well as with the research and educational institutions located in the region, such as Macquarie University, CSIRO, Royal North Shore Hospital and North Sydney TAFE. But for now, such collaboration remains only that — an opportunity with potential.

THE AUTHORS' CONCLUSIONS

The study's findings allowed Green and Hughes to reach some conclusions about the potential for cluster development in the Northern Sydney Global Technology Corridor. The researchers say these five conclusions have implications for governments on how they might design and deliver policy to promote industry clusters; as well as provide some clues for individuals and companies on how they can play a role in making industry clusters more than just a clever idea.

We present the conclusions here as Green and Hughes did in their research report.

1. Vibrant local market but minimal business interaction

Green and Hughes say businesses in the ICT and biomedical sectors in the Northern Sydney Global Technology Corridor demonstrate co-location and there has been a strong attraction for businesses to establish activities in this region over time.

“The region provides a source of inputs as well as an end-market for these high technology sectors, and this business activity is supplemented by supply chain activities reaching into the rest of Australia and overseas.”

2. Innovative businesses that tend to stand alone

While the Northern Sydney Global Technology Corridor may have some attributes of business clustering, Green and Hughes say there is a low level of collaboration and knowledge diffusion among ICT and bio-medical firms.

“In many cases, these businesses claim to be innovative, yet the levels and types of interaction and of knowledge generation and transfer are minimal. Like a survey sample of US and British firms, the primary source of knowledge for firms in the Northern Sydney Global Technology Corridor is internal to the organisation, but unlike firms in the US and Britain, they draw on few external knowledge sources.”

3. Educated workforce with limited research linkages

Green and Hughes say the Northern Sydney Global Technology Corridor is home to a highly educated workforce, but companies here do not seem to recruit at qualification levels as high as those in the US and Britain. Nor is there a strong level of interaction between businesses and research and education institutions in the region.

“Like firms in the US and Britain, some Northern Sydney Global Technology Corridor businesses have informal contacts with these institutions, but unlike the US and Britain, these contacts are weak and there are few others of any substance.”

4. Nascent clustering with potential for impact

While the Northern Sydney Global Technology Corridor has some attributes of clustering, Green and Hughes say it lacks the higher level and more complex interactions among firms and research and education institutions that are the hallmark of innovative cluster activity internationally.

“The fact of co-location of businesses does not in itself signify cluster activity, but the attributes of the Northern Sydney Global Technology Corridor do indicate nascent or emerging clusters in this region which can be facilitated by concerted and well thought out leadership and intervention by business leaders and public policy makers.”

5. Policy role in cluster development

Green and Hughes say while much research has demonstrated the economic benefits of clustering, especially in high tech industries, it is also evident that there is no single formula for success.

“Experience around the world has displayed varying combinations of market spontaneity, entrepreneurial leadership and policy intervention. However, this experience suggests that all these elements must be present for benefits to accrue, with the policy measures of government and public agencies acting as both catalyst and facilitator of cluster development. Opportunities are rarely visible until they are seized.”

These conclusions left Green and Hughes to decide that while the Northern Sydney Global Technology Corridor is not an industry cluster, it is slightly more than an agglomeration. It is something else. It is a nascent cluster with potential.

There are elements of clustering, in terms of the region's supply chains and local activities. There is a level of co-location, but minimal business interaction. If there are any elements of innovation in companies, it is because those companies are working in conjunction with their head offices overseas, not horizontally across the region or with a wide range of other companies in Australia. Finally, there is little interaction or knowledge-sharing between firms and the region's research and educational institutions.

Green does not hide his passion for creating a more innovative and productive Australia. If he was to choose one piece of the Northern Sydney Global Technology Corridor that epitomised the character of its whole, it would be Waterloo Road, which has a direct vehicle and pedestrian entrance to Macquarie University.

"Look at the big glass boxes on Waterloo Road," says Green. "That's really what it is — a row of glass boxes. People drive to their office, park in the company car park, have a coffee in their own cafeteria, go to their desk and call New York, Seattle, or Berlin, do a day's work, then go back to their car and drive home. At no time do they interact with anyone else on Waterloo Road or at the university, which is only a stroll away. All the glass boxes on Waterloo Road are productive enterprises, and they add value to the NSW economy, but they exist largely for sales and marketing. If you care about Australia's propensity for innovation, it's a depressing picture."

3. The intrigue of industry clusters

The chief executive of the Australian Business Foundation, Narelle Kennedy, and Professor Roy Green, explain why industry clustering and collaboration are important to Australian businesses, and why governments and policymakers should be interested.

THE CORE OF THE KNOWLEDGE ECONOMY

Unlike previous eras, when the wellsprings of growth and competitiveness thrived on what we owned and how we used it, today's sources run on what and who we know, and how we apply such wisdom. And this is to say nothing of tomorrow's sources of growth and prosperity.

The traditional features of production — sweat, machinery and money — are now secondary to intellect, creativity and innovation. Today, more than ever, Australia is operating in a global economy in which knowledge, rather than labour and technology, is the main impetus for the productivity that supports sustainable economic growth.

Enhancing competitiveness and productivity — developing new ways to get a higher quantity and quality of output from each unit of input — depends on know-how, know-what, know-who and know-why. In short, it is about knowledge.

Industry clusters are important in a globalised world because they provide ways to connect with these flows of knowledge, and the people responsible for them. Clusters help to close the gap between business and research, thereby bringing knowledge to market faster.

As Michael E. Porter said: "Clusters affect competition in three broad ways. First, by increasing the productivity of companies based in the area; second, by driving the direction and pace of innovation, which underpins future productivity growth; and third, by stimulating the formation of new businesses, which expands and strengthens the cluster itself."¹⁰

Porter and others say a nation's wealth is determined by how productively it uses its human, capital and natural resources. Productivity depends not only on the value of products and services, but also the efficiency with which they are produced. What determines prosperity is not *what* industries a nation competes in, but *how* companies in those industries compete.

Clusters are critical to competition. They increase the productivity of companies based in their geographic area. They drive the direction and pace of innovation, which bolsters productivity. Clusters provide better access to employees, customers, suppliers, specialised information, institutions, trends, training, and ultimately, to innovation.

¹⁰ Michael E. Porter; "Clusters and the Economics of Competition", *Harvard Business Review*, November-December 1998.

Industry clusters are seen as being at the core of a new model of competitiveness and productivity. They will continue to provide the energy for the knowledge economy.

Porter even goes as far as to say that local cluster development has a significant role to play in reinventing a capitalist system which he claims is now unsophisticated and under siege¹¹. In the January-February 2011 edition of *Harvard Business Review*, Porter says the purpose of the corporation must be redefined around the progressive and holistic concept of shared value — benefits created by identifying and expanding the connections between social and economic progress — rather than the traditional and narrow focus of making profits.

Porter writes: “Companies can create economic value by creating societal value. There are three distinct ways to do this: by reconceiving products and markets, redefining productivity in the value chain, and building supportive industry clusters at the company’s locations. Each of these is part of the virtuous cycle of shared value; improving value in one area gives rise to opportunities in the others.”

THE AUSTRALIAN CONTEXT

Many of the world’s thriving clusters include government agencies and other institutions such as universities, think tanks, vocational training providers, trade unions and industry associations. The lifeblood of any cluster is collaboration. It is here that Australia fares poorly.

There is evidence that shows Australian businesses have fewer connections with other businesses, with universities, and with other sources of knowledge, than as happens in other countries. Australian businesses simply do not collaborate as much, a claim supported by various findings in recent literature, including the Australian Business Foundation report, *Global Connections: A Study of Multinational Companies in Sydney* by Professor Michael Enright, Director, Enright, Scott & Associates and Professor of Business Administration, University of Hong Kong; *Powering Ideas: an Innovation Agenda for the 21st Century* by the Department of Innovation, Industry, Science and Research; *Innovation in Australian Business, 2008-09* from the Australian Bureau of Statistics; *Global Innovation Index and Report 2009-10* from INSEAD; and in the study that is the subject of this paper, *Northern Sydney’s Global Technology Corridor: A Scoping Study of Cluster Development*.

Australia also faces the issue of size and volume. Australia’s smaller population means it does not have the critical mass of connections enjoyed by other nations. If a business is located in an environment where it is surrounded by 22 million people — such as California, Southern France or Germany — the opportunities for meaningful connections are far greater than if the business is based in a sparsely populated continent.

If collaboration is critical to competitiveness and productivity, then collaborating less is a problem for Australia. Two recent appraisals — one local and one international — of Australia’s spread and depth of collaboration reveal that the problem is extensive.

AUSTRALIA AND INNOVATION: THE HIGH ART OF BUSINESS

First published in 2007, the Global Innovation Index (GII) is one of the most comprehensive international assessments of the impact of innovation on competitiveness and growth.

¹¹ Michael E. Porter and Mark R. Kramer, “Creating Shared Value”, *Harvard Business Review*, January-February 2011

In the latest GII¹², jointly published by leading international business school INSEAD and the Confederation of Indian Industry (CII), Australia ranked 18 overall. For the Asia-Pacific we were behind Hong Kong (3), Singapore (7), New Zealand (9) and Japan (13).

The GII evaluates the progress of innovation readiness in 132 countries, highlighting the obstacles that prevent governments, businesses, and individuals from capturing the benefits of innovation. The annual study examines how countries benefit from innovation through the use of various enablers that stimulate innovation and their ensuing outputs. The GII uses five enablers — institutions, human capacity, general and ICT infrastructure, market sophistication, and business sophistication. The two outputs — scientific outputs, and creative outputs and well-being — provide evidence of the results of innovation within each economy.

Under the broad heading of business sophistication is the criteria of **state of cluster development** — the extent of collaboration among firms, suppliers, partners, and associated institutions within clusters. Here, Australia ranks 37, on a par with Qatar, Kenya and Saudi Arabia, and adrift of our Asia-Pacific neighbours Japan (1), Hong Kong (4), Singapore (5), Taiwan (6); China (16), Malaysia (17), Vietnam (18), India (19), South Korea (23), Indonesia (24), Sri Lanka (31), and Thailand (35).

For business sophistication, we see Australia's rankings for the following criteria — innovation environment in firms (26); innovation ecosystem (16); university/business collaboration (14); culture to innovate (8); knowledge creation (21); number of patents (24); local availability of specialised research and training services (17); capacity for innovation (26); knowledge application (14); employment in knowledge-intensive services (20); high-technology exports as a percentage of manufacturing exports (30); entrepreneurship: total business density (18); new business ownership rate (14); creative products and services (44); trademarks (9); and export earnings of creative industries (45).

The Australian Bureau of Statistics 2008-09 Business Characteristics Survey (BCS) collected information about the incidence of innovation and related practices by Australian businesses¹³. The data included types of innovation; barriers to and drivers of innovation; sources of ideas for innovation; and innovation-active businesses and collaboration.

The ABS says measuring collaboration provides insight into the linkages between businesses, particularly innovation-active businesses, and other organisations. The ABS defines collaboration as an arrangement where businesses work together for mutual benefit, including some sharing of technical and commercial risk. The ABS Business Characteristics Survey researched the type of collaborative arrangement businesses were involved in, and whether that collaboration was for innovation purposes.

Overall, only 22% of innovation-active businesses reported some type of collaborative arrangement. The most common activity was joint marketing or distribution (12%), followed by joint research and development (7%), joint buying (6.5%), and joint production of goods or services (5.5%).

For the purposes of innovation, businesses were more likely to collaborate with other organisations within Australia, rather than from overseas. Within Australia, clients, customers or buyers were the most common collaboration partners (41%), followed by suppliers of equipment, materials, components or software (36%) and consultants (34%).

¹² INSEAD; *Global Innovation Index and Report 2009-10*, March 2010. Viewed at <http://www.globalinnovationindex.org/gii/main/home.cfm>

¹³ Australian Bureau of Statistics; *Innovation in Australian Business, 2008-09*. Viewed at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/8158.0Contents2008-09?opendocument&tabname=Summary&prodno=8158.0&issue=2008-09&num=&view=>

Businesses with 0-4 employees were most likely to collaborate with clients, customers or buyers (45%). For businesses with 200 or more employees, the most frequently reported collaboration was with other firms related to their business (48%). The proportion of businesses collaborating with universities was tiny overall (3.6%) and relatively small for businesses with 200 or more people (12%).

These numbers look dire for Australia because sharing information and expertise has become critical to both individual and organisational prosperity. True innovation is near impossible without collaboration. And innovation is indispensable to success. This is why smart businesses are constantly looking for ways to connect to communities of employees, of customers, of partners and others in order to acquire knowledge and to speed innovation.

In a world where working collaboratively has become business as usual, Australia appears to lag. A consensus of more than 1,500 of the world's CEOs sees this as a problem. In IBM's most recent biennial, international CEO study, *Capitalizing on Complexity*, the authors reach this, among many conclusions:

"Each day, business processes are becoming more global, interconnected and collaborative. But the complexity that comes from involving more people, more organisations and more information also brings fresh perspectives, deeper insight and more innovation."¹⁴

WHY AUSTRALIANS SHOULD CARE

Narelle Kennedy says that if the Australian Business Foundation had to crystallise a single piece of intelligence from its 13 years of research on innovation, emerging business models and new forms of competitiveness in a knowledge-based economy, it would be this:

Fundamentally different competitive strategies, based on innovation and knowledge, are vital in the face of an increasingly volatile and globalised business environment.

If a firm, however large or small, is competing on knowledge and skill in our highly-connected and globalised world, then the characteristics which make it distinctive are crucial to its success. What makes any firm distinctive are people, relationships, and the knowledge people share. Australians should care about our collective ability to collaborate and share knowledge because we do not want to miss opportunities to prosper — opportunities that other nations are seizing.

"If we are not operating with the critical ingredients that cause individuals, firms and nations to be productive and competitive then we will miss vital opportunities for growth and profit," says Kennedy. "We will be fighting today's battles with yesterday's weapons. And this is to say nothing of the weapons of tomorrow, which Australia's global competitors are already developing.

"Australia cannot operate on the idea that we can earn our living and make our way in the world by continuing to dig materials from the ground — an activity which is based on finding ways to do things as cheaply and efficiently as possible.

"The issue for Australia — the higher calling — is to earn our living by using our intellect, by tapping into the wisdom of crowds, and through knowledge that is external to our firms. We need access to knowledge that we would not otherwise come by if we continued with business as usual."

¹⁴ *Capitalizing on Complexity: Insights from the Global Chief Executive Officer Study*, IBM Global Business Services, May 2010

Australia's Productivity Challenge, a February 2011 report from the Grattan Institute¹⁵, says Australia's productivity performance deteriorated over the past decade, with the broadest measure of productivity growth going backwards over the past five years.

The report's authors, Saul Eslake and Marcus Walsh, say this will impair the quality of living in Australia, and hamper our ability to respond to everything from an ageing population to climate change.

Saul Eslake, Program Director — Productivity Growth at the Grattan Institute, says in the report: "Australian governments need to focus their efforts on correcting the slide in Australia's productivity performance before it is too late.

"Productivity growth is the only way to improve the material well-being of Australians, and their quality of life, in the long run.

"Australia's economic prospects beyond the end of the current resources boom will deteriorate significantly if the decline in our productivity growth performance is not reversed. We need a re-invigorated economic reform effort, which includes improvements to education and training, improved governance of infrastructure investment, and a heightened innovation effort. We should not be lulled into a false sense of security about our capacity to continue to enjoy our economic prosperity. More work needs to be done."

Professor Roy Green points to the last five years in Australia where he says there has been a structural deterioration in the economy, despite the resources boom.

"In the period of micro-economic reform in the 1980s and early 90s, productivity in Australia increased at twice the rate of the OECD average," Green says. "Now it is bumping along the bottom at zero. Last year it even went backwards by 0.2 per cent. And yet we have just been through a big commodities boom, where our windfall gains were directed towards consumption, and not towards investment in productivity-enhancing innovation. This is a problem for all our industries.

"The dilemma with the commodities cycle is that it is volatile and all booms eventually come to an end. Then where do we go? What are the industries that will sustain Australia in the long term? As other countries know, they are industries founded on research and innovation. Norway has dealt with this issue by establishing a sovereign wealth fund, and pouring the windfall gains from its resource industries into the high-tech industries of tomorrow.

"Now, Australia is about to enter another commodities boom. Our terms of trade will increase again. Does this mean there is no scope for exporting industries in high tech, or exports in other knowledge-based industries? Is this idea something we now abandon along with the car industry, and textiles, clothing and footwear? Or is there scope to develop competitive industries through an emphasis on, among other things, clustering?"

Connectivity through clustering is essential to making the innovative transformations in the capabilities of businesses to underpin the productivity growth that Australia needs.

The number of connections businesses have, the diversity and depth of their knowledge flows, and their capacity for learning from interacting with others are the ingredients that clusters contribute to the recipe for productivity.

¹⁵ Eslake, S and Walsh M, 2011, *Australia's Productivity Challenge*, Grattan Institute, Melbourne.

4. Beyond the Northern Sydney Global Technology Clustering study

Narelle Kennedy and Professor Roy Green go beyond the Northern Sydney Global Technology Corridor study's conclusions to capture the implications of what its findings mean for Australia. They suggest how the nascent cluster in the northern part of Sydney can develop into something more vibrant, and discuss two of Australia's current contentious issues — the National Broadband Network and regional development.

The Northern Sydney Global Technology Corridor study by Professor Roy Green and Kate Hughes revealed that this part of Sydney has elements of cluster development that generate some economic and social benefits for businesses located there, as well as for Australia. But Green and Hughes also pointed out the region's industry cluster deficiencies. So, how can businesses in this part of northern Sydney, and governments, transform what Green and Hughes found into something of more commercial and social value?

In their research study for the Australian Business Foundation *Global Connections: a study of multinational companies in Sydney*, Professors Michael Enright, Richard Petty and Suresh Cuganesan of strategy consultants Enright, Scott and Associates (ESA)¹⁶ examined if Sydney was well-connected in the strategies, activities and knowledge flows of multinational companies.

Many of the multinationals in ESA's study are located in the Northern Sydney Global Technology Corridor. ESA's research revealed that in Sydney there are many high value-added sales and marketing and customer service activities, but firms here are not significant centres for their global parent company. The Sydney operations of multinationals are seen as self-sufficient, well-run outposts with their own sources of knowledge, but they are not in the loop, either with local SMEs or with other nodes of their global parent. They are not seen as the decision-making centre for anything in particular for their global firm, or the source of critical skills and knowledge the global firm needs.

Kennedy and Green point to ESA's findings for hints about what could be done to transform the Northern Sydney Global Technology Corridor into more than a nascent industry cluster.

MAKING CONNECTIONS

Going back to the heart of the findings of the study, Green and Hughes say there is co-location of companies in the Northern Sydney Global Technology Corridor, but there are not

¹⁶ Enright, Scott and Associates (ESA); *Global Connections: a study of multinational companies in Sydney*, Professor Michael Enright, University of Hong Kong; Professor Richard Petty, Macquarie Graduate School of Management; and Suresh Cuganesan, Swinburne University of Technology, February 2009, Australian Business Foundation.

many dynamic connections or knowledge flows that drive new competitive and innovative activities associated with clustering. So the short diagnosis is: make opportunities for people to meet and talk, and to exchange knowledge.

Companies within the Northern Sydney Global Technology Corridor must make strong, local connections. They must go out of their way to find opportunities to meet others in order to look at problem-solving; to think about who else is able to be a partner in a business opportunity; to discover who has that piece of knowledge they need to help them create a new product or service; or to develop a new understanding of any unmet customer needs.

The question becomes: how can we promote the collaboration that leads to new sources of competitiveness?

Professor Alan Hughes, the Director of the UK Innovation Research Centre at the University of Cambridge, Professor Andy Cosh, Programme Director for Enterprise and Innovation at the University of Cambridge Centre for Business Research, and others have talked about the 'public space' role of universities — providing opportunities to meet, establishing circumstances for serendipity to occur, and creating more organic ways to be in the loop on knowledge.

Professor William Webb, the Director of Technology Resources at Ofcom, the UK's communications regulator, has studied clusters in Britain, especially the large cluster of high-tech software, electronics, and biotechnology businesses in Cambridge.

In an article for *Ingenia*, the quarterly magazine of The Royal Academy of Engineering, Professor Webb ponders whether clusters like the one at Cambridge can be manufactured, and how they develop.

Professor Webb writes: "The first key factor seems to be that the Cambridge cluster emerged through a bottom-up rather than top-down process. It was not due to central planning by, for example, a regional administration, but through the uncoordinated actions of a number of key individuals."

Webb goes on to suggest that it helps if some of these people have successful track records as entrepreneurs.

"This is because these individuals start their own companies — often going on to start a series of high-tech companies — and act as role models. These serial entrepreneurs provide encouragement and their successes persuade others to follow in their footsteps."

Professor Green agrees with this view, saying his experience in Ireland showed him that a cluster works like an amoeba — it separates, evolves and re-forms. He watched as many gifted and energetic individuals left large corporations to develop solutions and start their own business so they could sell back to their former employers, before repeating the process over and over again.

UNIVERSITIES AS "CLUSTER CENTRAL"

As far back as 1963, Clark Kerr, the former President Emeritus, Chancellor, and Professor Emeritus at the University of California, Berkeley, said: "The university today finds itself in a quite novel position in society. It faces a new role with few precedents to fall back on... We are just now perceiving that the university's invisible product, knowledge, may be the most

powerful single element in our culture, affecting the rise and fall of professions, and even of social classes, of regions, and even of nations.¹⁷”

The role of the university within a nation today, and its ability to distribute its precious product, would suggest it is imperative for Australian businesses to extend their linkages to research and education institutions. They have a vital role to play in any national innovation system because there is a strong link between investment in the research and innovation base of an economy and sustained economic growth.

But forging the most useful linkages between universities and businesses is not straightforward. Individual companies and industry associations, as long-time donors to business schools and dedicated sponsors of academic research, are beginning to lose patience. They are showing more interest in how their investments or endowments can generate results which can be applied to the real world of commerce, and less concern for projects of pure academic rigour. For business, the new research imperative is managerial relevance.

With this in mind, what types of linkages should businesses and universities build? What can they do to ensure successful collaboration?

Britain’s National Endowment for Science, Technology and the Arts (NESTA) is an independent body with a mission to make the UK more innovative. A recent report from NESTA, *The Connected University*, concluded that a new model of improved connections between the UK’s universities, businesses and local government — which harnesses a range of collaborations — will be at the heart of economic growth, supporting the development of regional clusters of excellence¹⁸.

The NESTA report says there is much that universities can do to foster productive and mutually beneficial relationships with business.

On a fundamental level, they should address the divide created by the often conflicting interests of businesses and universities — entrepreneurship versus research kudos; shareholder value versus discovering new knowledge; short-term solutions versus long-term outlook.

On a tactical level, universities should ensure that their technology transfer organisations and consulting arms perform at the same high professional standards set by leading institutions.

They should recognise the importance of building eclectic networks with local firms, nurturing local clusters, and creating national and international connections.

They should recruit, develop and promote more people with experience in both the public and private sectors who can build links between the two.

They should widen the focus of their knowledge transfer from science, technology and engineering to include contributions from other disciplines, such as the social sciences.

They should increase their level of interaction with small, high-growth firms and make their work — and their researchers — more accessible to them.

They should make time spent in industry more valued for the purposes of academic career advancement, and make more information available to researchers about options for working with business.

¹⁷ Clark Kerr; *The Uses of the University*, 1963

¹⁸ National Endowment for Science, Technology and the Arts (NESTA); *The Connected University: Driving Recovery and Growth in the UK Economy*, Michael Kitson, Jeremy Howells, Richard Braham and Stian Westlake, April 2009.

THE POWER OF INTERSECTIONS AND CONNECTIONS

While the Northern Sydney Global Technology Corridor study reveals minimal interaction among businesses, Professor Green points out that it is a different story in what many regard as Sydney's creative industries precinct — a collection of small, medium and large companies that have grown up in digital media, fashion and design, film and TV — in the arc from Pyrmont to Surry Hills. Here, Green says there is much spontaneity, interest, passion, and interaction.

The Federal Government recognised this co-location of businesses and established the Creative Industries Innovation Centre (CIIC) at UTS as part of its Enterprise Connect programme. In this way, once a nascent cluster is recognised, governments can act deftly to support emerging connections between businesses and their web of customers, suppliers, competitors, financiers, service providers and other stakeholders.

The CIIC aims to grow the potential of Australia's creative enterprises. There are some large companies within the boundaries of this creative industries precinct, such as Google, but many smaller ones. Green says this is how clustering occurs — spontaneously, and under its own momentum. He says what is happening in Pyrmont and Surry Hills is a stark contrast to the Northern Sydney Global Technology Corridor, but it shows that culturally, there is nothing in our make-up that prevents clustering from occurring in Australia.

Green also cites the experience of walking around the coffee shops and meeting places in Palo Alto, California, the birthplace of many dynamic and disruptive business ideas in recent times. He suggests there is something about the social infrastructure of the Northern Sydney Global Technology Corridor which acts as a barrier to spontaneity and interaction.

"It is not likely that anyone will be struck by inspiration wandering around the major shopping centre at North Ryde, which is the antithesis of an incubator for ideas," says Green, commenting on the role of spaces and places in being conducive to gatherings of people and the exchanges of ideas.

Similarly, in his book *Hidden Innovation*, Richard Lester wrote about the importance of connections across different areas of interest; all the intuitive reasoning that can be found at the interface between disciplines. This is when people come into contact with each other without really understanding what the other is doing, yet they discover that one has the solution to the others' problem. Such fruitful inter-relationships can occur through clustering between different industries, as well as between those companies in the same industry.

Author, speaker and entrepreneur, Frans Johansson, calls these collaborations "intersections" in his book *The Medici Effect*. Johansson advocates looking to other cultures and disciplines — science, art, business, politics and fashion — for inspiration. For Johansson, innovation happens when people are exposed to multiple ways of thinking. As we are exposed, we pull truths from one discipline and import them into another. Extending our doctrine by incorporating thoughts from outside our doctrine, says Johansson, is the essence of innovation.

Related insights about the critical importance of investing in the sharing, use and expansion of knowledge, not just its creation, come from authors and practitioners, John Hagel III and John Seely Brown in their presentation to the World Economic Forum in Davos in January 2006.¹⁹

¹⁹ John Hagel III and John Seely Brown, *Globalization and Innovation: Some Contrarian Perspectives*, World Economic Forum, Davos Switzerland, January 2006

Who we know is more important than what we own.....

- *As change accelerates, our stocks of physical assets and knowledge depreciate at a more rapid rate. Flows of new knowledge become critical to competitive success and these flows occur only in the context of relationships. Successful strategies will depend on privileged positions in rich networks of relationships. In this world, the primary value of assets is their ability to help us build and sustain relationships.*
- *Whatever our existing capabilities, we will only succeed in the future by finding ways to get better faster than others. No matter how good we are internally, we will be able to get better even faster by working with others at the edge because people with complementary capabilities can help us to find creative ways to deepen and extend those capabilities.*

In his study of innovation²⁰, engineer and social scientist, Professor Andrew Hargadon, argues that our romantic notions about innovation as invention undermine our ability to pursue breakthroughs. Based on 10 years of study into the origins of historic inventions and modern innovations, from the light bulb to the Reebok Pump athletic shoe, Hargadon claims revolutionary innovations do not result from flashes of brilliance by lone inventors or organisations. Instead, he says innovation comes from creatively recombining ideas, people, and objects from past technologies in ways that spark new technological revolutions.

CAPITALISING ON THE CHANGING NATURE OF WORK

Much has been made about the changing nature of work over the last 50 years. IT research and advisory firm Gartner recently made some predictions about how work will transform again during the next decade²¹. Gartner says as the world of work changes, organisations will need to plan for increasingly chaotic environments that are out of their direct control.

We will work with less routine. Gartner says the core value people add is found in those uniquely human, analytical or interactive contributions that lead to discovery, innovation, teaming, and learning.

We will work in swarms, as do bees. Gartner says swarming is a work style characterised by a flurry of collective activity by *anyone* able to add value. This form of teaming, rather than solo performance, will be valued and rewarded more and occur more frequently. Teams have historically consisted of people who have worked together before and who know each other, often working in the same organisation and for the same manager. Swarms will form quickly, attack a problem or opportunity and then quickly disband.

We will work with weak links. In swarms, if individuals know each other at all, it may be just barely, Gartner says. Navigating one's own personal, professional and social networks helps people develop and exploit both strong and weak links. This, in turn, will be crucial to surviving and exploiting swarms for business benefit.

We will work with the collective. Gartner says there are informal groups of people, outside the direct control of the organisation, who can impact its success or failure. These informal groups are bound by a common interest. Smart business executives discern how to live in a business ecosystem they cannot control, but only influence. The process requires

²⁰ Professor Andrew Hargadon, Charles J. Soderquist Chair in Entrepreneurship and a Professor of Technology Management at the Graduate School of Management, University Of California, Davis; *How Breakthroughs Happen: The Surprising Truth About How Companies Innovate*, 2003.

²¹ Gartner; *Watchlist: Continuing Changes in the Nature of Work, 2010-2020*, August 2010

understanding the collectives that influence their organisation, as well as knowing the key people in those external groups. Gathering market intelligence via the collective is crucial. Equally important is figuring out how to use the collective to define segments, markets, products and various business strategies.

Work will be more spontaneous. We will be more proactive and seek out new opportunities.

We will become hyper-connected. Gartner says hyper-connectedness is already a feature of most organisations, existing within networks of networks, unable to completely control any of them. Hyper-connectedness will lead to a push for more work to occur in both formal and informal relationships across enterprise boundaries.

Tom Austin, vice president and Gartner fellow says that by 2015, 40% or more of an organisation's work will be of this non-routine nature, up from 25% today.

"Work will become less routine, characterised by increased volatility, hyper-connectedness, swarming and more," Austin says. "People will swarm more often and work solo less. They'll work with others with whom they have few links, and teams will include people outside the control of the organisation."

The implications, and opportunities, for industry clusters are obvious.

BOLSTERING MANAGEMENT AND LEADERSHIP

Management and leadership are vital. But Professor Green says we do not have leadership in Australia of the scale or sophistication needed to invigorate the idea of industry clusters, which in turn could help achieve the productivity outcomes the nation seeks.

UTS Business School and the Macquarie Graduate School of Management did a management study²² for the Federal Department of Innovation, Industry, Science and Research, which was part of a global study that compared Australia with 15 other countries in terms of management calibre, looking at management characteristics. Overall, Australia finished middle in a field of 16. The United States and Sweden were at the top.

Of all the characteristics, Australia was at the bottom in talent management, and in a characteristic called *instilling a talent mindset*. Green says this is where Australia fell behind most. Yet Australia does not have programs focused on enterprises or workplaces that deal with specific weaknesses in this area. Australia's innovation policies, dating back to the 1980s, have remained focused on science, research and technology.

"Australia puts a lot of money into business R&D," Green says. "But there is little investment in organisational innovation, especially in programs designed to bolster the calibre of our management."

This needs to change, especially in ways that will help local management enhance its collaboration and problem-solving skills, manage multidisciplinary teams, source and apply knowledge to better meet customer needs, and learn by interacting with others.

The UTS-MGSM management study suggested Australia should consider the important role multinational corporations (MNCs) play in lifting overall performance and productivity, and

²² *Management Matters in Australia: Just How Productive Are We?* 2009, project leaders Professor Roy Green and Dr Renu Agarwal from the University of Technology, Sydney, with the Macquarie Graduate School of Management and the Society for Knowledge Economics for the Department of Innovation, Industry, Science and Research

that there is “merit in looking at more strategies to augment the role of these companies in supply chains and networks and to more fully gain from their presence in Australia.” UTS said “this might be achieved through local industry development policies which encourage collaboration and industry clustering between domestic firms and foreign MNCs.”

The positive impact of MNCs on the Australian business landscape is also supported by research conducted by Dr Lyndal Thorburn and colleagues for the Australian Business Foundation, entitled *Friend or Foe? Leveraging Foreign Multinationals in the Australian Economy*. This study concluded that one of the major contributions of MNCs to Australia was to augment the flow of knowledge and skills to domestic firms, customers and employees. UTS Business School reminds us that earlier research indicates that the primary means by which MNCs create and diffuse innovation is through the knowledge base contained in their network of subsidiaries. UTS Business School says it believes that the more sophisticated the use of management techniques by Australian MNCs, the more their involvement in this innovation network.

In urging enterprise level innovation, growth and prosperity, the Federal Government’s White Paper *Powering Ideas: An Innovation Agenda for the 21st Century* emphasises the importance of management skills and talent. The paper says:

“Making innovation work requires a workforce with sophisticated skills of all kinds — including leadership and management skills. It also requires cooperative workplaces in which creativity is encouraged. Few organisations command all the skills needed to innovate successfully on their own. They must network and collaborate — locally and globally.”

In the Grattan Institute report referred to earlier in this paper, one of the authors, Saul Eslake, argues that since 2000, Australia has experienced — among other things — an aversion for productivity-enhancing change among governments, businesses and voters, and a fall in Australia’s take-up of productivity-enhancing technologies. As part of the remedy, Eslake suggests more attention on education and training, innovation and technology, and collaboration.

“There would appear to be significant potential for productivity gains from improvements to Australia’s education and training systems,” says Eslake. He goes on to refer to the Australian Treasury’s 2010 Budget Papers, which said ‘a more highly educated workforce is likely to be more productive and better able to adapt to changing circumstances’, something which ‘requires not only increasing the number of people with higher level qualifications but also ensuring that all Australians have strong foundation skills’.

“Innovation has long been recognised as a critically important source of productivity growth,” says Eslake. “However, Australia’s stalling innovation effort will not necessarily be revived simply by the provision of more tax breaks or other subsidies for research and development expenditures. It is widely recognised that the weakest link in Australia’s innovation chain is the commercialisation stage. It may be that this is a direct result of the low level of collaboration among Australian firms...”

WHAT SHOULD WE EXPECT FROM GOVERNMENTS?

The jury is in: industry clustering is a crucial factor in developing competitive advantage and sustainable growth — in cities, in regions, and even across nations. But what can governments do to promote industry clusters? This conjures a more philosophical question about what is amenable to government policy and what is not.

Narelle Kennedy comments on the policymaker's appetite for innovation and risk:

"Governments are comfortable about getting settings such as monetary policy right — what they call the framework conditions — to allow everybody to operate on a level playing field. But suggest to governments that they intervene in the behaviour of firms — to influence conduct, how workplaces are organised, how knowledge flows between companies — and they are reluctant to engage.

"They fear policy decisions directed at firms and workplaces will be captured by special interests or that such decisions are beyond government's expertise and best left to the 'animal spirits' of entrepreneurship.

"For example, governments know what to expect when they put money into research and development. They know what this produces, what is reasonable, and what safeguards achieve. But ask governments to institute policy where they foster relationships between business and universities, or between businesses and their suppliers, and they will see risk. They are unsure of the outcomes, so as policymakers, they retreat to a more certain course."

However, this approach is belied by recent experiences in other countries, such as Ireland and Finland, where policymakers are much more directly engaged with businesses and other stakeholders in setting strategies in the national interest. Finland is one of the few countries that has successfully transformed its traditional resources-based economy into an innovation-driven economy in the last 20 years.

Such nations identify where they could or should be doing better. Their governments, business sectors and CSIRO equivalents work together to search the world for the missing ingredients that will make their national economies more resilient. They seek out people who work in research institutes, universities or the R&D labs of companies elsewhere who they can learn from or borrow for a period of time. They especially seek to bring home those expatriates who left for bigger opportunities or greener fields. The nations pursuing these strategies have transformed a brain drain into a brain gain.

Their approach is straightforward: If the best unit of analysis is the firm and the workplace, they want to know how to make their firms and workplaces more innovative. How can they assist enterprises to seek new sources of competitive advantage, new sources of knowledge, new connections, new markets, or new understandings of customers?

For Australian governments, the vital aspect is building a critical mass of innovative, sustainable business enterprises competing globally. They need to define what they really want to achieve; set the level of granularity for their policies and programs; and work out how to approach the task at a Federal, State and local level. There are also questions about how to encourage hubs of high-performing industries; not just individual enterprises, but fostering connections between enterprises.

"It is the business of government to understand their economies and supply chains, to engage industry, to organise and deliver services, to invest and allocate resources, to provide incentives, to market the region, State or country, to attract investment, to help prepare the workforce, and to achieve social goals," says Kennedy.

"From this informed position, governments can properly address how to foster clusters that benefit Australian businesses and the communities in which they operate. They can then consider questions like:

“How do you capture benefits from collaboration? What makes it work? How do you promote collaboration and clustering in a way that isn’t heavy-handed? This is the public policy challenge for Australia.”

In attempting to identify a broad role for policy in cluster development, we offer the findings of a 2008 report²³ prepared for the Ontario Ministry of Research and Innovation in Canada by Professor David A. Wolfe from the University of Toronto.

While Professor Wolfe believes there is no recipe for designing and implementing cluster strategies and policies, he says policymakers are part of the mix. There are clear lessons for Australia.

“Successful cluster initiatives exhibit a common set of characteristics,” Wolfe writes. “They are able to recruit and rely upon strong, local civic leaders and business champions. Governments can play a supporting role for the cluster, but cluster initiatives that rely excessively on government for leadership have difficulty sustaining their momentum. Successful cluster initiatives build the need for renewal and refocusing into their agenda from the outset.

“Cluster strategies that take too long to produce results can fail by attrition, as key participants lose their energy and commitment and fall by the wayside. It is essential to target small, achievable steps from the outset to provide concrete and measurable indicators of success for cluster participants.”

Wolfe cautions that successful strategies for cluster development also rely on sound policy alignment. He says strategies that require governments to implement major new programs or commit substantial new investment will probably fail against the scrutiny and complexities of the public sector budgetary process.

“Often cluster initiatives can succeed by tapping into existing government programs and budgetary envelopes to access needed resources, or by co-opting new federal, provincial, or even private sector initiatives, and aligning their objectives to meet the goals of the cluster strategy. In this respect, cluster strategies should be viewed as focusing devices; the greatest benefit can sometimes be derived from using the cluster strategy to align existing policies at the national and regional level more effectively to support firms in the local cluster.

“A final challenge for cluster policy is the need for policy continuity. Because electoral and policy lifecycles are shorter than cluster lifecycles, volatility or lack of continuity in the policy environment can destabilise the process of cluster development. Cluster policy is clearly one area where perseverance has the potential to deliver great rewards.”

Professor Green says Australia has a long way to go in building world-class clusters, but he believes government has a legitimate role in making a start on the journey.

“If government sends a signal, companies will listen,” says Green. “They take careful note of government signals. If the Federal Government was to put in place an imaginative program of the kind we sometimes see in Europe or the United States to promote clustering activities, companies would respond.”

For example, Green says seed money from State and Federal governments could encourage well-resourced research relationships between companies and universities that

²³ *Cluster Policies and Cluster Strategies: Lessons from the Innovation Systems Research Network National Study*, by Professor David A. Wolfe, Program on Globalisation and Regional Innovation Systems, Centre for International Studies, University of Toronto, 2008

enable those companies to develop an R&D capacity in an area that was of interest to their head office, as a first step towards persuading that head office to devolve some of its R&D.

“People think that if the R&D office of a multinational is in Palo Alto, Austin or Munich then the situation is set and nothing will ever change,” says Green. “But head offices are always looking for opportunities to devolve research because they know they cannot do it all at one centre. They want research that is close to the firm’s markets, but head offices will only devolve research if people show they are competent and able to deliver.”

Green cites Ireland as an example. With conducive government policies in place, the Irish subsidiaries of multinational companies asked for R&D, showed they were competent, and then delivered. In one case, HP in Ireland conducted some locally generated research activity which drew the attention of HP’s head office in Palo Alto. HP realised that if its Irish subsidiary could show such initiative — and achieve results — it would move other R&D work to Ireland. There was a similar experience in Ireland for Nortel. Green says there is nothing to stop Australia from making the same moves.

In May 2009, the Australian Government released a white paper titled *Powering Ideas: an Innovation Agenda for the 21st Century*. *Powering Ideas* is a 10-year reform plan to make Australia more productive, more creative and more competitive.

It has seven national priorities that are designed to produce, distribute and apply new knowledge; and remedy Australia’s long-term weakness in business innovation and collaboration.

One priority is to ensure Australia’s innovation system encourages a culture of collaboration within the research sector and between researchers and industry. Another priority aims to ensure Australian researchers and businesses are involved in more international collaborations on research and development; and a third priority aims to ensure the public and community sectors work with others in Australia’s innovation system to improve policy development and service delivery.

However, there is a chilling reference in *Powering Ideas* about Australia’s level of collaboration between public researchers and industry; on this measure Australia ranks last in the OECD. Senator Carr’s ambition is for Australia to double its rate of collaboration over the next decade. Green says this goal is not only admirable, it is also essential.

Everyone agrees collaboration is vital to meet national and global challenges.

Everyone agrees Australia can do more to boost collaboration, support research to create new knowledge, and increase business innovation.

This leaves governments the task of setting the environment that minimises barriers and maximises opportunities for entrepreneurship, new ideas and new technologies.

THE BIG DEBATES FOR AUSTRALIA

At any one time in any country, economics and industry policy will be shaped and tempered by the big social and political events of the day. In Australia at this time, such debates include investment in infrastructure, the National Broadband network and regional development.

National Broadband Network

Green and Kennedy say that in relation to unleashing the power of clusters, the National Broadband Network (NBN) is a huge opportunity for Australia. There are two aspects to this opportunity.

One is building the NBN. This will require expertise in existing, and in still-to-be-developed, telecommunications and engineering capabilities. As a result, Australia should expect some lasting impact in our technology development as a nation, especially if the NBN experience helps local enterprises cultivate ICT skills they can sell to the rest of the world.

There is also the application of very fast broadband. As any telecommunications engineer will tell you, fibre optic technology is to networks what asphalt is to roads – even at German autobahn speeds. The magic of fibre optics at 100 mbps comes in what we do with the technology.

“We cannot even envisage today what opportunities the NBN will create,” Green says. “Who knows what will be possible?”

One potential application is telepresence, a group of technologies that create an interactive experience similar to being in the same room. It allows people to meet from multiple locations via high quality video imaging and crystal clear audio.

Telepresence solutions for specific industries already exist, for settings as diverse as pharmaceutical research labs, television studios, university-level distance learning, and neurological operating rooms.

If applied to its potential, the NBN will transform business and alter many other aspects of our lives. The frustration, says Green, is that people think too much about the bandwidth of the technology, and not enough about the bandwidth in our minds.

Australia’s task is to generate sustainable, competitive advantage through thoughtful application of the technology. We need to challenge our complacency and develop competitive industries for the long term; industries that will last beyond the next commodities cycle; industries based on knowledge and ingenuity. Green suggests the genesis of such industries can be through collaboration in geographically-concentrated clusters. The question is: can we create innovative clusters that are capable of exploiting the new technology?

Recent history suggests we can.

Professor Alan Hughes, the Director of the Centre for Business Research and Margaret Thatcher Professor of Enterprise Studies at the Judge Business School at the University of Cambridge, did a study for the Australian Business Foundation in 2007 where he analysed the sources of Australia’s high productivity growth in the 1990s compared to the low productivity growth period of the 1980s²⁴.

Hughes found that the sectors which deployed high technology — not the high technology sectors themselves — were at the heart of this productivity surge. It was the application of ICT in particular that enabled new capabilities for Australian firms, especially those involved in logistics, financial services, and mining services. Their use of enabling technologies was one of the basic causes of that wave of productivity.

²⁴ Professor Alan Hughes and Vadim Grinevich, *The Contribution of Services and Other Sectors to Australian Productivity Growth 1980-2004*, November 2007

“The NBN is our next enabling technology,” says Kennedy. “It will help Australian enterprises unlock new opportunities, create new business models, and formulate new ways of competing. We will be able to do new things, different things, better things. There can be more micro multinationals — small global enterprises that operate anywhere in the world because they have fast broadband, they are nimble, and they are smart. And it won’t matter where they are located.”

The technology gap between city and country will narrow dramatically as people in Orange, Mildura or Mt Isa will be able to do the same as someone with a fast connection in Sydney, Melbourne or Brisbane. Green says this should lead to clusters in industries such as education and health, where all types of businesses can flourish.

Regional development

The opportunities for clusters to create new sources of competitive advantage and to restructure declining industries is a story that applies not just to the Northern Sydney Global Technology Corridor, but also to centres around the country, especially in rural and regional Australia.

Regions are geographic clusters by definition. They provide opportunities to drive economic growth, create community wellbeing, and generate lasting prosperity in ways that can be customised to each region’s created or natural advantages.

In a paper for the Australian Business Foundation released in October 2010²⁵, Professor John Tomaney presented new ideas for boosting the growth and prosperity of Australia’s regions. Tomaney, a UK authority on urban and regional development, reported on the latest international thinking on regional policy with some timely advice for securing the growth and liveability of regions.

Tomaney’s take on regional development has added significance for Australia following the Federal Government’s deal with Independent MPs to give regional development a priority in Australia’s political agenda.

Tomaney analyses the latest international thinking about regional policy that can help Australia avoid the danger of pork-barrelling and instead generate sound, long-term action on regional development. His report summarises the new successful approaches to regional development overseas as locally-owned growth opportunities, innovation-focused, and characterised by strategies that are integrated and inclusive. The approach is less about infrastructure spend and more about awakening local community strengths, particularly on innovation and human capital.

Kennedy says regions that are self-motivated to grow their own opportunities will become the success stories.

“Regions are more likely to succeed economically and socially if they identify and mobilise their in-house potential and strengths,” Kennedy says. “They have the dynamism to draw on their own resources and to make the necessary connections to create new opportunities for growth that are best suited to their local circumstances. The innovation capabilities of businesses, the skills and know-how of people, and strong and adaptable local institutions are the key.”

²⁵ Professor John Tomaney, Director of the Centre for Urban and Regional Development, University of Newcastle, UK, and Professor of Regional Studies, Monash University, Australia, *Place-based Approaches to Regional Development: Global Trends and Australian Implications*, October 2010

Tomaney's report highlights that good infrastructure investment only has a positive impact on growth and development if it is accompanied by improvements in human capital and innovative capacity, such as retaining graduates, improving the performance of firms and attracting skilled migrants. Skills and innovation capacity are crucial to regional development because they can be used to embed investment in cities and regions in an era of more mobile capital, in ways that low cost labour and infrastructure cannot.

These new approaches have moved away from the traditional top-down, subsidy-based interventions designed to reduce regional disparities. What works overseas is a bottom up approach where locals mobilise their knowledge and skills, build on their own competitive strengths and create new localised opportunities for growth.

Tomaney's report argues that in these new approaches, there is a stronger role for local and regional players, including business and other social partners, in formulating policy. Tomaney stresses the importance of integrated policies for land-use, infrastructure, and business support.

Kennedy says these new approaches to regional development can have equal value in metropolitan regions and are not just designed for rural and regional areas.

"The increased focus on regional and rural Australia due to the election result has stirred a city versus the bush debate, when the reality is that urban and rural areas are in fact inter-dependent," Kennedy says. "To get the best outcomes, regions need to capitalise on the advantages of nearby cities, and cities benefit from prosperous self-sufficient regions with infrastructure and services that provide attractive lifestyle choices.

"The experiences of European regions described by Professor Tomaney have lessons for Australia as we deal with issues like the challenges of water-sharing in the Murray-Darling Basin and competition for different uses of land in traditional food production areas."

If we are adept at connectivity, and know how to form alliances and coalitions that work for mutual benefit, then we will be searching the world for new opportunities, connections, knowledge and relationships. Today, information technology allows us to have global relationships and connections with greater ease and lower transaction costs than ever before. But as with most interactions between human beings and technology, we are also living a conundrum.

Professor Philip McCann, one of the world's most cited and widely recognised economic geographers and spatial economists, often talks about two contradictory trends happening at the same time. McCann says that while transaction costs for routine information exchange have been decreasing, there is a new premium on face-to-face contact, because firms build capability from knowledge, wisdom and understanding, not from routine information. So while information flows are easier, gaining and using knowledge is as difficult as it has ever been, and more dependent on human contact.

This brings to mind a beautiful cartoon that first appeared in *The New Yorker* magazine during the dot-com boom. It depicts two well-dressed businessmen dining at a first class restaurant. One says to the other: "Trust me Mort, no electronic communications superhighway, no matter how vast and sophisticated, will ever replace the art of the schmooze."²⁶

²⁶ *The New Yorker* magazine, November 15, 1993

5. Conclusion

The aim of the Northern Sydney Global Technology Corridor Clustering study was to determine whether the grouping of businesses in two prominent high technology sectors in a particular geographic region of northern Sydney could be classified as industry clusters.

Professor Roy Green and Kate Hughes sought to discover if the information and communication technology (ICT) companies and the biomedical companies in this area operate as industry clusters, show evidence of clustering, or are merely an agglomeration of businesses in the same industry in a single location. Green and Hughes also wanted to provide evidence that could be used as a sound basis for policy intervention designed to foster clustering and maximise its economic impact.

The study revealed that the Northern Sydney Global Technology Corridor is a vibrant local market. It has a skilled workforce, and a concentration of sophisticated and affluent consumers which attracts multinational companies. But Green and Hughes found that the firms within the Northern Sydney Global Technology Corridor are not capitalising on this agglomeration. There are limitations in knowledge flows, collaborations and connections, and so there is no critical mass of innovative activity.

Even though the firms within this part of northern Sydney have a significant collection of high value-added managerial, sales and marketing, and customer service activity, there is little evidence of either local or global knowledge flows among them. Generally, the firms in the Northern Sydney Global Technology Corridor are not sources of new business opportunities for their parent companies. In most cases they are not local or global innovators, and they are not seen as a place to go for ideas about new business opportunities by decision-makers in the global firm.

Within the Northern Sydney Global Technology Corridor, similar to other international locations, there are a group of companies that look like a cluster. There are many leading international names and some dynamic local firms, but their co-location does not capitalise on the opportunities offered by being a true cluster.

Some of these companies are innovative, others less so. Most are focused on the sales and marketing brief given to them by their head offices in Europe or the United States. Some have their own home grown production facilities, such as Cochlear and ResMed, but few have an integrated view of how they can collaborate to innovate and compete globally from the Northern Sydney Global Technology Corridor.

That such collaboration is scarce does not mean it cannot take root. The pre-conditions do exist, and the companies within the Northern Sydney Global Technology Corridor could create the platform for such development. But vigorous interactions of a type that create new and better ways of doing business, and that would allow a true industry cluster to form, will demand leadership from three sources.

First, successful clustering will require leadership from the companies themselves. Senior managers both locally and in overseas head offices must show that they want their firms to be involved, they must recognise the benefits, and they must become active. The senior executives of the Australian subsidiaries must push their head offices for action.

Second, developing an industry cluster will require leadership from governments. They must provide the direction and soft infrastructure that allow clusters to flourish. There is a role for policy. Governments *can* do something. They cannot prescribe collaboration. They cannot prescribe a cluster. But they can put in place the fundamental ingredients that will encourage clusters to develop.

Third, it requires leadership from universities. They must provide those special places which incubate collaboration and innovation, especially by generating greater interaction between academics, business leaders and entrepreneurs in the way we see happening in many other countries.

Strategic serendipity can emerge from agglomerations, and this sets in motion the knowledge flows and swarming of ideas that forms a cluster and makes it a potent source for new business opportunities and competitive industries.

Far removed from coincidence, chance or kismet, strategic serendipity is about being prepared and practiced in the art of being in the right place at the right time — with the right people.

THE TRIUMPH OF HOPE OVER EXPERIENCE

For now in Australia, Professor Roy Green says we do not have the personal chemistry that is needed among individual policymakers, business people and academics that would allow industry clusters to flourish and generate long term benefits for the nation.

Australia has major assets in its higher education and research base, and we should support the nexus of business, universities and government to become a cornerstone of innovation and future growth.

The gist of the matter, says Green, is that even though collaboration has not been Australia's forte in the past, there is no reason why we cannot develop a capacity for collaboration in the future. And there is nothing peculiar about technology-based industries in Australia, for example, which prevents collaboration. There is nothing unique about Australian business culture which prevents clustering.

In the case of the Northern Sydney Global Technology Corridor, Green believes the blockage is caused by a combination of the structural relationships between multinational head offices and their Australian subsidiaries, and how these relationships remain unchallenged; the continued dearth of productive alliances between businesses and Australian universities; and the lack of foresight by governments to recognise their own role.

It has always been assumed that collaboration is a positive force, but much thinking has focused on the means of collaboration rather than on the ends collaboration is intended to serve. In and of themselves, clusters mean little. But now that knowledge is the new currency, clusters have the potential to improve Australia's productivity, capabilities and competitiveness, with obvious results for the country's prosperity.

For those Australians who believe the future belongs to those nations which put innovation and productivity at the centre of their economic plans, it remains the triumph of hope over experience.