

Industry Clusters ***A Review***

History, Theory, Practice



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1. Introduction

Platform & Trends

There is a global trend towards adoption of industry clustering as a key component in economic development policy and the development and enhancement of regional innovation systems. A 1998 review of clusters ⁽⁷⁾ noted the OECD estimated 35 countries had cluster development initiatives. In the four years since this would have very significantly increased. There is now also a global, non-profit membership organization for the furtherance of cluster theory and practice – ‘The Competitiveness Institute’ (TCI), based in Barcelona. It has held five annual international conferences on clustering. There is also a similar, related organization based in Australia “Clusters Asia Pacific”.

The growth of interest in clusters is generally credited to Michael Porter (Harvard), through his book *The Competitive Advantage of Nations* (1990). In it, he developed the now well-known ‘diamond of advantage’. He held that four factors create competitive advantage in an economy:

- Factor conditions
- Demand Conditions
- Structure of firms & rivalry
- Related & supporting industries

While his original theory was from the point of view of competitive positioning of nations, his ideas have come to be widely applied to cities and regions.

The concept was born in the US and has spread globally under various labels – ‘knowledge economy, associational economy, learning regions, regional innovation systems’. All utilize the same concepts as clusters, which are often key components in these wider systems. Canada is forging ahead, while the EU is spending some third of its budget on ‘learning regions’ initiatives. The EU has seen cluster style policies as a means of addressing the wide disparity in economic conditions as between its member States and the regions within them. There is a basic difference between US and EU style approach to clusters.

The US sees clusters forming within a region, with the possibility of their moving on to other regions in the search for competitive advantage. The EU sees clusters as based on regions and their attributes, with the regional clusters evolving and perhaps transmuting into others to suit competitive conditions and market forces. The two models have the same components, but different emphasis. The first emphasises competition, the other ‘learning societies’.

A key, primary difference in the general cluster approach is that rather than look at industries or firms in relative isolation, the emphasis is to consider them as part of a system and how those systems operate.

Fashion or New Paradigm

To the extent that clusters are ‘trends’ or ‘fashion’, they will blossom and wither, but to the extent there are sound underlying principles, they will tend to evolve and adapt to be the basis of the next trend or fashion, under a different guise or ‘branding’.

One difficulty as ‘clustering’ grows in acceptance and popularity, flows from the pitfalls of attaching a label to any concept. This applies especially with a term encompassing a variety of possibilities in terms of styles, scope and components.

A label is useful as a short hand reference, but can also mask a lack of understanding and thought about the underlying principles.

This inevitably leads to disappointment in use of the tool and leads to its likely fall from grace and a search for another 'solution', (probably using the same principles).

This document has been prepared to provide an overall appreciation of industry clusters. As such it is not intended to be a comprehensive treatise on the subject.

It canvasses what industry clusters are; the origins of clusters and cluster theory; the components and drivers. It draws attention to useful contemporary work and thinking on clusters, the global status of cluster practice and attempts at evaluation.

2. Definition

Scope

There is no precise, widely accepted definition and the term tends to have different meanings for different audiences. There is a good deal of literature and academic debate on the subject of an appropriate definition. The difficulty is perhaps that the definitions overly seek finite descriptions of physical attributes and boundaries, whereas an industry cluster is more a concept involving collaboration and intensity of interactions than an object. As a concept it is capable of being applied (to a greater or lesser extent), across a range of physical systems and arrangements. One can have a system that is ‘more’ or ‘less’ a cluster.

The basic definition is:

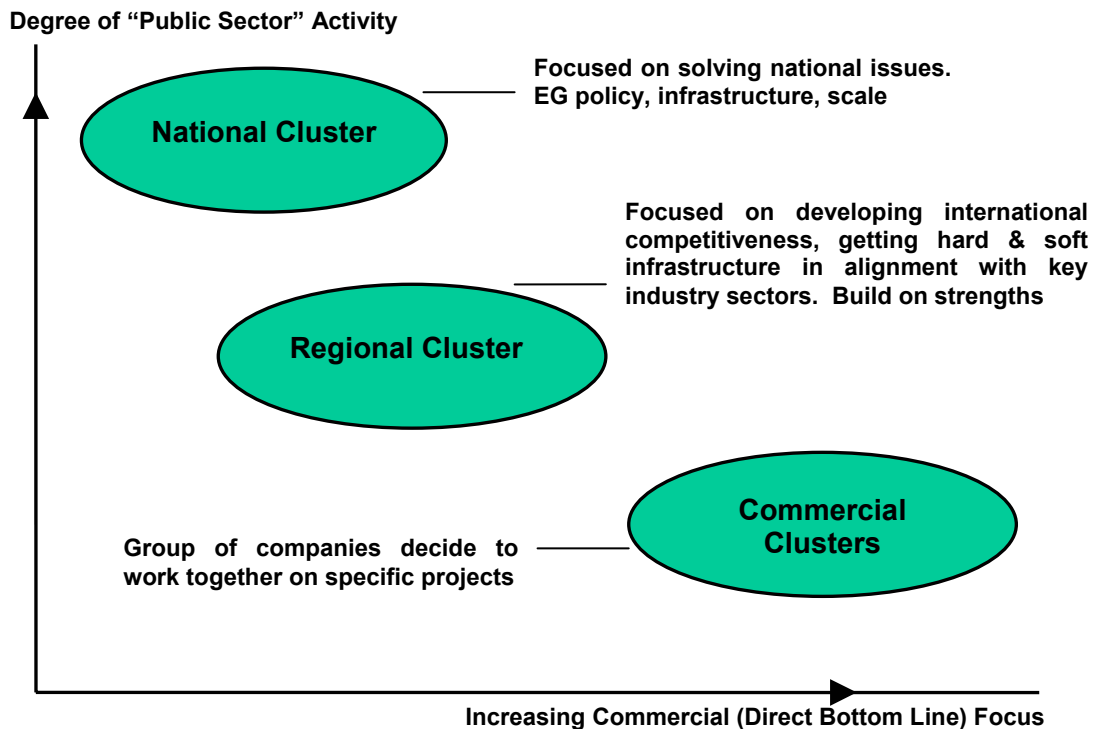
Geographic concentrations of industries that gain performance advantages through co-location. (Doeringer & Terkla 1995)

A more comprehensive definition suggested is:

A geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue that share specialized infrastructure, labour markets and services and that are faced with common opportunities and threats. (Rosenfeld 1997)

Porter described two types of clusters, vertical and horizontal. Vertical clusters consist of industries/firms linked through buyer/seller relationships. Horizontal clusters share a common factor. This may be market for end products, common technology, skills, or natural resource.

A New Zealand ‘Cluster Manual’¹ suggests clusters may be at three different levels of an economy. This is illustrated graphically on page 8:



Page 9 of the same document expands on the three levels. (last column listing examples not shown below:

Item	Comment	Proponent sponsors	Benefits
Regional Clusters	This is term and concept introduced by Professor Michael Porter. They have a strong element of aligning soft and hard infrastructure within a region , and creating the right micro environment for growth.	Usually a territorial authority, such as an EDA (The geographic boundary of each cluster is unique, and may well spill over into neighbouring territories)	Applied to key drivers, the core wealth creators in the locality, the TLA seeks to embed that cluster in the region. Ensures that all infrastructure and institutions are well aligned. A high performance micro environment can attract FDI when alignment is tight.
Soft networks, National associations	Started with Trade NZ Joint Action Groups in the early 90's with a national focus. Based around a leadership group appointed by TradeNZ and action initiatives initiated and directed by the leadership group (though implemented largely by Trade NZ staff) Open membership, often from a single industry. Low risk, limited trust involved...and limited pay-offs. Can provide an initial step to building harder linkages between small groups of members	Industry Associations Chambers of Commerce Business Councils	Provides a forum for the larger exporters. Enables a number of regional clusters to address national issues eg export development, trade access, training standards. Valuable where no one region has a critical mass. Provide a clearing house to establish and address common agendas. The neutral corner often brings competing businesses together, enabling them to develop 'harder' linkages.
Commercial clusters, Hard Business Networks, Strategic alliances	Alliances between small groups of companies, networking to achieve aims they cannot realise alone. Strong commercial focus. Many Hard Business Networks have a flexible structure which evolves as the level of cooperation increases	Individual companies SME Assistance Programmes Technology NZ TradeNZ	Enabling SMEs and larger firms to develop the critical mass to compete more effectively.

Item	Comment	Proponent sponsors	Benefits
Supply Chain Initiatives	Often driven by a large company seeking to focus on its core competencies, and facilitating / encouraging SME suppliers, such as assisting with ISO. May be supported by e-procurement.	Large firms SME development agency	Enables SMEs to develop competencies in supplying a lead NZ firm, and often to compete in e-commerce and e-procurement environment

The above therefore brings ‘business networks’, industry associations, commercial alliances and supply chains into the scope of the cluster definition.

If this is the case, the term cluster could be simply a catch all phrase for previously recognized relationship activities in a free market economy. In practice, it is certainly often taken that way in the application of the term.

This would indicate that there is ‘much ado about nothing’. However it is felt that such a conclusion would miss important driving forces that may or may not be present in these other arrangements, but which are underpinning concepts in driving a cluster.

Common Themes

Across all the literature, there are four common themes in defining a cluster:

Dynamic Interactions

It is the type, quality and extent of interactions and relationships between firms, industries that characterize clusters. Where successful clusters go further than other systems is the extent and depth of collaboration, especially between competitors. They have learnt that they can both collaborate and compete.

Systems Recognition

Clusters recognize that individual firms are part of much larger systems. They may therefore seek to draw in both vertical and horizontal relationships in the value chain. These include R&D, educational, academic and government partners. They may also move beyond traditional industry segments. A key is breaking down traditional institutional barriers to **aligning** all elements of the system to gain best leverage and competitive advantage for the cluster.

Social Infrastructure

Rosenfeld (1996) argues that information flows are critical to effective industry clusters. In order to facilitate this, open and effective social infrastructures are required. He points out that while the characteristics of a cluster may be present, it is not necessarily effectively a cluster. Our experience would reinforce this. An effective cluster must include social interaction, trust and a shared vision in order to fuel the dynamic nature of a cluster. One could say this about other structures as well. However it is the degree that these systems are informal, self-perpetuating and the level of intensity that makes the difference, meshed with the three other elements.

Geographic Scope

All attempts at definition refer to geographic proximity. This would appear to be closely tied to the level of interactions and trust required for an effective cluster. The greater the distance, the more difficult it is to maintain these at a high level. The degree of geographic spread of a system referred to as a cluster is an indicator of whether the system is 'more' or 'less' a cluster system. One suggestion is that the geographic spread of a cluster is defined as the area covered by a one hour journey by road. Anything more inhibits regular, informal interactions. It is a matter of at what point does the system have to revert to mainly relying on formal communications, rather than being mainly driven by informal interactions

A variety of researchers have concluded there is no uniform definition of geographic scope for a cluster. (Rosenfeld 1996, Jacobs and DeMan 1996, Jacobs and DeJong 1992).

The value of the debate and search for definition is of value to the extent that it contributes to deeper insights into what are the most effective mechanisms for regional economies to pursue and maintain markets and competitive position. The risk is that it leads to confusion and lost momentum due to lack of agreement. In this respect, the view put by Oxford Research Sweden is in our view worthy of support:

Firstly, cluster studies and theory, seem to be in a trough. Especially, on an academic level discussions and debate centres around defining the rather chaotic concept, answering basic questions such as what is a cluster, and what is not? How narrow or wide should a definition be and how is it possible to actually document the existence of a cluster? The answer is probably that there is no universal cluster theory or concept. It is and also will be a somewhat chaotic phenomenon. This paper suggests that instead of focusing on finding the "correct" definition and "true" clusters, effort should be put in developing of a more dynamic framework for cluster studies. Looking at clusters from a life cycle approach, trying to identify the characteristic of different types of cluster and their specific needs for policy approaches and initiatives.²

Life Cycles

The issue of life cycle raised in this paper is an important one, not well understood, little studied and never brought into consideration of definitions. Clusters are socio-economic systems. They do not just appear. They evolve, have peaks and troughs and may die.

Only twelve years have passed since Porter drew attention to clusters and there has been little time for recorded experience of life cycles in that time. However there are 'clusters' with a much longer history. The Far North Queensland Tropical Tourism Industry is an example of a cluster with some 30 years of history. Two papers have been delivered which touch on life cycle experience. These were delivered to the 2001 and 2002 TCI Annual conferences.³

The Oxford Research paper goes on to suggest five classifications for cluster life cycles:

One way of looking at clusters is the life cycle approach. The basic rationale of the dynamic cluster approach is that all industries contain clusters – on different stages of the life cycles. The approach identifies 5 types of clusters:

Potential clusters: *Or the contour of a cluster. Clusters in the early phase of development. At this step it is still uncertain whether it will become an actual cluster, develop critical mass and unique, marketable competencies and*

technologies. Policy-wise the effort should focus on establishing national research and innovation programs and initiatives supporting the development of more “robust” competencies and knowledge.

Young clusters: Clusters with strong regional roots and importance to the local economy. These clusters may not be the spearheads of the nation. But they are important in a local context and policy makers should focus at improving the local business conditions for these industries. This could involve two types. 1) Generic type concentrations that may not be true clusters with competitive and unique competencies. 2) Possible future competitive clusters. Typically very specialised industries building on strong knowledge building. These may not yet generate a high number of jobs, but they could possibly do so in a few years and thus need special attention. Examples could be photonics or biomedicine.

Established clusters: Clusters characterised by unique competencies, international competitiveness, and a need for market growth. Given that these clusters also possess the necessary critical mass and strong relations between the firms of the cluster, the political initiatives should aim at profiling these clusters in an international perspective, supporting their entry into and activities on the global market.

Mature clusters: Well established and mature clusters, characterised by growth and expand strategies via mergers, economies of scale, and development of production technology. Firms in this type of clusters have to a large extent the size and capabilities that enable them to “run their own business”. The political task is rather to ensure that these clusters maintain their strong market position through strengthening critical frame work condition such as assess to qualified labour and research institutions.

Specialisation/revival: In some cases, clusters reach a level of maturity and stagnation, which pushes them to develop new technologies and specialised competencies – if not they die out. Hence, it is important not to write of clusters heading for stagnation, but politically stimulates the innovation and development of new strengths.

Examples

The best way to describe the scope and variety of what are being described as clusters is to list examples. There are so many, it is difficult to choose. Extracts from two papers provide a reasonable, if not extensive sample.

The New Zealand paper ⁽¹⁾ lists the following:

We are familiar with such clusters as Silicon Valley, a region similar in size to greater Wellington, just south of San Francisco, that has become home to over 7,000 high tech companies. We all know Hollywood, the corner of Los Angeles that is the world’s entertainment capital. These clusters provide an environment that enables specialised local firms to develop the competitiveness to service large, often global markets, and extends globally to many industries.

In New Zealand we have difficulty in adding value to our wool, which is still largely exported as scoured product in bales. Three locations around the world illustrate the reasons for this difficulty. All three are customers for New Zealand wool. The three localities demonstrate what small communities can do with clusters:

- *Biella, Italy (population 48,000) is the world’s leading luxury textile center. Half of all the firms in this city, which is not much larger than Ashburton, are in activities that relate to wool processing. Biella is home to some 1,300 textile manufacturers and 200 machinery manufacturers. It is also where Merino New Zealand have established their European HQ.*

- Castel Goffredo, Italy (population 7,000), a community not much larger than Wainuiomata, is home to 200 hosiery related firms, who together produce over half of Europe's socks.

- Dalton, Georgia, USA (population 25,000), similar in size to Whakatane, is home for 174 carpet mills, accounting for 85% of US carpet output, and almost half of the world's carpet output.

In many other industries, similar local specialisations can be seen:

- Wichita, Kansas (population 300,000) is the world's small aircraft manufacturing center, with half of the world's aircraft fleet taking off for the first time from this city the size of Christchurch.

- Montebelluna, Italy (population 25,000) produces 75% of the world's ski boots along with other specialist footwear, and describes itself as 'The sports footwear capital of the world'.

- Renfrew, Ontario, Canada (Population 10,000) has a mini cluster in wood home construction, with a number of wood building products firms collaborating to service Pacific Rim

A Swedish report (2001) ⁴ lists twelve clusters and provides a discussion of the factors that led to their creation. Those discussed are::

1 The automotive testing cluster in inland Norrbotten

The core product is to offer infrastructure for testing of automotive and related components in winter climates. The cluster is held together by a non-profit association –the Swedish Proving Ground Association – whose vision is to promote and spread knowledge about automobiles and components as well as to develop the automotive testing industry.

2 Biotech cluster in Umeå

The core products include biotech/medicine, laboratory instruments, etc. There is no formal cluster organization, but Umeå university and a number of research centers may be viewed as the binding elements in the cluster.

3 Västerbotten's woodworking cluster – the Hedlunda example

The core products are woodworking products. The vision is to develop an effective wood industry in inland Västerbotten.

4 Crystal Valley (Dalarna/Borlänge)

The cluster's core products are LCD related. The Swedish LCD Center, an industry research institute, has been established to meet the R&D needs of the LCD industry. The vision is to strengthen the Crystal Valley brand and become a global centre of excellence in display research.

5 TIME (Stockholm)

The core products are in Telecom, IT, Media and entertainment. The cluster organization strives primarily to strengthen the TIME brand.

6 IDEA Plant (Sörmland/Eskilstuna)

The cluster's core product is concentrated in activities related to Information Design, Experience industries and Arts. The vision is that IDEA Plant will achieve global recognition for creativity in information design.

7

Rockcity (Hultsfred)

The core product is music related activities and digital media. The cluster is centered around IUC Hultsfred and those companies that are a part of the Rockcity initiative. The cluster vision is to develop a national knowledge node in the areas of music and digital media.

8 The audiovisual cluster in Fyrbodal (Västra Götaland)

The core products are in audiovisual and video businesses. The cluster organization (Film i Väst) actively strives to strengthen the Fyrbodal brand and to make the cluster more competitive by attracting businesses and activities that are lacking.

9a The Polymer Center in the Gnosjö region

The core products are plastics and polymers. Their vision is to develop the polymer center into a national centre of excellence.

9b The Cutting Technology Center in the Gnosjö region

The core products are in cutting processes. The cluster organization strengthen the cooperation between the companies and with efforts to raise the level of specialized skills and expertise. Their vision is to develop the cutting technology center into a national competence node.

10 The Kingdom of aluminium (Småland – Blekinge)

The core product is aluminum. The cluster organization, which is a membership organization, works with both marketing and the development of specialized skills and expertise.

11 TelecomCity (Karlskrona)

The cluster's core products are in IT and Telecom. The cluster organization is membership based. Their vision is that TelecomCity will become a leading development environment focused on telecommunications.

12 Medicon Valley (the Öresund region)

The core products are in pharmaceuticals and medical technology. The cluster organization – Medicon Valley Academy – is a member-financed association. The vision is to make Medicon Valley an attractive international brand.

3. Historical Perspective & Context

As an academic model, clusters are only some twelve years old. This simply means they have been identified, described and observed as a phenomenon for that time. For instance the genesis of the highly successful clusters in Northern Italy was their 11th century craft guilds. The region has some 1,000 years of history in collaborative systems and civic engagement. This compares to Southern Italy, with a history of individual competition, secrecy, non-cooperation and government bureaucracy. At the beginning of the twentieth century, Northern and Southern Italian regions had more or less equal levels of economic prosperity. As the flow of knowledge has become more important, the fortunes of both have digressed. Northern Italy is now one of the richest regions in the world, while Southern Italy contains some of the poorest in the developed world.

The currency of clusters is a child of evolving and competing economic models during the twentieth century and the driving forces of globalization.

Keynes concept of the central role of government gave way to the thinking of Friedrich von Hayek, who shaped and influenced the models adopted by Reagan and Thatcher oriented to free market economies. The retreat of centralist government policies and the rise of contemporary drivers and shapers of global trade set the scene for recognition of regions and cities as centres of economic activity in Western economies.

In a similar time frame Asia had developed the ‘corporatist model’, which for a time out-competed western economies. Australia adopted an ‘infant industry’ strategy which saw Government protect ‘emerging’ industries. The US identified the ‘knowledge economy’ or neo-liberal model, partly in response to the ‘Asian Tiger economies’. The US model was translated as economic rationalism in Australia.

Dr Peter Brain (1999)⁵ draws a concise picture of these patterns and interactions in the context of the evolution of economic theory in the 20th century.

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By the 1980s, a number of important strategies had been developed to address the risk-management constraint. The oldest – the infant industry strategy adopted by Australia and New Zealand – had been overtaken by technological developments. This left those countries without any coherent policy to deal with the risk-management constraint other than the neo-liberal policy of ignoring it.

The rather military overtones of the corporatist state strategy were no accident, since it had its origins in the Meiji restoration in Japan. After the disaster of World War II, the strategy brought rapid economic growth to Japan; but, by 1990, growth had slowed and the country was facing what were to become long years of stagnation.

In Germany, more market-oriented and consumer-friendly corporatist state strategies were used to address the risk-management constraint, but were supplemented by social welfare programs designed to spread the benefits of economic growth and to prevent the economy from falling into a Marxian trap. This concern for the distribution of benefits may have slowed growth during its peak years; but it may also account for the greater stability of Germany's economy, compared with the Japan's, in the 1990s.

Several other variants of the corporatist model have been tried and, mostly, found wanting. The communist variant exaggerated the militaristic aspects of corporatism, and depended heavily on central control. After producing rapid

growth in the post-war period, it was unable to cope with the diversification of technology. Countries pursuing the socialist model emphasised distributive aspects at the expense of the corporatist emphasis on investment, and tended to fall into Marxian traps. The crony capitalist model combined corporatism with a dependence on foreign capital inflow, which had been characteristic of the infant industry model; it flourished in South-East Asia until the recent meltdown.

Up until the 1990s, corporatism, in its classic or modified versions, had a proven record of success in generating rapid economic growth and in catching up with and possibly surpassing the United States. However, the end of the twentieth century found the East Asian corporatist states in disarray. The reason was that the United States, with a little help from Taiwan, had broken through into the new knowledge-based economy. A decentralized economic system could now be designed which was more than competitive with the corporatist states.

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The emergence of the knowledge industry model: the missing link

A new industry model for industrial and economic development emerged in the United States over the course of the 1990s. This model's particular brilliance lies in its appreciation of the importance of a clustering of goods and services at a regional location, with strong relationships or networks between participating enterprises. These strong relationships take root only if there is a natural synergy between the enterprises – that is, if there is a cluster of related production activities. We have already encountered a prototype of this model in Chapter Four, as enunciated in Professor Michael Porter's 'diamond'.

There were a number of driving forces behind the development of this new model, including:

- The need for United States' industry to develop an institutional framework which overcomes the disadvantages of the neo-liberal model in competition with the corporatist states;
- The production requirements of the new bio-technologies and information technologies;
- The improved efficiency of information flows allowed by the new technologies; and
- The changes in the usage of labour forced by the emergence of the new technologies, as well as the development of more productive work practices for industry generally.

This new model has turned out to be a crucial factor in the emergence of a meltdown, which threatens to become global because, in conjunction with the new technologies, it has undermined the competitiveness of the corporatist state and crony capitalist models. Not surprisingly, the model is most widely practiced in the United States, where it developed initially and is continuously evolving.

The model goes under a number of names: the knowledge industry model, the network model, the regional cluster model, and the network/regional cluster model. Some of these names could have applied to various types of regional economic structures of the past, although they had very different underlying features. The name which perhaps does imply a generational shift in operation characteristics is simply the knowledge industry model.

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The adoption of American-export neo-liberalism

Although Australia's modified liberalism became steadily more out-of-date during the post-war period, its failure did not become manifest until the Marxian-trap period of the mid-1970s. During this time, the mechanisms of macro-economic

control, which had sufficed to maintain internal and external balance during the post-war period, broke down as conflict broke out over income distribution. The result was a perplexing combination of inflation and rising unemployment that came to be known as 'stagflation'. To regain control, the policy elite turned to monetarism rather than to the corporatist-leaning alternative of incomes policies; and, having once chosen monetarism, they became increasingly reliant on its parent, American neo-liberalism.

As in the United Kingdom and New Zealand, a major reason underlying the adoption of neo-liberalism was its prestige as the economic ideology of the United States. As an ideology, it had been developed to combat pitch during the cold war. Complete with econometric accoutrements, neo-liberalism was borne back to Australia by the first generation of local economists to seek post-graduate training in the United States. It received a strong boost from the university practice of assessing merit in terms of publication in international (and hence generally American) journals.

It was fateful for Australia that neo-liberalism arrived in its academic form. It was the neo-liberalism that the Americans preached, and not the one they practiced. The export version lacked the corporatist elements that turned out to be essential to the rebuilding of American's competitiveness during the 1980s – including the military-industrial complex and its financing of research and development, the networks of interaction between government and business which were forming at the local level, the surreptitious government financing of regional development, and the concern for higher education.

The adoption of American export neo-liberalism by Australia's policy elite was not merely an intellectual event. It was strongly supported by several interest groups. The pastoral interest saw it as a means of removing the burden of tariff-induced costs, which had reduced profits during the wool boom of the 1950s. More importantly, the mining industry was enjoying a bout of optimism, reflecting recent increases in the price of several metals (notably gold) and the effect of the oil-price shock on coal prices. As I pointed out in Chapter Four, the neo-liberal model is appropriate for small, resource-rich countries; as it happened, the mining industry proposed that Australia was one such. The industry argued that, provided it was relieved of the burden of support for infant industries, which never grew up, it could underpin continuing prosperity.

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I can see only one way forward for Australia, whatever political party governs it. That is the rejection of American-imported neo-liberalism's disregard for the role of government, and its replacement by a return to the indigenous liberal tradition, which expects much of government.

I do not mean a return to the indigenous tradition after its capture by distributional interest, but a return to that pragmatic use of governments by which Australia overcame its disadvantages in the nineteenth and early twentieth centuries.

A century ago, Australia's disadvantages were long distances and small scale. The tyranny of distance has been conquered, but the diseconomy of small scale remains. Now it has been joined by an additional failure to keep up with a sufficient range of technological developments to maintain income relative to the world's leading economies. It seems such an obvious thing to say but as before, government activity should be aimed at overcoming these disadvantages.

The last extract is included as it relates to criticisms of clusters discussed later. Australian industry scale, global market share and resources spread thinly across a large continent require a special role for government and adaptation of the knowledge economy model to suit our particular circumstances.

The emergence of clusters, either by accident or design, could also be seen as a response to the growth of transnational organizations and their trend towards ever

bigger agglomerations. Regionally based clusters, supported by ICT, transport technologies and global financial systems provide opportunities to compete with these global structures.

For a wide variety of reasons, it is difficult to escape the conclusion that 'industry clusters', in a variety of incarnations, are to occupy centre stage in economic development theory and practice for quite some time.

4. Components & Drivers

Underpinning the emergence of clusters is the continuing search for comparative and competitive positioning in an environment impacted by global forces and constant change as the norm.

These forces are quite well-known, but briefly reviewed below, as they drive the 'knowledge economy' and consequently also the formation of industry clusters.

Trade Environment

Information and communications Technologies (ICT), improved transport systems and associated global financial market reforms have been leading drivers in the 'globalisation process'. They are breaking down social, institutional and logistical constraints to trade. At the same time as they open up wider, larger markets for regional enterprises, they also expose regional industries to international competitors.

International competition is also growing in low and medium technology products and services since ICT has provided poorer countries with access to markets, technology and capital.

A variety of trade barriers are still in place in an attempt to restrict this flow of goods and services to protect regional producers and their markets. For trading nations (including Australia) protection of industries through artificial protection measures has become unsustainable for a number of reasons.

There is a long and hard road of negotiations before international trade is made truly fairer and closer to the often quoted 'level playing field'.

The trend is nevertheless inexorably towards greater and more open competition.

Competitive Advantage

Technology has also enabled flexible manufacturing systems which out compete mass production systems limited in product range. Consumer preferences are better catered for, specialised products are possible and changes to other products to suit market trends can be made at minimal re-tooling cost. Product cycles and time to market are shorter.

Developed nations can only be price competitive by adopting current, best practice technology. However, technology is changing so quickly that competitive position based on technology alone is not likely to be sustainable unless re-investment in R&D and new technology is continuous and differentiated from competitors.

Short life cycles, the need for the latest technology, systems and R&D for new products have collectively placed the ability to remain competitive beyond the reach of increasing numbers of individual enterprises. This has been one of the drivers towards increased collaboration between enterprises and across sectors of industry supply chains.

The possession of physical assets (land, water, cheap labour, power etc), is no also longer a sustainable competitive advantage alone.

The recognition of knowledge, innovation and continuous learning as central assets in creating competitive advantage in the global, networked environment are also

driving increased collaboration. Technology is facilitating huge, free flows of information. Development is too fast and change too constant for knowledge to be a competitive advantage unless constantly updated and enhanced. Those who continue to work in isolated units and groups will inevitably be left behind.

These forces have led to the re-discovery that the quality of human capital is the central source of sustainable competitive advantage, when innovatively **combined** with other regional assets and fostered by appropriate support mechanisms and policy settings. This assumes basic business competence, especially matching product to market demand.

There is a competition not only between differing economic philosophies but also one based on a mosaic of cities and regions with differential competitiveness and performance. There will be winners and losers in this competition, as reported in five successive annual 'State of the Regions' reports.⁶ The 2002 report notes:

In the new economy, regions develop advantage based on their ability to quickly mobilise the best people, resources and capabilities required to turn innovations into new business ideas and commercial products. Leading regions establish competitive advantage through their capabilities. (Page 28).

Regional Disparity

Globalisation is driving increasing disparity between regions *within* National borders. The distinguishing feature of leading regions is the high level of 'knowledge workers'. 'State of the Regions' reports referred to previously have been reporting this effect in Australia over five successive annual reports. A number of insightful observations from the current report are reproduced below.

The trend is alarming, with the leading, richest regions mainly centred around major central CBD areas progressively and rapidly increasing the gap on almost all indicators.

If these trends continue at the current rate it will not be too long before Australia's claim to be land of equality has a hollow ring. (Page 31).

Internationally there is a similar trend, with policy makers actively involved in attempting to redress this trend. The European Union has budgeted A\$400 **billion** for the 2001-2006 period (around one third of its total budget), to policies and programs aimed at bringing disadvantaged regions more in line with the leaders. In the US, particularly California, there is a similar focus on addressing regional disparity.

The generation of gross regional product is more unequally spread between Australian regions compared to both the Economic Union and United States jurisdictions. At the top end of the Australian distribution for gross regional product, the top 6% of the population live in regions which create 20% of the nation's gross product. (Page 24)

Development in one area used to lead to diffusion into other, less developed areas. As development increased, so did costs and lower cost areas tended to be sought out and developed. This is no longer generally the case.

The advent of this new type of economy means that the market mechanism now works in reverse. That is, resources are pulled into these high cost high income regions rather than being pushed..... (Page 40)

This also has implications for regional population demographics that may exacerbate regional disadvantage. Retired persons are attracted to lower cost

'lifestyle regions, while workers with skills that disadvantage them in high cost 'knowledge' centre seek lower cost regions.

Lifestyle regions have to be careful not to depend too greatly on population growth to drive their regions. They should also pay attention to the age and household characteristics of the population. (Page 24)

Just as the rural and regional areas are losing their youth, the core metro regions are soaking them up, providing strong employment and incomes growth. The opportunity cost of being young and not being in the core metropolitan region of Australia is now stark. (Page 71)

A central issue for regions is becoming how to attract and retain 'knowledge workers', rather than enterprises:

Increasingly the location of high technology firms is dictated by where there are high concentrations of creative capital. That is, firms are now following the talent as opposed to the converse. The key to identifying regions where there will be concentrations of high technology industries and dynamic growth outcomes is understanding how the creative class make their decisions on where to locate. (Page 29)

The decision parameters used by the creative class on where to locate are based on the characteristics of an area, that is its openness with regard to acceptance of social and cultural diversity, bohemian and alternative lifestyles and multi-culturalism, in conjunction with vibrant street culture, music scene, night life and open spaces. The indexes derived to measure these parameters accurately predict regions where the proliferation of high technology industries and economic growth are, and will, occur. (page 29)

Tourism is consequently an important key in regional economic development, as it tends to provide infrastructure and facilities well beyond what a region would otherwise be able to afford and may also create a more international, open society.

Policy Settings

Regions can drive many factors to generate wealth and prosperity from within. There is also a critical need for enabling policy settings at National and State levels. This sets the national context for cluster based initiatives.

A two year OECD project to study the factors producing differing growth rates in member countries led to a 2001 report - *The New Economy Beyond the Hype*. The Report introduction, page 10, observes:

.....Crucially, ICT seems to have facilitated productivity enhancing changes in the firm, in both new and traditional industries, but only when accompanied with greater skills and changes in the organisation of work. Consequently, policies that engage ICT, human capital, innovation and entrepreneurship in the growth process, alongside fundamental policies to control inflation and instil competition, while controlling public finances are likely to bear the most fruit over the longer term.

The conclusions, (page 97), in part state:

....But ICT is not the only factor explaining growth disparities and policies to bolster these technologies will not on their own steer countries on to a higher growth path. Indeed, growth is not the result of a single policy or institutional arrangement, but a comprehensive and co-ordinated set of actions to create the right conditions for future change and innovation. This depends more than ever on improving the quality of human capital and responding to the changing demands of the workplace and society more broadly. It also means providing more scope for risk-takers to explore the new business opportunities that come with economic change. At the same time, the importance of fundamentals has not lessened. If anything, the pivotal role of sound macroeconomic management has been underlined.

Moreover, the significance of openness to trade, investment and ideas, as well as well-functioning economic and social institutions has been reaffirmed.

The key policy recommendations made by the report are (page 98):

While specific policy priorities may differ across countries, this report encourages governments to adopt a comprehensive growth strategy based on a combination of actions in order to:

1. Strengthen economic and social fundamentals, by ensuring macroeconomic stability, encouraging openness, improving the functioning of markets and institutions, and addressing the distributive consequences of change.

2. Facilitate the diffusion of ICT, by increasing competition in telecommunications and technology, improving skills, building confidence and making electronic government a priority.

3. Foster innovation, by giving greater priority to fundamental research, improving the effectiveness of public R&D funding, and promoting the flow of knowledge between science and industry.

4. Invest in human capital, by strengthening education and training, making the teaching profession more attractive, improving the links between education and the labour market and adapting labour market institutions to the changing nature of work.

5. Stimulate firm creation, by improving access to high-risk finance, reducing burdensome administrative regulations and instilling positive attitudes towards entrepreneurship.

Many policies in keeping with the above have been put in place in Australia already and Australia's good performance on a number of indicators in the report reflects this. However there is more to be done, especially under items 3, 4 and 5.

Cluster Components

Industry clusters are commonly described as having four components. The New Zealand paper ⁽¹⁾ referred to previously refers to these:

The origins of clusters differ. The initial stimulus may have been

availability of a raw material

soil / climate conditions

proximity to a nearby market.

a chance event, such as the return to a location of an entrepreneur with specific skills and ambitions (e.g. Angus Tait's return to Christchurch as a radar technician)

the establishment locally of a government funded R & D facility. There are common elements to all high performing clusters. Their participants can be divided into four broad categories:

1. Core Businesses: *The businesses that are the lead participants in the cluster, often earning most of their income from customers who are beyond the cluster's boundary.*

2. Support Businesses: *The businesses that are directly and indirectly supporting the businesses at the core of the cluster. These may include suppliers of specialised machinery, components, raw materials; and service firms including finance/venture capital, lawyers, design, marketing and PR. Often these firms are highly specialised, and are physically located close to the core businesses.*

3. Soft Support Infrastructure: *In a high performance cluster, the businesses at the core and the support business do not work in isolation. Successful clusters have community wide involvement. Local schools, universities, polytechnics, local trade and professional associations, economic development agencies and others support their activities and are key ingredients in a high performance cluster. The quality of this soft infrastructure, and the extent of teamwork within it, are very important keys to the development of any cluster.*

4. Hard Support Infrastructure: *This is the supporting physical infrastructure: roads, ports, waste treatment, communication links, etc. The quality of this infrastructure needs to at least match competitive destinations, be they local or further a-field.*

While the origins of a cluster may differ, its ongoing survival will depend upon fostering and building on a **core competency** within the region, which is used to produce goods and/or services that continue to match target market requirements. This is leading regions to specializations, since they must strive to **align** the four components above for maximum competitive advantage. Once support structures are aligned to support core regional competencies, they effectively limit choices as to the type of industries that will be attracted to or could be based in the region. This exposes the region to increased risk, discussed later.

Drivers

The underpinning drivers of clusters have been inferred in the material so far. This section will consider at least some of these in more depth.

A useful summary of these has been assembled by the University of Carolina ⁷

Factors Driving Industry Cluster Growth and Development

The factors, which drive industry cluster development and growth, are also the subject of debate in the literature. In general, businesses locate where it makes the greatest economic sense, either in terms of accessing the market for their product, the labour pool, or required resources. The basic factors that drive industry clustering are very similar to the factors that encourage urban or locational agglomeration economies. As stated by Doeringer and Terkla, “The presence of positive externalities explains the clustering process, whereas specific location sites for each cluster depend on either ‘historical accident’ or the cost advantages provided by immobile factors that attracted the firms anchoring the cluster (Doeringer and Terkla 1995, pg.226).” While there is consensus among the researchers that firms will cluster because they receive some type of benefit, the factors that create those benefits are debated.

Michel Porter (1990) argues competition is a driving force behind cluster development. Clustering is a dynamic process, and as one competitive firm grows, it generates demand for other related industries. As the cluster develops it becomes a mutually reinforcing system where benefits flow backwards and forwards throughout the industries in the cluster. Porter argues that it is the competition between rival firms in the cluster that drives growth because it forces firms to be innovative and to improve and create new technology. This, in turn, leads to new business spin-offs, stimulates R&D, and forces the introduction of new skills and services. Because many of the industries within the cluster employ a similar labour force, the labour force can freely move to other related firms within the cluster, thus transferring knowledge to new firms, and continuing to promote competition and therefore growth. This growth can either lead to increasing the vertical integration of the cluster, or it can lead to the horizontal integration of the sector. Increased vertical integration occurs as the division of labour gets more specialized, and new firms are able to fill the new niche markets. Horizontal clustering occurs as the new technology and labour skills are applied to related industries in different sectors. Porter points to Silicon Valley as an example of how competition has spurred the horizontal clustering process.

There are several other key factors that are discussed in the literature that contribute to cluster development. Doeringer and Terkla (1995) cite the benefits of agglomeration economies observed in industry clusters as one factor leading to cluster development. Firms locating in close spatial proximity benefit from lower transportation and transaction costs, as well as access to a skilled labour force. Agglomeration economies can also spur competition, which encourages information, knowledge, and technology transfer among related firms. The transfer of knowledge and technology among firms can lead to new industry growth, and therefore helps drive the overall growth of the cluster.

Face-to-face interaction is also cited in several of the sources as a critical factor in cluster development (Doeringer and Terkla 1995, Rosenfeld 1997). This interaction is most beneficial to small, specialized firms, which have the flexibility to fill emerging niche markets as final demand or technology changes (Doeringer and Terkla 1995). Local proximity to firms in all aspects of the production process, such as the suppliers, machine builders, assemblers, distributors, and final customers allows the cooperating firms to adopt new technology and innovations rapidly, therefore increasing the overall efficiency of the production process. The firms collaborate to provide specialized services; through this collaboration, clusters develop (Rosenfeld 1997). The social infrastructure within the cluster helps facilitate technology and knowledge transfer, which strengthens the cluster and promotes future growth. The importance of face-to-face interaction is cited in Rosenfeld's case studies of the furniture industry in Mississippi and the apparel/hosiery industry in Northern Italy (Rosenfeld 1997).

This commentary is from a US perspective. There has also been a depth of work carried out in the EU, which draws out the differences between the US and EU approach mentioned previously. Cooke and Morgan (1998) ⁸ have for instance produced a comprehensive review of a variety of models from a European perspective and contributed to the concept of the firm as 'as a repository of knowledge'.

We think that while competition is an important driving force, it is the quality of the human capital and human interactions within the system that are at the core of producing competitive edge through the rate and quality of assimilation and dispersal of knowledge. Technology provides only better tools.

The Cairns Region Economic Development Corporation has provided the pilot cluster based program for Queensland. From its perspective, the reasons driving the need for and advantages of clusters are set out in **Attachment C**.

Learning Regions

'Learning Regions' is a label applied in the EU. Two diagrams are attached (**Attachments A and B**), which attempt to illustrate both efficient and inefficient regional innovation systems. ⁹

At their core is again face to face interaction and collaborative processes. We believe it important to consider the process of learning in more detail. After all we are talking about the 'knowledge economy'. There are distinctions between first and second order learning.

First order learning refers to the refinement of existing practices – doing things better; while second order learning refers to the production of novel practices – doing better things. ¹⁰

First order learning can be achieved through tradeable knowledge and can be to some extent centrally codified and distributed. Second order learning requires personal interactions leading to intuitive adaptations. **It is these personal**

interactions that produce innovation. It has been felt that innovation is a linear event, typically beginning with scientific or engineering R&D activity and then moving down through the production system. In fact R&D need not be innovative at all, as some national systems have demonstrated. Innovation can occur right throughout the production and value chains and equally move upwards as easily as downwards through systems.

Collaboration can occur at a variety of levels, from one requiring only formal interaction and low order trust, to intense face to face collaboration, requiring high levels of trust and intuitive learning likely to produce innovative outcomes.

This indicates a core reason for the insistence on limited geography in the definition of clusters. First order learning can be spread remotely, but second order, intuitive learning and high order trust can most easily be developed through face to face interactions.

There is also a note of caution in high trust, ongoing collaborative arrangements. For it to continue to be a learning, innovative situation, periodic appraisals need to be built in, otherwise they can degenerate from 'ties that bind to ties that blind'. A second caution is to emphasize the need for the motivation associated with initiatives to create collaborative systems, to be transparent and genuine. Where collaboration is rhetorical to conceal narrow self-interest, it is likely to fail and make any future attempts more difficult. There are many examples of this in Australia.

Another important feature of the EU model at a regional level is the alignment and interaction of the actors and institutions in the economy. This involves breaking down traditional communication barriers between institutions and 'silo' thinking.

Builders

Clusters cannot really be built; they evolve given facilitation of the right environment.

Drawing from the essence of the material in previous sections, the list of key factor conditions to be facilitated or met could be summarized as follows:

Foster Collaboration to drive:

- Intuitive learning
- Systems Integration
- Trust/Transparency
- Shared Vision
- Geographic concentration
- Broad engagement – (demand chains and regional institutions)
- Core competencies

Many of the factors involve attitudinal and behavioural change. These changes are not achieved quickly.

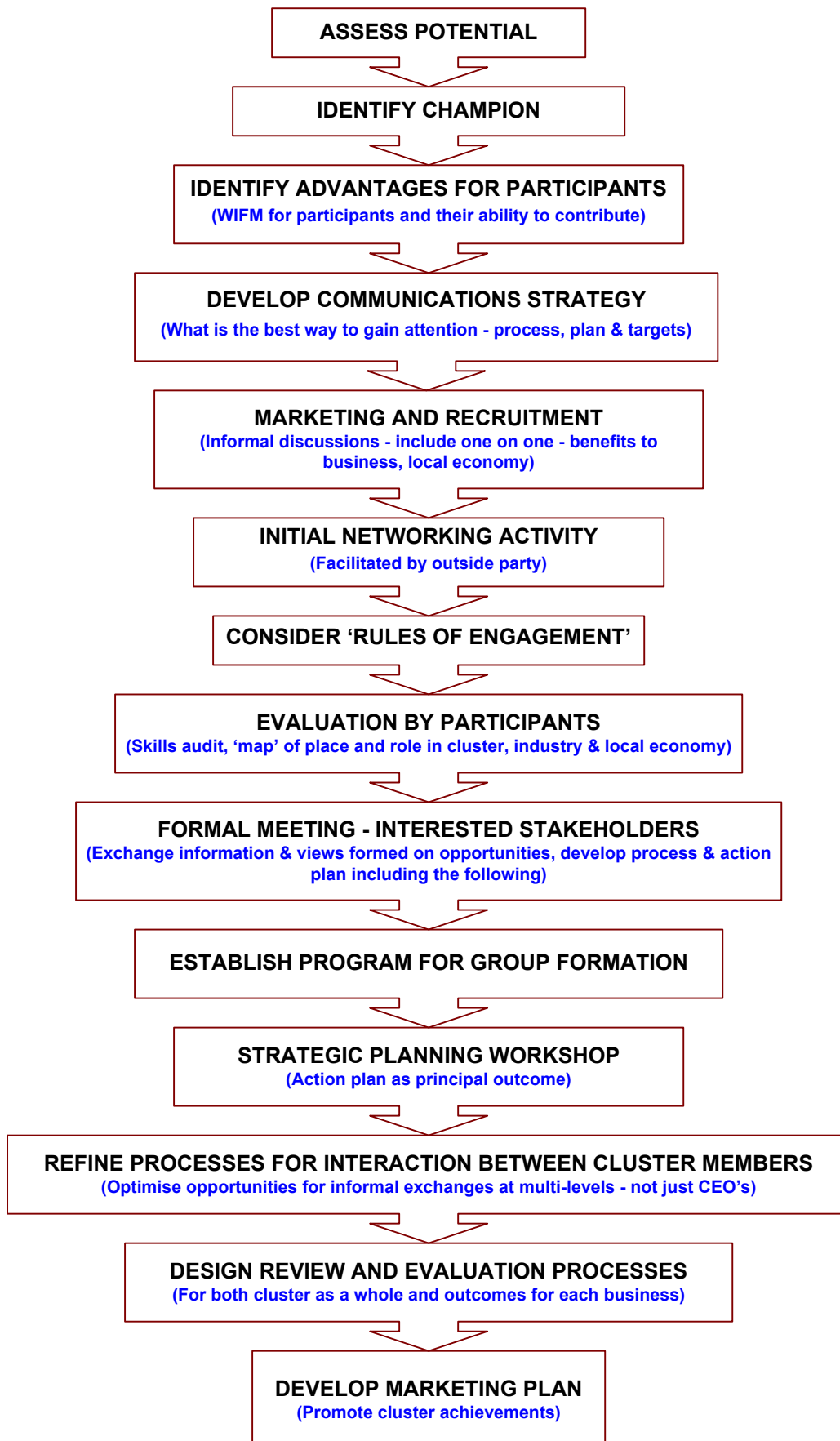
“People don't change their lives based on data. They change it based on experience, an intimate contact they have had with somebody that they trust “

- Peter Block quoted in Believing Cassandra 182

The principles enunciated by Senge¹¹ as to building 'learning organisations' apply equally to fostering of clusters, so far as the human systems involved are concerned.

A 'Cluster Development Flow Chart' indicating very initial steps in the cluster facilitation process, taking into account the above factors follows :

CLUSTER DEVELOPMENT FLOW CHART



5. Contemporary Work

References to contemporary work are made throughout this paper. The scope of contemporary work on industry clusters is well represented in output from members of The Competitiveness Institute, which includes the global leaders in this field as members. A report on the 2000 conference of the TCI ¹³, held in Glasgow, summaries thinking on the subject at the time. The TCI website includes papers presented at all five annual conferences (including the 2002 Cairns Conference), which provide comprehensive coverage of current thinking, academic activity, policies and initiatives:

www.competitiveness.org/

A copy of the abovementioned report on the 2000 conference is attached as Attachment D.

6. Evaluation and Criticisms

1998 Review

The 1998 ⁽⁷⁾ University of Carolina review found little research or tools available on cluster evaluation.

Evaluation and Critique of Industry Cluster Policies

To date, there is little research on the effectiveness of industry cluster policy in generating economic development in cities or regions. The traditional measures of economic development are the number of new jobs created and tax revenue generated. In terms of these measures, there is no relevant literature available. However, Rosenfeld (1997) presents several criteria that could be used for evaluating the overall efficiency of industry clusters. These include the number of new spin-off businesses firms in the cluster have generated, the development of new technology and increased R&D capacity, the improvement of labor force skills, and the intensity and quality of firm networks created.

While there are very few industry cluster policies currently in place in the United States, the potential adoption of such policies has been criticized. Rosenfeld (1995,1997) provides a discussion of some of the general criticisms of cluster policies. The biggest concern is that cluster policies encourage over-specialization in the economy. If the industries in the cluster fail, then the economy in the entire region is damaged. Many leaders chose to encourage the diversification of the economy, and fear that the use of a cluster policy will run counter to this effort. Secondly, industry cluster policies are criticized for being more applicable to small, specialized firms, particularly because of the level of trust and cooperation required for a successful cluster. Critics claim that in reality, large, multi-national companies dominate the current economy, and these companies will undermine the trust that is required for a cluster to be effective. A third criticism of industry cluster policies is that it only applies to urban areas, and that rural areas lack the necessary scale for a cluster. Lastly, critics claim that new telecommunications technology is replacing the need for spatial clustering. Therefore, firms will no longer receive a competitive advantage from close geographic proximity.

Harrison and Glasmeier (1997) critiqued cluster policy specifically in regards to Porter's application of cluster policy to inner-city economic development. However, several of their criticisms could be appropriate to cluster policy at all geographic levels. First, they claim that cluster development is more appropriate

in areas where there is already an existing, diverse economic base, which can support new markets and diversification. A second criticism is that industry clusters are only capable of responding to small, incremental changes in technology and market demand. However with larger changes, Harrison and Glasmeier claim that clusters can be resistant to new information because it may introduce changes that are drastically different from the processes used for previous successes. As discussed earlier, information flow is critical for innovation, which is in turn necessary for a cluster to continue growth.

Much of the quantitative work to date has concentrated on identification of the existence of clusters, with input-output analysis being a common technique. The University of Carolina review summarises the position:

The varying definitions of industry clusters helps explain the differing arguments regarding the methodology to identify clusters. One of the common approaches to identifying clusters is based on quantitative techniques, including location quotients and input-output (I-O) analyses (Rosenfeld 1997). These tools help identify relative concentrations of industries in the region, as well as identify the buyer-seller linkages in different industry sectors. Michael Porter relied heavily on this type of analysis to form the basis of his international study of industry clusters. I-O analyses and other quantitative tools were also the basis for identifying clusters in several other studies, including the Twin Cities Industry Cluster Project (State and Local Policy Program 1998) and UNC-Chapel Hill's study of North Carolina's industries (Bergman, Feser and Sweeney 1996).

The quantitative approach towards identifying industry clusters is generally regarded as a critical component of a cluster analysis. This type of analysis will provide an initial tool for identifying potential clusters and will indicate the relative presence of different industries in the local region. An I-O analysis is especially useful in the analysis of a vertically-integrated cluster, when the buyer-seller linkages are more obvious. However, the quantitative analysis does not address whether relationships really exist between the individual firms, and it does not account for other factors beyond the product-market relationships, such as industry collaboration and information flow (Doeringer and Terkla 1995, Jacobs and DeMan 1996, Rosenfeld 1996,1997). "Although inter-industry transactions incorporated within production channels can sometimes be detected in input-output tables, neither the character or relationships among firms nor the benefits of clustering can be discerned in this way (Doeringer and Terkla 1995, pg.228)."

There is a general consensus in the literature that in order to truly identify industry clusters it is necessary to conduct a qualitative analysis in addition to the quantitative analysis. Surveys and interviews of key industry representatives will help expand an understanding of the buyer-supplier relationships, as well as further identifying commonalities between industries (i.e., workforce or infrastructure needs, or technologies used). The use of the qualitative analysis will both confirm the findings of the quantitative analysis, as well as help identify potential industry clusters that may have been overlooked by the conventional data analysis (Doeringer and Terkla 1995, Jacobs and DeMan 1996, Sternberg 1991, State and Local Policy Program 1998).

Criticisms

Measurement: Apart from the criticisms indicated above, the other is that broadly accepted evaluation, measurement and benchmarking tools are lacking. This leads to doubt as to which initiatives and activities produce real outcomes. A commonly heard comment is 'it would have happened anyway, without clusters';

Overspecialisation: is a risk, but in the global environment, it is difficult to avoid if a region is to sustain competitive advantage and market share for its industries. Once the four elements of clusters (core businesses, support business, soft and hard infrastructure), are aligned with regional core competencies, a region will tend

to automatically limit the scope of industries it can sustain or attract. The smaller the region, the fewer specialisations it is likely to be able to support.

It is perhaps a matter of recognising this and then setting out to identify the range of industries consistent with and which have synergies with core competencies and key industries.

In any event, it is nothing new for regions to develop a reliance on a specialisation or particular resource. Cluster style of thinking within a 'learning region' may be more nimble in adapting and changing to meet market trends.

Limited scope: – The observation that clusters are more suitable to small firms has a number of dimensions. Clustering could be regarded as a response to the influence of multi-nationals. It is a way to compete. In other circumstances clusters form based on the support businesses required by a multi-national firm. The 'Just in Time' systems associated with the Australian automotive industries are an example. In the traditional operation and view of multi-nationals it could be said that they would not fit comfortably with a local cluster and would undermine the necessary trust, but it is not clear that this continues to be the case across all industries.

Urban Benefit: There is a huge pull effect of skills and resources into major urban centres. This has been well-reported in the State of the Regions Reports ⁽⁶⁾ over the past five successive years. The effect has been operating in Australia for perhaps thirty years and is accelerating. Particularly global centres are attracting '21st century' or 'knowledge workers' and leaving rural areas under-resourced in soft infrastructure. While scale and resources are certainly therefore a difficulty for rural areas in forming clusters, global experience is showing that they are in fact providing an answer in addressing the drift to large urban centres. Regions with good life styles in particular that develop specialities have been shown to be able to attract and retain talent and investment. The Australian Scone Thoroughbred horseracing cluster is but one of many examples.

ICT technology: replaces the need for spatial proximity. This criticism appears to have limited validity; given the argument that at the core of clusters and regional innovation systems is second order learning, based on face to face interactions that produce intuitive insights,. Advantages from spatial proximity are also derived from logistical considerations in alignment of components of the production systems.

Response Limitations: to the effect that 'clusters are only capable of responding to small, incremental changes in technology and market demand'. This will depend on the nature of the cluster and depends whether it is based on 'ties that bind' or 'ties that blind'. We would have thought that one of the advantages of a cluster based on learning and innovation would be that it had a better chance of adapting to changing technology and market conditions than other forms of production systems. The clusters of automotive, knitwear and footwear Northern Italy clusters seem to be illustrations of this.

Evaluation, Measurement & Benchmarking

The University of Carolina 1998 review found little research on the effectiveness of cluster initiatives. Not much has changed in the four years since, but there has been a growing recognition of the need for evaluation, measurement and benchmarking tools. These are needed to attract support from government and policy makers, to evaluate the effectiveness of different approaches, to provide feedback on performance for participants and benchmark and compare the performance of regions.

The limitations of I-O analysis noted above have been noted from a variety of sources.

There is now an emerging body of work seeking to find appropriate tools and techniques.

University Of Arizona

Arizona has been fostering clusters for some ten years. In 2001 the University undertook a survey and interview based study of six Arizona clusters. The report¹⁴ noted:

Previous single – industry examinations were not consistent in methodology and lacked comparability among industries, and over time. Those issues were resolved with the “all clusters at one moment with one method” survey approach used in this study.

The study is to provide a benchmark for comparative studies over time. The clusters studied were:

- Aerospace
- Bio-industry
- Environmental Technologies
- Food, Fibre and Natura Products
- Information Technology
- Optics
- Plastics and Advanced Composite Materials
- Tourism

The material collected and analysed provides considerable depth of information on each firm and the cluster as a whole and included analyses covering:

- Employment data and projections
- Revenues
- Export revenue from region
- Procurement expenditure in region
- Cross cluster commercial interaction indicators
- Percentage of engineers employed and analysis by discipline
- Percentage of firms that are branch facilities
- Overlapping Cluster affiliations
- Geographic distribution of firms
- Sources of Financing
- Joint ventures and collaborative activities
- Participation in cluster organisations
- Age of firm
- Ownership structure
- Industry Supplier qualifications
- Industry concentration in large firms

Curiously, the study found that there appeared to be a low level of collaborative activity, based on the measures evaluated:

The level of joint ventures and other collaborative activities between firms is low and varies by cluster; only eight to 22 percent of the firms have engaged in these activities with other cluster companies. (p27)

Commercial interaction between firms and clusters is documented by looking at patterns of sales and purchasing transactions, joint ventures and other collaborations. Technology interaction is examined on the basis of purchasing research and development services and technology licensure. (p27)

South Australia

Professor Richard Blandy has completed a report on cluster performance and outcomes in South Australia. This has not been reviewed. However South Australia is apparently currently taking this work further and is in the process of developing measurement and evaluation techniques and procedures. Some preliminary work has been done with the ABS.

They are presently developing a Cluster Innovation Framework through the Cluster Innovation System they have developed and are applying in the Water and Spatial Clusters. Built into the framework will be measurable KPI's directly related to the process itself. Also the Framework will have decision processes built into it to test relevance and direction. They are particularly concentrating on methodologies of engagement and enablement in relation to cluster firms and their foundations.

This work is anticipated to be complete in six months, when they anticipate they will have substantial knowledge bases on:

- Measurement of outcomes
- Processes
- Collaborative models
- Education knowledge bases for skills improvement
- Management of innovation
- Role of facilitation, facilitators and CEO's
- Cluster governance
- Other cluster related issues

Scottish Enterprise

It is understood that Scottish Enterprise has carried out some early attempts at cluster evaluation. This material has not been sighted.

Porter – Harvard

Michael Porter indicated to the last TCI conference in Cairns (October 2002), his recognition of the growing importance of determining appropriate measurement and evaluation tools for clusters. He noted that he was initiating a project to develop these over the next twelve months.

There are no details to hand as yet.

NZ Industry

Industry New Zealand has developed a draft for a project to contribute to global interaction between regional industry clusters. It is understood the project may now proceed under the auspices of the OECD.

The project may have relevance to the development of widely accepted evaluation and measurement tools, since benchmarking and comparing performance would seem to be implied as flow on needs from this project. The draft project proposal¹⁵ summarises the project in the following terms:

The project goal is to research, design and implement facilitation processes for the development of world-class international businesses, which offer international incomes for the citizens and investors of our countries. More particularly, we aim to substantially increase and enhance the participation of small and medium scale enterprises (SME's) through the development of network social capital in the form of clusters or industrial districts, and similar structures such as technology alliances.

The project aims to create an international cluster map on a searchable database. It aims to use the information, networks and forums to promote interaction and trade between local production systems.

The underpinning concepts are of specialisation and trade to mutual advantage in the tradition of the economic model of David Ricardo. The local dimension is the externalities that can be realised through enterprise specialisation and the development of the "horizontal" inter-firm trade and technology spillovers as originally analysed by Alfred Marshall. In addition, there is the ability of local production systems that have developed their processes to the point where their system is in some way "governed or managed" as to its development and strategies. Such systems also offer to micro enterprises working within them "market reach". This provides micro firms with the opportunity to enter into the benefits of inter-regional trade in spite of their small size, a very important aspect for smaller and more peripheral economies.

For the participating government economic development delivery organisations (EDA's), the identification of the principles of best practice is a major goal. This enables them to fulfil their brief to build the economic dimension of their nations and communities. This project is designed to achieve that goal through the sharing of experiences and case studies, the design and development of local economic development (LED) initiatives, and international industry/region partnering.

In this context, the governments of the OECD nations are facing the need for a strengthening of their innovation systems if their countries are to continue to deliver sustainable growth in living standards. The agenda is focused upon lifting productivity, and the need to do this as a response to the rapid emergence of new economic players in Asia and Latin America in many international industries. As the OECD nations respond to this challenge, the competition in the innovation domain intensifies.

Circumstances in various national, regional and local economies are markedly different as to capacity, history, capability and culture. The differences can even be quite pronounced within countries, and even regions. Often, first peoples are not full and equal participants in the economy. And yet, there are some experiences that are common to all regions, and some common to sub-groups of regions. The challenge is to identify the genuine underlying principles, and to enable EDA's to generate their own, locally relevant best-practice initiatives. This likely encompasses national, regional and local EDA initiatives.

It is desired that participation in the project will provide members a platform for increasing the concept of "specialisation" within an international context, and thus provide a basis for greater cross-border trade and prosperity among regions. The experience of Lumezzane, Treviso and of the Arizona Optics Industry Association are pertinent, see below.

Outline of Project

The project is divided into 3 parts with 10 sub projects. Although they have some sequential logic to them, it is envisaged that they will be undertaken concurrently. Different countries will develop their own work programmes, giving priority to different sub projects, as is most appropriate to their individual circumstances and needs.

This draft is prepared as a working document, and as a basis for project partners signalling both the status of their local systems and capabilities, and the areas where they would prefer to focus their project engagement so that co-ordination and collaboration can be enhanced. The sub-projects are:-

- 1. Part 1 – International Specialisation and Trade Development*
 - i macro mapping and modelling of national centres of industrial concentration and specialisation;*
 - ii mapping of local production systems and building specialisation and managerial capability*

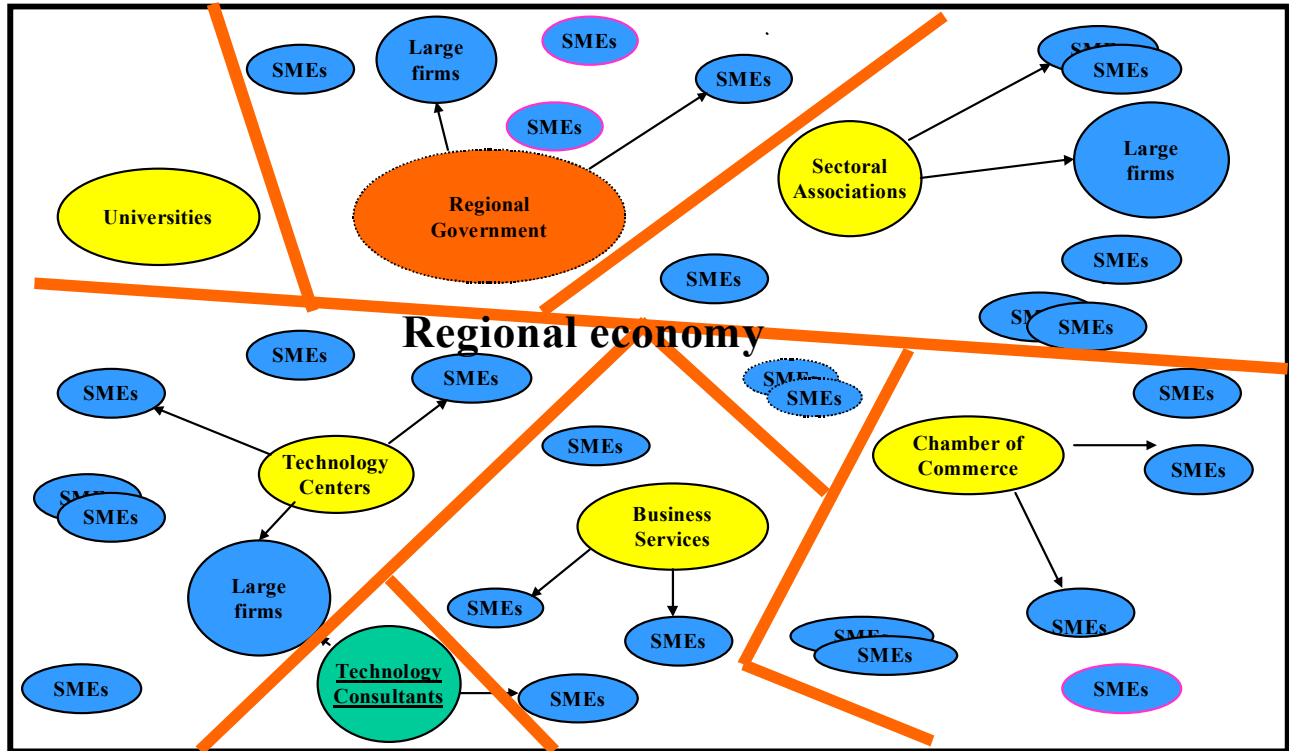
- 2. Building Local Economic Capability*
 - iii fast growing enterprises (transformational rate), especially SME's*

 - iv national technology systems and economic learning (NSEL)*
 - v local, regional and national innovation systems*
 - vi facilitating regional specialisation and trade within international industries*
 - vii identifying the principles of EDA best-practice for the support of*
 - industrial districts or business clusters (local production systems which have management capacity)*
 - fast growing enterprises*
 - local, regional and national innovation systems*
 - viii Researching and identifying the specific characteristics of local, successful, international enterprises.*
 - ix Participation in developing the 'New Economy'.*

- 3. Management of an International Collaboration*
 - x a process for dissemination of results, sharing case studies, and the development of a learning process in EDA best practice and the design of local programmes.*

ATTACHMENT A

Figure 1 A fragmented regional innovation system: less favored regions



ATTACHMENT B

A learning region: An efficient regional innovation system

Open gate: International R&D/academic excellence networks



ATTACHMENT C

CAIRNS REGION ECONOMIC DEVELOPMENT CORPORATION

WHY CLUSTER-BASED ECONOMIC DEVELOPMENT IN TNQ?

- ***Our Region, An Economic Island?*** - Companies and regions as independent economic islands operating alone are not well placed for survival in the new global economy. Evidence suggests that region's and industries competing collaboratively through the formation of industry clusters will raise their international (and local) competitiveness.
- ***So Many Small Businesses*** 98% of business in TNQ is small business. 85% of these businesses employ less than 5 people and 75% are owner operator. Operating independently these companies find it difficult to access finance, undertake research, development and marketing activities and to influence government decision making.
- ***Global Competition and International Markets*** To compete effectively in today's markets, most companies are finding that they have an ever increasing need to invest in research for better market intelligence, new product development etc. In any business, particularly small, the level of investment required can be an unacceptable burden.
- ***Competing Collaboratively*** Forming industry clusters, that are generally smaller than an entire industry yet much larger than a business network, enables firms, even competitors, to form alliances and combine capabilities to accomplish business objectives that they could not achieve by acting alone. This raises their competitiveness and enables them to take advantage of growing international markets.
- ***Establishing Important Linkages*** Clusters facilitate links which are central to longterm innovative capacity.
- ***Innovative Capacity***, otherwise known as the speed at which one reacts (or proacts) to the market, it is key to maintaining a competitive position in the ultra-dynamic global marketplace. Clusters facilitate this by linking key industry and government players allowing decisions to be made collectively and collaboratively rather than individually.
- ***What are our Unique Selling Propositions (USP's)?*** All of the region's industry groups are invited to come together to explore their strengths and weaknesses and the opportunities that could come from competing collaboratively. The aim is to focus on the strengths and unique qualities of each of the industries and try to promote them. This is sometimes known as defining a region's "Unique Selling Propositions" (USP) that serve to sharpen a region's marketing messages to different industry audiences and promote targeted investment opportunities.

- **Extra Resources!** Companies operating within a cluster are able to access specialised resources (including human, other businesses, capital, information and intelligence) on a quick turnaround basis. Thus they can exploit their own competencies and gain performance advantages by operating within a cluster.
- **No One Recipe for All** Our experience has shown that there is no one magic recipe for cooking up clusters. Every industry is unique. It will have its own set of needs, issues, aspirations and modes of operation and conduct, and these can differ enormously between industries. So with each industry the cluster development process has to evolve and the time needed for that evolution may vary greatly.
- **If You Are Standing Still You Are Falling Behind!** By becoming a cluster member, participants can be actively involved in the future directions of their industry. They will learn how to become more competitive and be better able to influence government bodies regarding matters and regulations that impact on the competitiveness of their industry.

CLUSTER MYTHS

- **Clusters work against diversification.** Absolutely not! There is no one industry that can meet all our requirements for economic stability, growth, job creation and increased standards of living. For example, food processing is a major earner of foreign exchange, but it does not employ as many people as the trade industry. The trade industry on the other hand, is a major employer, but it is not a foreign exchange earner. If we promote both industries, they will complement each other towards the goal of sustainable regional economic growth.
- **Clusters represent an economic development fad.** – All over the world regions are organising themselves to compete in world markets. Unless we compete collaboratively along similar lines we risk being left behind and our quality of life may suffer.
- **Clusters explain nothing new.** To a certain extent, this is true. Dynamic economic clusters have been around for many years, take for example the high tech industry in Silicon Valley, high fashion in Milan and even auto manufacturing regions here in Australia. What is different now is that the success factors for these clusters are now well understood and are particularly relevant in today's global economy. Clusters are recognised as important driving forces in international trade.

CLUSTER POWER

Economies which are driven by clusters working collaboratively, have considerable influence and power to overcome constraints to economic expansion.

TROPICAL NORTH QUEENSLAND is fortunate to have the support of local and state governments in stimulating and facilitating cluster development as an integral part of the region's economic development strategy.

ATTACHMENT D

Clusters, Innovation & Investment

A report on TCI Conference Proceedings

Glasgow 2000

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Rod Brown

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**Clusters,
Innovation
& Investment**

**Building global supply chains
in the New Economy**

Rod Brown

January 2001

(c) Australian Project Developments Pty. Ltd.
Member of Clusters Asia Pacific Inc.

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Executive Summary

Industry clustering is a relatively new field of enquiry, with direct application to industry and technology policy, as well as regional policy. It is based around the work of Professor Michael Porter that became popularised in the early 1990s.

While some people have no association with the term 'cluster', and others consider it academic jargon, there are some businesses who understand the concept as a strategy for extending capabilities, resources and responses to levels that would not be achievable as an individual firm. These businesses do not necessarily use the term cluster, but see significant advantage in working with other businesses on joint activities and projects for mutual gain.¹

A range of cluster models is now in operation across the world. The models are meeting with mixed success. While they vary to suit different industries and/or localities, there are common principles and problems, particularly how to initiate clustering agendas, and how to deliver results and keep the players 'at the table'.

This report has had two main aims:

- to disseminate information about the various models and perspectives, and
- to begin a process of linking cluster agendas across the world.

The main conclusions are as follows.

The 3rd TCI Conference in Glasgow (October 2000) provided an excellent vehicle for improving the understanding of clustering concepts, and the OECD World Congress on Local Clusters in Paris (January 2000) and the 4th TCI Conference in Arizona (late 2001) provide further opportunities.

The development of industry clustering theory and practice continues in two interrelated streams (which accounts for some of the confusion):

- the physical phenomenon whereby companies and people congregate in particular locations due to the proximity to infrastructure, soil, water, other companies/people etc.
- the clustering agendas, which collectively comprise a body of knowledge about industry/regional development techniques that aim to build critical mass and achieve a better balance between collaboration and competition.

When all the theory and mystique is stripped away, clustering agendas are about nurturing collaborative instincts and trust - these traits can become hidden in market-based economies. The key to successful cluster development is nevertheless to identify and then leverage off 'enlightened self-interest'.²

In Australia, there is particular scope for clustering concepts to facilitate R&D commercialisation and investment flows. The seven problem areas for application are:

- Insufficient information for the potential investor
- Short-term focus by proponents
- Weak feedback from governments and investors
- Inadequate skills
- Rivalry & low level of trust
- Inadequacy of supporting infrastructure
- Lack of connection between the players

¹ Fergus Lyon & Andrew Atherton, 'A business view of clustering: lessons for cluster development policies' (See Attachment)

² Doug Henton of Collaborative Economics Inc. (Palo Alto, Ca.) possibly first coined this quite apt term.

The Scottish Government has made a significant commitment to use clustering concepts to build industrial capacity and strong supply chains. The CEO of Scottish Enterprise summed it up - 'successful firms don't just happen - some do, but the majority do not'.

Expenditure by Scottish Enterprise involves £38 million over 4 years in respect of biotechnology, £46 million over 4 years for semiconductors, plus tourism, food and drink, as well as four new cluster agendas. The annual ballpark is around \$A80 million. Scottish Enterprise is using clustering concepts to build world-class nodes in key locations, to attract off-shore investment. Support from the EC is secured on a case by case basis.

The collective wisdom at the Glasgow TCI conference is encapsulated by the following comments:

'Don't try to build trust - get people to solve a problem (trust is an outcome of problem-solving)....don't look to build networks for their own sake'.

'The easier way to approach the question of where to start is to look at market failings, and cluster analysis helps in this regard. Market failure might include - lack of information, managerial myopia, under-provision of public goods and coordination failure ('people just can't organise it').

'Clusters will grow in importance in the New Economy, given that it requires the revitalisation of old sectors, knowledge transfer and creativity, collective learning, untraded interdependence (favours), spill-over effects from new business formation, and project-based collaboration'.

'The uptake of R&D is increased by access to advice and support services, as well as knowledge sharing. Clusters deliver economies of scale for infrastructure, create Centres of Excellence, facilitate informal transfer; attract/retain high calibre employees and facilitate links to R&D establishments'.

'People and investors want to know what places will be most attractive in terms of investment - space matters more than ever....Firms benefit from action to build clusters because it builds more attractive locations - this is a combination of immovable and intangible assets'.

'Supply chains are moving on-line. The computer and electronics industries are strengthening their supply chains via on-line technology. Industries to follow are utilities, shipping, pharmaceuticals. It's the job of clusters to move these industries into e-commerce'.

'The links between the players are critical. BT wants to better understand how to build economies and help regional players to connect via clustering techniques and online/electronic networks. Although BT is becoming increasingly global, it needs to extract revenues from local markets, and this can be done via cluster-led regional development'.

'We think the losers are the entrepreneurs who are isolated, and the winners are those who are part of clusters'.

'Clusters help business find a common interest, and thereby organise themselves'.

'Clusters lead to people spilling the beans'.

'Politicians tend to look short-term, whereas cluster agendas are essentially long-term'.

The biggest question in Australia at present is 'When do you know you have a cluster?' 'There is a perceived need for greater intellectual rigour into this area. Accordingly, Clusters Asia Pacific is currently working with international experts to better identify and evaluate clusters, based around some key criteria.

The final key conclusion is that there is prima facie evidence that the linking of clusters can be of benefit in commercialising R&D and attracting investment. There are three reasons.

First, people with innate collaborative tendencies probably gravitate to clustering agendas. By linking such people via clusters, information should flow more readily. Secondly, the strong parochialism and competitive instincts at both the company and regional level in Australia retard collaboration. Our working hypothesis is that clusters in different countries, because they are not in direct competition, may find it easier to collaborate. Thirdly, clusters are fundamentally about building trust. As trust and confidence grows, the commercial relationship is deepened. This is critically important in the area of R&D collaboration, where intellectual property issues are uppermost in both parties' minds.

The last issue is of deep importance to Australia and New Zealand. As a first step in engaging overseas interest, this report lists the cluster agendas underway at present in Australia and New Zealand.

We welcome your interest in this fascinating subject. Please contact us at the addresses indicated throughout this report.

Rod Brown

Australian Project Developments Pty. Ltd.

Canberra, January 2001

Acknowledgements

Many people have contributed to the ideas and views contained in this report, and to the formation of Clusters Asia Pacific Inc.

We talk about the importance of networks and people - accordingly, I have acknowledged the following individuals not to name-drop, but to sincerely thank them for their willingness to share ideas and to help us network.

Rodin Genoff, Terry Bell and Ray Pincombe Playford City Council have been a source of inspiration. So too have the other members of Clusters Asia Pacific - from Day 1 active support has come from Julian Lowe, Paul Miller and Paquita Lamacraft (Ballarat, Daylesford), Mark Cloney (Canberra), Hugh Forde and Howard Harris (Adelaide), Graeme Sheather (UTS), Nariida Smith (CSIRO), Andrew Kenny (Bega), Tom Lindsey (Warrnambool), Gary Kerr (West Wyalong) and our kiwi chums Ifor Ffowcs Williams and Paul Frater.

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Last, but not least, thanks to my long-suffering wife and children.

All errors and omissions are my responsibility.

Clusters Asia Pacific Inc.

Clusters Asia Pacific Inc. is a network of organisations with a common interest in developing and sharing knowledge about clusters, and in collaborating with like-minded groups in the Asia Pacific region and beyond. It has until recently been operating on an informal basis, when it went under the name of ANZAC.

At present, Clusters Asia Pacific Inc. is a virtual operation - a cluster of cluster expertise. However in the longer-term there is the prospect of establishing a hub and spoke arrangement.

Apart from sharing information and experiences, we look for commercial or professional opportunities on each other's behalf. As part of this approach, we have developed links with organisations in twenty five countries, including Austria, Belgium, Brazil, Canada, Chile, Denmark, England, France, Germany, Hong Kong, Ireland, Italy, Netherlands, Northern Ireland, Scotland, Spain, Sweden, USA and Wales. We are keen to establish links with any country that has an economic relationship with our region.

While our work delves into many public policy issues, and goes well beyond the individual interests of members, we have operated without any government support or external sponsorship. Since we are now in expansion mode, we are seeking support by way of sponsorship or membership. Clusters Asia Pacific circulates a monthly newsletter, free of charge, to its members and friends.

Foundation Members

Organisations (representing companies)

Business Vision 2010, Adelaide
Cairns Region Economic Development Corporation
Central Murray Area Consultative Committee
Gippsland Development Ltd.
Industry Development Corporation, Newcastle
Inland Marketing Corporation, Central West NSW
Southern Province Projects Group, Albany

Research/Education

Ballarat University (School of Business)
CSIRO Division of Building, Construction & Engineering, Sydney
University of SA (National Institute of Manufacturing Management), Adelaide
University of Technology (School of Management), Sydney
University of New England (Rural Development Centre), Armidale

Local Councils

Bega Valley Shire Council
Bland Shire Council (West Wyalong)
Deniliquin Shire Council
Hepburn Shire Council
Playford City Council

Associated Agencies

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2 The Importance of Clusters to Australia

Critical mass and market share

Australia's efforts to build a dynamic industrial economy are thwarted by lack of critical mass, stemming from a small population on a vast continent, and parochial attitudes that further fragment the industrial base. Instead of industry being located in areas with of greatest competitive advantage, State Governments bid against each other to attract footloose international investors and the national government sometimes exacerbates the problem by joining the bidding war.

However another factor is now in our midst - global alliances are forming in virtually every industry where goods and services are traded. Decision-makers in Australia have been slow to understand the repercussions of this, particularly the challenges it presents in redressing Australia's modest track record in commercialising research and adding value to the resource base.

The underlying problem has been reflected in a virtually permanent Current Account Deficit, which derives from the lack of critical mass in manufacturing, the low level of resource processing, and entrenched structural weaknesses. This rarely raises concern among economic commentators, institutional investors or government advisers - most of whose knowledge and experience is based around macroeconomics and financial systems. Two years ago, the spin was that our merchandise exports have fallen because of the Asian crisis. Over the last 15-20 years, other excuses have included imports of capital equipment to maintain our industrial competitiveness, one-off purchases of Qantas jets, the re-equipment needs of the Defence Department, the impact of droughts on grain exports.....the list goes on and on.

The 'State of the Regions 2000' report, prepared by National Economics, has made no bones about the problem with data as follows.³

Table 1 - Import Share of Domestic Market, in Selected Key Industries, Australia compared with OECD Average, 1996

	OECD	Australia
	%	%
Aerospace	33	80
Computer/office equipment	61	71
Drugs & medicine	20	48
Communications equipment	34	70
Professional equipment	42	79
Automotive	30	43
Electrical machinery	25	57
Chemicals	34	42
Non-electrical machinery	26	67
Rubber & plastics	16	25

Source: *National Economics (2000)*

³ At the Annual Conference of the Australian Local Government Association (December 2000)

National Economics argues that Australia made a large scale strategic error in the 1970s and 1980s when it decided that manufacturing was no longer important, and that it was easier and better value to exploit the value-added of emerging technologies rather than the hard task of producing them in Australia. It also claims that Australia is now locked out of the fastest growing areas of world trade, because the value-added potential is being eroded by the impact of e-commerce i.e. the attractiveness of importing, distribution and servicing is heightened.

From my perspective, the whole e-commerce certainly does present a major challenge because it opens up economies to powerful economic alliances of companies which have formed global supply chains - and they tend to cluster in particular locations. It is critically important that we better understand the implications of globalisation pressures on industries and regions.

We must also understand that Australia's weak capability in high technology areas cannot be dismissed by pointing to the buoyancy of Australia's exports, including manufactured exports. An analysis of our exports shows that a good deal of the strength is in commodities (e.g. aluminium ingot) or price-sensitive manufactures sustained by our weak currency and/or government assistance (e.g. motor vehicles). The risk for Australia is that we will become locked into chasing exports that are driven by price - these are not necessarily high value added goods and services that can underpin Australia's role in the New Economy. Clusters can be part of the solution.

The regional dimension

During 1997-98, my company conducted workshops in 17 regions of Australia and dissected 68 investment proposals. The relevance of clustering concepts came into clear focus during this process. This is explained hereunder.

The rationale of the workshops was to determine the conditions under which institutional investors can play a greater role in the development of Australia's regions. This is a critically important question given that the bulk of our national savings are now with the banks and super funds, and not governments - accordingly, the Australian Council for Infrastructure Development (AusCID), AMP Investments, Commonwealth Bank, Macquarie Bank, National Australia Bank were involved.

The majority of the projects were in regional areas, but some were in, or adjacent to, major cities - the projects comprised water treatment plants, transport hubs, power stations, health resorts, airports, port developments, forestry plantations, marinas, gas and water pipelines. Arising out of that work, we identified three core impediments to institutional investment in regional Australia:

1. Insufficient critical mass in terms of customers and world-class, dynamic companies.
2. The lack of a strong strategic focus, and 'distinctiveness', at the local level.
3. The political and administrative difficulties posed by our three-tier system of government.

Problem No. - Insufficient Critical Mass

Proximity to physical infrastructure and people still matters despite the Internet, instantaneous access to information, and global markets. Certainly there are examples of smart, innovative companies operating successfully in strange places. However the overwhelming evidence is that critical mass - in other words, sufficient numbers of players, particularly consumers that can be "captured" in a market and/or geographical setting - continues to be the single most important signal to investors.

The recurring explanation put by the bankers to regional project proponents investors is that robust revenue streams are required to attract their interest. If the proposed investment is in infrastructure, financiers look for sufficient users of that infrastructure. If the proposed investment is a business venture, the quality of hard and soft infrastructure will often be a major consideration. However, many regional markets lack critical mass and sufficient quality infrastructure, and the two are inextricably linked.

Regional Telecommunications

‘The identification and commitment of a core customer base to support the business model is in many cases a critical issue. The business case may presuppose local government traffic, existing customers of an associated business, or larger users of telecommunications and online services.

Risk associated with the development of a model is substantially diminished if a core of initial customers is identified and contracted before the investment is undertaken.’

- report to the Telecommunications Services Inquiry (*September 2000*)⁴

Agglomeration effects - the role of infrastructure

Infrastructure investment is inextricably linked to agglomeration effects. Why is this? The best way of explaining this is by linking three strands of earlier research:

- Forty years ago, Hirschman (1958) showed that externalities are generated via the linkages between firms, and via the linkages between these firms and the general level of physical infrastructure in a country and/or region.
- Stern (1991), Barro (1991), the Kelty Task Force (1993) and McKinsey & Co. (1994) built on this by arguing that ‘social infrastructure’ - schools, universities, hospitals, management structures etc. - is also a significant determinant of growth. The corollary of this is that governments, as the traditional providers of public assets of this type, are key players.
- Krugman (1991) then overlays this by noting that investors decide where to locate, or what products to invest in, on the basis of previous decisions of others. The determinants of these previous decisions are largely irrelevant to potential investors - what matters is that the physical and social infrastructure is in place. Krugman goes on to argue that firms tend to cluster around successful, already-established or larger firms. This agglomeration of firms generates externalities that, in turn, reinforce and realise the investor’s initial expectations.

My strong suspicion is that these effects are well entrenched in the Australian economy. Agglomeration effects are driving economic and political decisions, and those locations with the quality infrastructure benefit from series of reinforcing actions from consumers and investors. The areas so “bestowed” grow like ice crystals, as a result of the following realities:

⁴ Network Economics Group, et al. ‘New Market Models for the Delivery of Telecommunications and On-line Services to Regional Australia’. (commissioned by Telecommunications Service Inquiry, 2000).

- A. Investors are attracted by the quantum of potential customers in the bigger cities - this confers ongoing advantages for Melbourne and Sydney over Adelaide, Brisbane, Perth etc.
- B. Investors are attracted by quality public infrastructure - this means that those locations that already have infrastructure in place and paid for (i.e. a sunk cost) have a relative advantage over locations less endowed. As governments pull back from infrastructure investment, and look to the private sector to fill the gap along commercial lines, the effect is magnified.
- C. Investors are attracted by the opportunity to link projects to make cost savings and generate revenue - most of these opportunities are in urban areas. (Refer to A and B)
- D. Politicians are attracted to invest in public infrastructure that favours the maximum number of taxpayers - this is illustrated by the massive expenditure in transport, tourism and sports infrastructure underway in Sydney and Melbourne. (Refer to A, B and C). They only shed this habit in the run-up to elections, and then usually focus on marginal seats.
- E. School leavers and unemployed in regional areas gravitate to the bigger cities in search of jobs and lifestyle on offer in the capital cities. (Refer to A and B)

The above features are normally associated with third world economies - however they clearly present in the OECD countries, particularly Australia where spatial effects are pronounced.

Bundling of projects

Regional Australia has generally weaker revenue streams than the cities because the customers are more scattered. A major consequence is that, most industrial and infrastructure projects are small. Exceptions are major resource projects and associated infrastructure, the occasional food processing facility etc. This is where institutional investor interest lies because projects of less than \$20 million are not attractive to them - small projects will remain orphans unless they can be bundled into bigger projects.

The recent move by the NSW Local Government Association to establish a \$130 million Regional Development Trust drawn from the assets of the Local Government Superannuation Scheme is very interesting in this regard. Deutsche Asset Management has been commissioned to work closely with the NSWLGA to identify appropriate projects. Similar Trusts or Funds have been discussed in the past, but most have not materialised because of concerns by the trustees that the economics of some of the investments will not stack up.

It is now recognised that if projects can be bundled or clustered, they will improve the business opportunities for energy and telecommunications utilities and other investors in regional Australia. However, as discussed in the next section, political actions often work to thwart this.

Problem No. 2 - Lack of Focus and Distinctiveness

The second main characteristic of regional Australia is the lack of focus and distinctiveness exhibited by regions.

Overseas visitors sometimes refer to a lack of distinctiveness in regional Australia. Perhaps they have a point, and on reflection one can recognise:

- A sameness of small town streetscapes, and indifference to buildings of architectural merit. Exceptions are Gladstone (Qld), Chiltern/Beechworth (Vic), Strathalbyn (SA) and Hobart.
- A lack of industry specialisation in small regional communities, reflected in the preponderance of businesses servicing the local market viz. agricultural machinery suppliers, car dealers, TV and electrical suppliers, bread shops etc.
- A lack of industry specialisation, even within the larger regional cities. In places like Albury/Wodonga, Bathurst/Orange, Geelong and Ballarat, and the coastal cities in Queensland, there are substantial opportunities for further industrial specialisation.
- Intense competition between local councils and development agencies for footloose investors, regardless of whether the locality has the factor endowments to suit them.

Much of the McKinsey and OECD thinking is about regions and industries needing to find their own niches, to develop distinctive capabilities around these niches, and to think outside the square. However there is clear evidence that the industrial landscape in Australia is not as specialised as in other OECD countries. As alluded to elsewhere, it has more to do with spatial effects and the very confused role of government.

There are signs that governments in Australia are getting their collective acts together, judging by the numerous government brochures extolling the virtues of industry clusters. However, government has the tendency to undermine its own rhetoric by:

- Ignoring 'competitive advantage' by offering substantial subsidies to private sector investments. Funding the critical infrastructure in the first place is the smarter option.
- Establishing small programs that make no overall impact on capacity building, because the funds have to be scattered around on equity grounds. The Regional Solutions Program (\$90 million over four years) is the supposed flagship of the Commonwealth's regional development policy - regional stakeholders might have been better advised to reject this program and ask the Commonwealth to try again.⁵
- The inability of local, State and Commonwealth government agencies to adhere to the recommendations of regional development strategies (usually funded by them).
- Pork-barreling in the lead-up to elections. This has become a very sore point in Australia.

The above situation stems largely from the lack of any long-term focus and coordination by government. There is very little 'spatial' feel in Canberra - because the federal government has mostly viewed regional development as a local or State government issue, and not as a key part of an industry policy. The decentralisation program of the federal Labor government (1972-75) is a laughing matter in most circles and many politicians - and not only those on the conservative side - are loathe to be associated with anything that could be compared with it.

The celebrated planner/geographer, Max Neutze, once said famously that:

'Decentralization of population has been the policy of most political parties since World War II. It has, so to speak, been everyone's policy but no one's program' (1965).

Indeed, Melbourne doesn't have to do anything extraordinary to maintain its standing as the pop music and TV centre of Australia - it achieved take-off in the 1960s and 70s due to a series of triggers, and its critical mass and international reputation now feeds further growth.

⁵ Coincidentally \$90 million is only slightly higher than the figure the Commonwealth Government is reported as recently offering General Motors Holden to invest in a car plant in Melbourne.

Killarney Whiskey - example of Competitive Advantage

In 1997-98, a network of farmers concerned about their low farm incomes, were planning to build a distillery to produce Irish-style whiskey at Killarney, in the McPherson Ranges outside Warwick (southern Queensland). The area's soft Irish appearance, the Irish roots of the locals, and the use of Darling Downs grain are distinctive features. A major European distillery group was holding talks concerning the possibility of equity participation.

The proponents were looking at the premium end of the market, keeping it at a small scale and gradually building up from there. A full-scale feasibility study was being suggested and the wider economic and social benefits in the region were being factored in e.g. strengthening of tourism and value-added agriculture. There were serious discussions about collaboration between a range of Irish and Australian players beyond the initial parties.

The Killarney Whiskey example has particular relevance. It is essentially the birth of a cluster, and promises to provide a focus for the community's efforts to reinvent itself, to attract inward investment, and to provide a signal to government agencies as to where and how they might coordinate their efforts.

Problem No. 3 - Political & Administrative Difficulties

One often hears the lament that "if only we were in a marginal seat, the government would take an interest in us".

Based on our examination of scores of projects, we estimate that governments need to take an interest if regional investment is to lift. Around 40 per cent of infrastructure projects in Australia have some degree of 'public interest' in them - this means that a government decision or some form of government financial involvement is required to advance them. Indeed, institutional investors expect a government agency to cover the public interest portion of a project - they argue that they should not be paying the government's way, nor carrying that additional risk.

I suspect, but cannot presently validate, that the public interest ratio is higher in regional areas than in the major cities. In a sense, it is irrelevant - the problem is that certain rural regions, as well as metropolitan regions, need to play catch-up. Unfortunately, we are not well served with data on the quality or quantity of hard and soft infrastructure in regions. The Australian Bureau of Statistics still does not collect any such data.

Institutional investors are very wary of some regional projects lest they are, or might become, political footballs. The big investors need to be assured that the greens, local government councillors, politicians, and bureaucrats have at least found some common ground. Institutional investors will stick around and keep their options open (at little cost) for big projects - the but smaller projects (say \$5-20m) tend to be passed over.

Another consequence of the current system of administration of government grants is the hand to mouth culture has developed. It manifests itself in local players spending considerable time applying for grants and then waiting for lengthy periods (often 6-8 months) for a blessing from Canberra. A raffle ticket mentality has emerged.

On average, I estimate that the success rate for applicants to the bulk of the Commonwealth programs is around 12-15% - which means that 85% of the punters have bought a losing raffle ticket. The ever-increasing accountability requirements of these programs means that they can only be expended within tightly defined limits. This has led to a series of "stove pipes", whereby funds flow down these pipes, but cannot be modified. We can learn from the Scottish experience.

The Potential of Clusters

We have discussed problem areas associated with getting investments off the ground - lack of critical mass and robust revenue streams, the tendency towards smaller and interconnected projects, difficulties in keeping agendas moving forward, public interest and politics, and the mismatch between government programs and real needs. Since wealth creation and jobs cannot happen without investment, these problem areas must be better understood and addressed.

The significance of clustering agendas is that they dovetail into many of the above issues.

What is an Industry Cluster?

First, a simple definition:

The tendency for like-minded firms and talent to cluster in specific geographic areas. They do so to achieve synergy, facilitate business transactions and utilise hard and soft infrastructure.

A cluster is really an advanced stage of a network, in that it incorporates infrastructure and government issues. Network agendas tend to focus on linking groups of SMEs. (Supply chains and value chains are an advance on networks, but fall short of a true cluster agenda).

Clusters can form naturally or they can be developed. An analysis of the 'natural' clusters indicates their origins generally lie in an investment in a piece of infrastructure, a government decision, a new technology, or a chance happening. Early commercial success led to the entry of other players keen to be part of the action. This in turn is feeding revenue streams that finance more infrastructure. This is a characteristic of Silicon Valley and the Italian clusters. Scone and Torquay clusters in Australia are home to two interesting clusters.

Clusters are intuitively understood by investors and real estate agents, and have been subject to extensive analysis by academics. However it wasn't until Professor Michael Porter's work that their relevance to economic, industry and regional policy, and to business practice, became more broadly appreciated.

The second type of clusters - those where specific programs are in place - is our particular interest. The different models and techniques being used in different countries, industries and regions provide a fascinating body of technology and mix of experience. Attachment 2 provides an overview of some of the more significant cluster agendas underway in Australia.

Scone equine cluster

Some 70% of Australia's thoroughbred foals are born around Scone in the Hunter Valley. The area has world-class infrastructure - race track, training tracks, equine research centre, convention centre, TAFE, and easy access to Newcastle and Sydney. The triggers were decades ago, with the vision and funding of local councillors and breeders. More recently, funding from State coffers and the Commonwealth filled in the infrastructure gaps. Now veterinary groups, feed suppliers, major local and Arab breeders/investors, hobby breeders and trainers variously compete and collaborate in a dynamic environment.

Torquay surfwear

Torquay, 20 minutes drive south of Geelong, is now a world-class centre for surfwear. The trigger was a couple of surfers in the late 1960s who decided it was the place to start making surfboards. They began their enterprise in an old garage, expanded with a business grant from the Victorian Government, and eventually split into two competing companies - Quiksilver and Rip Curl. Then Oakley sunglasses located there, as did numerous parts suppliers. Various hard and soft infrastructure investments have sustained the growth of this cluster.

The Australian agendas, with the exception of those in Adelaide, Newcastle and Cairns, are mostly in their infancy. They have similar aims as those in Scotland and elsewhere - the harnessing of collaborative instincts, building supply chains into foreign markets, aggregating demand, attracting investors and commercialising innovation. However there are some important lessons available from the overseas experience - accordingly Chapters 3 and 4 provide an overview.

3 Scotland the Brave

Scotland's industry policy is largely built around an extensive clustering program. It places emphasis on action to build competitive advantages through the marrying of public and private sector agendas, and the targeting of assistance to promising sectors. Critics of government intervention and industry policy, at least in Australia, view the Scottish approach with indifference. However, people with an interest in clustering mostly regard it as a brave and commonsense response to global realities.

This Chapter provides the background to the Scottish cluster agendas, and then describes the activities and issues associated with four of the clusters - food and drink, biotechnology, semiconductors and tourism.

The Policy & Program Framework

The opening address to TCI Conference by Dr. Robert Crawford, the CEO of Scottish Enterprise, provided a good overview of why Scotland has decided to incorporate clustering concepts into its industry policy.

He explained that Scotland is a small economy and the commercialisation of R&D is one of its biggest problems, together with the weak level of firm creation. He was pleased that in addressing executives at a six-week course at Motorola University in the US, they had indicated a high awareness of Scottish industry.

Scotland's total GDP is £54 billion - 22% of this relates to public administration, education and health, which is considered high. Scottish Enterprise sees clustering as a means of increasing private sector dynamics to increase its share of GDP. Clustering also helps the players to understand the bigger picture. The rules of competitiveness are being rewritten almost daily. In this context, the New Parliament has recently announced a parliamentary inquiry into the New Economy.

Dr. Crawford stressed that the important thing is for agencies to not get distracted when implementing cluster agendas - 'stick with them'. The problem with development agencies is that they spread their resources too thinly. Cluster agendas also differ - they do not all operate the same. There is also the risk of failure.

In closing, he noted that the Irish are utilising the influence of Irish-born achievers now living overseas, by linking them into the Irish development agendas. *(This is a similar concept to that being pursued by some local councils and regional bodies in Australia, which have established Ambassador programs. The basic intention is to engage captains of industry and prominent people, now based in say Sydney or Melbourne, but who were born, raised or schooled in the region i.e. they maintain any affinity with the region.)*

Ms. Heather Sim, Director - Cluster Development (Scottish Development) indicated that the company Monitor had been commissioned in 1993 to advise on where and how cluster strategies might be introduced in Scotland. Monitor identified 12-15 industries that were 'ripe' for clustering. However no real agreement was reached until 1997, when it was decided to introduce a pilot cluster-based program in respect of semi-conductors, food and drink, biotechnology and oil and gas. The main criterion used to determine which industries would be the first cabs off the rank was their ability to compete globally. It was later explained that Scottish Enterprise overlaid Monitor's work with some of their own criteria to identify those industries that would form the basis of a new program - these criteria were the overall growth potential and the level of industry support.

In 1999, a second wave began, with criteria that focussed more on identifying where future competitive advantage might lie - the industries selected from this process were creative industries, forestry, opto-electronics and tourism. Currently, chemicals and financial services are also adopting the approach.

Lessons learned

Dr. Crawford felt that three conclusions could be drawn:

- There is a need to sustain and build economic systems - 'successful firms don't just happen - some do, but the majority do not'.
- Networks - both national and international - are very important. Scottish industry considers that network development is the biggest thing that Scottish Enterprise can do on its behalf.
- Clustering analysis is an important adjunct to the traditional methods of understanding and interpreting industry development.

Ms. Sim suggested that from her perspective the lessons for Scottish Enterprise were:

- It is a better tool than other techniques for the New Economy. It allows you to get around misleading labels like high tech, low tech etc.
- It is a mix of science and art
 - the 'science' aspects involve market trends, competitiveness, customer demand, investment in R&D, benchmarking and productivity
 - The 'arts' aspects involve actors, relationships, communities and facilitation.
- It is about public sector value adding - where the key aspects are systemic thinking, economic renewal and strategic confidence.

She added that although a lot of time was initially spent pushing information around, it was not wasted, because the dialogue is now greater and better-grounded as a result. Scottish Enterprise also emphasises that there is no universal model. Each industry has its own characteristics, structures and challenges, and a strategy that took little account of these would have no chance of success.

Second, Scottish Enterprise believes that securing the widest possible ownership is vital - 'Not only is consultation and cooperation fitting at a time when Scotland is developing new systems to govern itself but, crucially, it is the key to the success of the clusters approach'.

Funding issues

Scottish Enterprise (SE) is one of 13 development agencies across the UK - others include the Welsh Development Agency, Tynewear Development, Bristol Development etc. They are formally within the portfolio of the UK Department of Trade and Industry (DTI). Scottish Enterprise is accountable to the recently devolved Scottish Parliament.

It is important to note that that DTI's industry policy approach emphasises knowledge-based industry. The regionally based development agencies (as above) have considerable autonomy, and deliver strategies and programs such as 'Cluster Challenge', facilitate the establishment of incubators, and the mapping of clusters.

Each agency sets its own priorities and selects its own Board (members mostly from the private sector). Their budgets are a mix of concurrent funding, supplemented by one-off grants from the EC and other UK government programs.

The amount that Scottish Enterprise spends on each cluster varies depending on the size & nature of the cluster.

At the planning stage, the average expenditure per cluster is around £300k (approx. \$A750k) - this is applied to data gathering, research, benchmarking, mapping etc. and includes overseas travel costs. This figure includes overseas travel costs. It should be borne in mind that this expenditure would not necessarily be confined to one locality, given that the Scottish cluster approach is a quasi-industry development program for the whole country. The planning phase could take 6-9 months and running costs for domestic travel, meetings, communications, hospitality etc. average out at £10k. None of this includes salary costs for the team leaders/teams involved.

In terms of implementation, the costs vary widely depending on agreed action plans and the phasing of the action plans e.g. the food cluster is likely to spend £5m this year whereas the semiconductor cluster may spend £11million. See following sections for more details.

Scottish Enterprise is currently undertaking an in-house evaluation based on snapshots of successes. This will enable the private sector to sell the importance of their cluster work to the politicians.

Ms. Irene Walker, the CEO of the Scottish Enterprise Dumfries and Galloway Enterprise (and also Director of Clusters and Industries) indicated that SE is charged with the industry development function, and operates within the national strategy. Annual funding of Scottish Enterprise is £450 million (\$A1.2 billion).

SE has priority projects that use cluster methodology, in the areas of biotechnology, semiconductors and food and drink. While the latter is a traditional industry, the other two are not. Oil and gas was to be a fourth industry cluster centered mainly around Aberdeen in the north - however after the mapping of the cluster was completed, it was realised that the time was not right to progress it.

She noted that tourism, as one of the new areas to adopt the cluster methodology will be most challenging - 'where do you start?' The north west of Scotland is very dependent on tourism, and the local economies are fragile. The Scottish Tourist Board and the local tourism boards would be joint venturers in this cluster work.

The Food and Drink Cluster

One of the key drivers for the establishment of this cluster agenda was the fact that 200 firms control three-quarters of the worldwide food and drink industry, and none of these are Scottish. Some of the identified trends that will affect the food market in the developed world are:

- The wealth of consumers
- Changing eating habits and patterns
- Concern about food generally e.g. is it healthy?
- Need for reduced food preparation times
- Increasing concentration and consolidation among suppliers
- Increasing market power of retail giants
- Arrival of home shopping

While many of these trends will mean that firm size will become more important, it also offers opportunities for specialised marketing.

Mr. Graham Young, a senior executive in the Food and Drink Cluster Team, explained that they worked in small teams doing the preliminary research and developing the Action Plan. Rigorous analysis was undertaken against the Porter Diamond, including international benchmarking in terms of the US poultry industry, Danish pork, NZ dairying etc. Global market trends were also built into the analysis.

The work has involved looking at many dimensions of the food and drink industry - there are around 1800 firms in the industry, with 70% of them employing less than 50 people. The key driver is the world-class science base, where there are 15-20 institutes working in food science - however they are not linking well to companies.

The vision is that, within 10 years, Scotland will have:

- An unrivalled reputation in the world food and drink industry.
- Organisations that have changed, with greater sophistication, better connections and linkages into national and international markets.
- A culture of quality and innovation.
- A sense of pulling in one direction.

The targets that have been developed for the 2000-2010 period include:

- a rise in turnover from £4.2 to £7.4 million (excludes whisky)
- a rise in employment from 48,000 to 54,000
- a rise in value added from 24% to 34%

The Cluster Team has examined for each market opportunity the product focus, the geographic market focus, the required capabilities and the scope of the opportunity. This work then led to the identification of two priorities:

- Excellence in raw materials (with an emphasis on red meat and seafood) and the premium segments of key European markets for healthy, sustainable food products.
- Value added meal components, also servicing key European markets.

Six action areas have been identified:

1. To develop leading food suppliers and processors.
2. To build Scotland's reputation and take advantage of European and UK retail and food service markets.
3. To gain advantage through new ideas, including uptake of technology.
4. To build on Scotland's high standards of quality, service and food safety.
5. To develop an efficient supply chain and improve services to customers.
6. To develop people's capabilities, to work together and to be active in local and worldwide networks.

Action Areas 5 and 6 are particularly relevant to some of the food cluster agendas in Australia and New Zealand, and open up avenues for cooperation between the three countries.

Scot Trout & Salmon Pty. Ltd.

This company is located in an industrial estate in Lanarkshire, which is about 50km north east of Glasgow. Mr. Muir Hunter, the MD, explained that all the cluster theory is fine, but the need is to get hard-nosed businesspeople interested, and to use commercial opportunities to this end.

The company was formed in 1983. It is a fish processor, with 14 other companies supplying fish from 17 trout farms across the region. Their activities as a trout/salmon cluster are one of 28 projects within the Scottish food and drink cluster.

Around 4,000 tonnes of trout and 2,300 tonnes of salmon are processed each year, which comprises 70% of Scottish production. They supply the major retailers, processors and food outlets. Supermarkets account for 85% of their sales - Scot Trout & Salmon is the sole supplier of trout to major supermarkets such as Tesco, Sainsbury's, Marks & Spencer, Safeway etc.

The growing influence of the supermarkets is evidenced by their rising share of the overall chilled fish market - the figure rose from 71.1% in 1997 to 78.3% YTD to April 2000. It rose further to 79.7% in the February-March 2000 period. As at October 2000, the share had risen further to 81.5%.

The influence of the supermarkets represents a barrier to SMEs in that the supermarkets do not want to deal with them one on one. Mr. Hunter observed that 'supermarkets want less suppliers - not more'. Since distribution is a major expense, and a barrier to entry, a pilot distribution cluster was developed, comprising four companies. Since the efforts to improve distribution channels began around 1998, sales have risen as follows:

Company	Sales circa 1997	Current Sales
RR Spinks (Arbroath) - smoked fish	577t	4526t
Scottish Shellfish	-	4124t
Orkney Herring	1320t	3084t
Wicken Fen	890t	1110t

The trout and salmon cluster agenda started almost by accident - Bob Spink had been concerned about his lack of success in selling to Tesco. He and Muir Hunter decided to get together and do something about it. They have effectively built a strong supply chain. (It appears that these two individuals have been champions of the cluster - the cluster leadership group numbers 20).

Mr. Hunter indicated that the cluster has delivered the following benefits:

- SMEs have enjoyed improved market access and market penetration, and reduced costs.
- Scot Trout & Salmon now has a bigger voice with the supermarkets, a greater range, and the scope to increase its product development activities.
- Customers (e.g. supermarkets) have greater availability of product, fewer suppliers to deal with, but conversely they have access to previously unknown small specialist suppliers.

The cluster is in its early stages - there are 80 companies now talking across the wider network, but the aim is to have around 400 companies involved. The 14 members associated with Scot Trout & Salmon are required to channel their product through the cooperative. Their emphasis has been on the UK market (their main competition is in southern England), but this will progressively pick up the international market.

The plant

The plant is modern and needs to meet stringent food health standards. The fish are trucked into the plant from the 14 suppliers, where it is processed (bulk of the salmon is filleted, while the trout is not), weighed, and packaged under a mostly single brand. The fish is trucked out at frequent intervals - 80% of the product leaves within the same day/night. The offal is used in cat food production. The processing equipment is mainly from Sweden, Denmark and the US.

Glenturret Distillery (Crieff, west of Perth)

The Glenturret whiskey distillery is the oldest in Scotland, being established in 1775. It has 24,000 barrels of whisky in stock, where it is aged for 12, 15 or 25 years.

Glenturret whisky is a good example of the building of mystique and uniqueness into a brand - to enable high prices to be commanded. (A 700ml bottle of 12 year old Glenturret sells for around \$60 - 65 in Australia). Some dimensions of this are described below.

- “The uniqueness of Glenturret is partly to do with the water, partly it reflects the quality and purity of the ingredients and partly it is the result of the skill and care that is instrumental in the distilling and maturing of the whisky.”⁶
- “Glenturret is made by the pot still process - slowly patiently and in small precious quantities - a tradition unchanged since it began in the eighteenth century.”
- “It was a lovely day when we first made the acquaintance of Crieff and its neighbourhood, so thoroughly highland in character and abounding in such wild and romantic scenery...Here at Glenturret are no fads, appliances or patents, but, like the buildings, the vessels are of the ancient pattern” *Alfred Barnard 1887*
- Whisky evaporates over time - this is called the ‘angels mist’ or similar - part of the patter.
- A sculpture of a cat stands outside the Glenturret shop. The cat died in the early 1990s. It has an entry in the Guinness Book of Records for the number of mouse kills.

The entry to the distillery is along a winding, heavily forested road. This is part of the image. The plant is operated by four staff, but the tourist guides and sales staff would probably be double that number.

⁶ Quotes are sourced from the company flyer.

A theatrette is in constant use, and the sales area is popular with tourists. A range of Scottish food is also on display.

The Glenturret distillery operates within a cluster of sorts. The Scottish whisky industry has existed for more than 200 years, with production mostly centered in the Highland and Grampian regions, and driven by the international success of its distilleries. The 'Scotch' brand has arguably been strengthened by the development of 'mystique' and rigorous quality control. The whisky industry and the tourism industry are mutually reinforcing.

Contacts: email info@scottishfoodanddrink.com The website is www.scottishfoodanddrink.com

The Biotechnology cluster

This cluster program followed 18 months of discussions with the Scottish biotechnology community. The cluster is made up of the following:

- A central group of research-based companies
- A related group of companies forming partnerships on a worldwide basis
- Support and supply companies e.g. specialist manufacturing equipment
- Support organisations for the development of new ideas and technological improvements
- Specialist legal, financial and technical experts

Mr. Ken Snowden of the Scottish Enterprise biotechnology team indicated that they had been involved in the industry since its inception. Their work in cluster development has been the catalyst, since it provided the tools to get things done. It has not been so much about analysis, but to 'move the industry to a higher plane'.

Scottish Enterprise has committed £38 million (\$A95m) to double the size of the cluster over the next four years. This figure has been used as a carrot in the consultation and engagement process with industry, academia and government. This has taken 18 months, and has involved 200 organisations. 'Getting people on board' has been the key activity. The fact that the European biotechnology industry is growing at 15% per year has been an important factor.

'Having these (clusters) would allow us to network technology opportunities which go across traditional areas'.

Andrew Shepherd, Managing Director of Omega Diagnostics Ltd.

Scotland has 69 biotechnology companies, with 135 support/supply organisations, 37 academic/research organisations and 90 medical device companies. Mr. Snowden explained that Scotland's highly skilled scientific base, which accounts for 17% of the UK's biotechnology graduates and 20% of its medical graduates, has been fundamental to the development of the cluster, as has the funding which provided the commercial gains to justify the organisations forming a network/cluster.

The Biotechnology Action Plan is the result of the Sainsbury Report (biotechnology clusters), the Genome Report, and the Baker Report ('Creating Knowledge, Creating Wealth'). The Action Plan provides for an increase in the number of participants, the number of linkages and the performance of companies. The issues being addressed include the identification of gaps in value chains, the scarcity of investment capital and the proliferation of small companies (average size of 19 employees).

Projects Underway

There are a number of projects in train:

- 'Proof of Concept' funding. This provides £11 million for national clusters, and is currently being applied e.g. £1.2 million to biotechnology as a first tranche.
- Biosolutions (refer www.biosolutions.co.uk).
- Regional networking groups - for example Edinburgh Bioalliance, BioDundee, Glasgow Bioscience.
- Strategic Alliance with Maryland USA - involving trade development, career development.
- Biomanufacturing - aimed at filling gaps in supply chains, and exploiting strengths and opportunities.
- Cluster interaction - in respect of the extended steering group. Also the development of an extranet website.

The £38 million (\$A95m) earmarked for the biotechnology cluster is to be spent mostly on infrastructure associated with science parks and incubators, some skills training and incentives for new entrants.

No details of the latter are available, although it is understood that Scottish Enterprise offers financial incentives to investors - this can be by way of part-payment for certain infrastructure associated with a new plant, especially where the boundaries between a public and a private good are blurred. I was advised that such expenditure requires extensive assessment within Scottish Enterprise. The situation appears to be similar to that in Australia.

Roslin Institute

Mr. Harry Griffin, the Assistant Director of the Institute, explained that this was originally a public research organisation established in the immediate post war period to assist in the food production effort. It was renamed in 1993 after the local village. It is about 50km south west of Edinburgh.

(I read in an Australian newspaper that Roslin is actually the home of golf - and not St. Andrews. The locals who developed the golf course in the 1700s had done so in secrecy because the Roslin area was a stronghold of the Masonic Lodge, which frowned upon sport)

The initial focus of the Institute was poultry research. In 1980, the complex was expanded, with the result that work on all major farm species is now conducted - the focus is on genetics, and molecular biology is an essential research area. The Roslin Institute's claim to fame is Dolly the sheep, the world's first cloned animal - or more correctly, the first animal produced from an adult cell. The management kindly introduced us to Dolly and her two offspring.

The Institute is funded by the UK Research Council, MAFF (the Ministry of Agriculture, Food and Fibre), the European Union, and industry. Its mandate is to improve the productivity and welfare of farm animals, and to develop new uses for farm animals.

Some of the research with sheep is to develop animals that secrete human hormones to act as a blood-clotting agent for haemophiliacs and sufferers of cystic fibrosis etc. In the late 1980s a sheep named Tracey was the first to produce these hormones in sizeable quantities (40grams/litre of milk).

There are two companies involved in the commercialisation of the research.

The first company is PPL Therapeutics. It is on-site, and was established in 1987. The Institute has no equity or management role. The company was floated on the LSE in 1996 with a valuation of £110 million. It received EU grants in 1997. The aim is to have the first of its products, mainly milk protein derivatives, on the market in 2001. Bayer is involved with the company, as is Immutran UK and Nextron, a US company. Further expansion via a £40 million production plant is currently being investigated.

‘If it can be done (develop a cluster), Scotland needs it’

- Dr. Ron James, Managing Director, PPL Therapeutics (Scotland) Ltd.

The other company is Roslin Biomed. It has an emphasis on gene targeting in sheep and pigs. It involves a £6 million investment over 3 years - the Roslin Institute and a company called 3i each hold 42% of the equity. Simon Best, formerly of Zeneca Plant Science (transgenic tomatoes etc.) has been hired as the CEO. The Chair is Ian Kent, former Chair of Immutran. There are several spin-off companies on-site, including Roslin Nutrition LTD, and a joint venture with Geron that focuses on human stem cells and nuclear treatment with applications in respect of Parkinson’s disease, diabetes, heart attacks, strokes etc.

Mr. Griffin felt that in retrospect the success of the Roslin Institute has been serendipitous. Networking has been critically important, and cluster techniques have been used in shifting from a public sector focus to alliances with companies.

Contacts: www.sebiotech.org.uk

The Semiconductors Cluster

Scotland accounts for 7% of the EC’s semiconductor capacity (47% of UK capacity). Several of the top 20 worldwide semiconductor companies have fabrication plants in Scotland. Scotland also manufactures 40% of the UK’s personal computers.

In terms of key companies, NEC is active - its focus is on integrated circuits and it has made particular efforts to build its skills base. Motorola is also present, as is Kymata which is the fastest growing Scottish company - it specialises in optical semi-conductors. National Semiconductor was facing closure, but is now consolidating with an emphasis on design and product development.

The semiconductor industry in Scotland currently employs 5,500 people, with another 2,700 jobs in the supply base and 500 in the semiconductor design base. This gives a total of 8,700 - (This suggests that the target figure of 14,500 by 2005 is realistic, given the very high growth rate of this industry). One of the speakers indicated that “we are looking to attract the best design people in the world”.

The supplier infrastructure involves:

- Facilities - 26 companies (DAW Technologies, ABB Climatic Control)
- Materials - 17 companies (BOC, Air Liquide, Du Pont)
- Equipment - 43 companies (Nikon Precision, SVG, Applied Materials)
- Services - 14 companies.
- Utilities - Scottish Power, Scottish Gas.

Scotland semiconductor and microelectronics

Action Plan

To develop a semiconductor industry based on innovation which enhances and exploits the research, design and development capabilities of business, research institutes and universities in Scotland.

The target is that the semiconductor industry will employ at least 14,500 people by 2005 with 5,000 in design, development and applications.

Cluster Development Goals

- Become a global centre for microelectronics design
- Increase quality and quantity of R&D and its application in Scotland
- Increase impact of emerging software process design and embedded software
- Develop and commercialise emergent microelectronics-related technologies
- Sustain and develop the manufacturing base in Scotland
- Make better connections between cluster components and final markets

The R&D community is currently being mapped. There are some 380 researchers spread across this industry e.g. Glasgow (80), Heriot-Watt (75), Edinburgh (70), Strathclyde (55) etc. The university-based research and design is focused on silicon devices, MEMS, sensors, MMICs, opto-electronics, novel materials/processes and analysis/spectroscopy.

The Scottish Microelectronics Centre, located in Edinburgh offers high-tech incubator facilities, on-site scientific support, serviced cleanroom facilities, and quality offices.

Compound Semiconductors is involved with the commercialisation of Scottish research into optical semiconductors, and has highly developed technology for transfer to industry.

Scottish Enterprise is building the cluster community through a variety of means - breakfast briefings, an annual conference, and "making sure there enough occasions to give people the opportunity to mingle". See www.microelectronics.org.uk

Some people are expressing caution about Scotland embracing the semiconductor industry in such a big way, given that the industry's reputation for volatility and fast declining firms. The downturn in the industry worldwide in 1998 caused some alarm within the local industry. However, the Scots are approaching this industry development in a fairly integrated way - they believe that this should reduce the risk of major damage to the industry should one or two firms go belly up.

The Industry Plan goes for 5 years, and there is a budget of £46 million (\$A115m) available over this period - it is a notional budget in the sense that bids need to be made each year. *(I take this to mean that if progress is not sufficient, funding is reduced.)*

Some of this funding is used to attract multinationals to establish in Scotland. This is on a selective basis, after considerable analysis by government officials. While details are not readily available, EC funds are often married with Scottish Enterprise funds. Spokeswomen for the Alba Centre indicated that the EU accounts for about 10% of the Centre's budget. It was explained that the assistance offered to multinationals is usually a mix of financial assistance related to education and training (allowable under WTO rules) or non-financial support associated with providing links to companies and skills identification. (This approach is similar to that of the Australian and NSW Governments, which recently provided \$3 million to IBM for a training initiative).

The biggest issue in this industry appears to be the relationship between the foreign multinationals and the SMEs. Scottish Enterprise takes the view that if companies are anchored via R&D, there is a better chance of keeping them.

The venture capital industry is also relevant. In 1990, it was a very small activity, but there are now 4-5 different funds as well as seed capital provided by Scottish Enterprise. Connect, a Californian VC group, is now in Scotland.

Alba Campus & Alba Centre

The Alba Centre is a research and design incubator at Livingstone, in the heart of Scotland's Silicon Glen, about one-third of the way from Edinburgh to Glasgow.

It is situated within the Alba campus, which is a greenfield project aimed at driving the growth of the electronic design industry. The campus has water features, extensive landscaping, conference/exhibition facilities, sports facilities, business support (via the Alba Centre), restaurants, shops etc. It has attracted Cadence Design Systems of San Jose as a foundation tenant, and will be home to some world firsts, such as:

- The Virtual Component Exchange (VCX) - an industry-led initiative to provide a structured market for the trading of intellectual property blocks associated with system level design - membership of the VCX is growing rapidly and included Cadence, Toshiba, Hitachi, Phoenix Technologies etc. The particular benefit of VCX is that it shortens product design cycles and reduces transaction costs.
- Institute for System Level Integration - to undertake research and deliver education and industrial training in system level integration and system-on-chip design. One of the drivers of the research is the need to improve the intellectual property selection process (i.e. IP delays, IP evaluation costs) as a means of reducing design times for new electronic products.
- M.Sc. in System Level Integration.

'If we're going to build new industries based on emerging technologies, partnerships are essential. As the cluster strategy shows, modern technology is too complex to be monopolised by single organisations or disciplines.....our future is going to depend on complex electronics, but we must be creative in combining with our other research strengths to take ownership of new opportunities in the marketplace. How else will we create a truly indigenous sector of such a key industry?'

- Professor Steve Beaumont, Director of the Institute for System Level Integration, Alba Centre

The Alba Centre is very new - it offers four incubator suites at present, with room for 15 companies. It is 2800 square metres over three levels. The first occupier is Microlinear who have established their first Scottish Design Centre there.

Contacts: www.microelectronics.org.uk or www.albacentre.co.uk

Summing Up

What does the Scottish experience tell us? It should be emphasised that Scotland's experience with clusters is quite new - it is two years behind the cluster agendas in place in Adelaide. However the Scottish model has considerably more political support and funding. The particularly noteworthy aspects of the Scottish clusters are outlined below.

1. A very specific commitment to use clustering concepts to build industrial capacity and strong supply chains. The CEO of Scottish Enterprise summed it up - 'successful firms don't just happen - some do, but the majority do not'.
2. An emphasis within the clusters to use networks, both national and international, to drive the development agenda, secure ongoing ownership, and build confidence among the players.
3. Commitment to the time-consuming task of engaging the players - 'getting people on board'.
4. The interesting (and very true) description of clustering as a mix of science and art:
 - the 'science' aspects involve market trends, competitiveness, customer demand, investment in R&D, benchmarking and productivity;
 - the 'arts' aspects involve actions, relationships, communities and facilitation.
5. Acknowledgement that there is no universal model.
6. A strong commitment to fund the cluster agendas:
 - £38 million over 4 years in respect of biotechnology, £46 million over 4 years for semiconductors, plus tourism, food and drink, as well as the four new cluster agendas. The annual ballpark would appear to be a minimum of \$A80 million p.a.

7. The commitment to use some of this funding to attract multinationals to establish in Scotland.
8. The big issue is the relationship between the foreign multinationals and the SMEs. Scottish Enterprise considers that if companies are anchored via R&D, there is a better chance of keeping them.
9. The commitment by Scottish Enterprise to build nodes in key locations, and the opportunity this provides to build links between these and nodes outside Scotland. Can the Scottish biotechnology cluster be linked with the Bio21 biotechnology precinct in Melbourne?
10. There is substantial opportunity for Australian/NZ clusters to benchmarking themselves with the Scottish clusters.

Post-script - Scottish Motor Art

The Tourism cluster, not covered in this report, is involved in various projects such as Loch Shores, an eco-tourism and commercial development on the shores of Loch Lomond.

Another project is Scottish Motor Art. It is certainly innovative.

Midway between Edinburgh and Glasgow - in a paddock twenty metres from the main freeway - are 5-6 pyramids in a row. They are 10-15 metres in height, made of earth, covered in grass with sheep feeding on them. The pyramids are part of a series intriguing points of interest for tourists, and apparently to also keep drivers alert and kids quiet.

Further down the highway, in another paddock is a giant gramophone - 15 metres high and made of stainless steel or similar. It may relate to a famous singer from a nearby town.another 10 km on there are three heads made from treated pine planks.....then a giant Clydesdale horse made from wire. It is about 4 metres in height and stands adjacent to the signage denoting the entrance to the Clyde Valley.

The theme of Scottish Motor Art is 'Dare to be Different!'

The Motor Art has generated considerable interest among the locals. *(Thinking persons' art of this kind has application in Australia, if only to balance out some of the now dated monuments scattered across the Australian continent viz. the cement structures depicting giant prawns, merino sheep, cows, pineapples, trout etc.)*

This Chapter provides a snapshot the key issues raised at the Glasgow TCI conference and the OECD Bologna Ministerial conference in mid 2000.

The Glasgow conference was organised by Scottish Enterprise. Attendance was around 140, and comprised experts from 33 countries. The strength of TCI conferences is the high-level attendees and the mix of expertise - trade and investment officials, CEOs of industry development bodies, academics, executives from telcos and other companies, as well as consultants.

TCI grew out of a World Bank-sponsored conference in Chihuahua (1997) where it was agreed to establish a body with the following mission statement:

“To improve the living standards
and local competitiveness of regions
across the world, by enhancing
cluster-based development initiatives”

The Glasgow Conference was the third since Chihuahua - the others being in Barcelona in 1998 (Barcelona is the home of the TCI Secretariat) and Varese, north of Milan.⁷

The Competitiveness Institute has a website (www.competitiveness.org) that provides general information on its objectives and operations. A Members Only section provides additional material, including articles written by members. The papers presented at Glasgow are currently being entered on the website. TCI's budget is mainly derived from member subscriptions and consultancy fees.

The TCI Conference provided perspectives from around 25 speakers, as well as informal views offered in break-out sessions. Two significant papers are also provided in the Attachments.

- ‘The schizophrenic corporation: corporate governance in a clustered world’ by Chaiton, Paquet, Roy & Wilson of the University of Ottawa. This is a thought-provoking analysis of the different governance contexts of the three different types of firms - flagship enterprises, emerging enterprises and SMEs. It argues that the the governance structures at the firm level need to be understood before attempting to influence firm behaviour at the local level. The bibliography is impressive (and saves me the bother).
- ‘A business view of clustering: lessons for cluster development policies’ by Fergus Lyon & Andrew Atherton of the Foundation for SME Development, University of Durham. This is a very readable overview of the clustering process, together with some tips for new entrants.

Outlined below are the main issues raised by various speakers.

⁷ For a report on the Varese conference, see ‘Pret a Porter’ (R. F. Brown) available from the author or via TCI website.

Professor Josef Konvits, Head of Division, Territorial Development Policies & Prospects, OECD, Paris

There are four key points to be made.

1. People and investors want to know what places will be most attractive in terms of investment - space matters more than ever.
2. Regions are vital to the future - 'territorial capital' can be built by clusters of firms and networks of players.
3. Change tests the 'elasticity of change' - people want to know the future of their community.
3. Territories most likely to benefit from globalisation are those in regions that are in different or marginal circumstances.

The marginal territories/regions can feed off the complexity and heterogeneity. They lie between the core economic regions - Sweden is an example, although 'they have not done a good job in restructuring'. Australia and Finland are marginal in the sense that 'they are small economies between major regions'. He indicated that 'marginal' was not meant in a pejorative sense, and that his views were based on intuition. The kinds of goods and services that can be traded are vast, but globalisation has allowed a whole series of locations to leapfrog forward - hubs can be built and regional airports can be significant in this regard. Some of the large old hinterland economies will however find it difficult to change. The smaller flexible regions have a competitive advantage.

The key issues as identified by the OECD are:

- The world's population will increase from 6 to 8 billion over the next 40 years.
- Over 90% of new jobs will not be in the OECD countries.
- The ageing phenomenon will become more pronounced.
- Space does matter - even in the macro policy context, the mobility or otherwise of capital is recognised.
- The New Economy involves more specialised forms and needs. This means that firms need to be in places where people want to live.
- Firms benefit from action to build clusters because it builds more attractive locations - this is a combination of immovable and intangible assets.
- Clustering concepts are supported by recent research which shows that R&D undertaken by an organisation of interests is more important than R&D performed by a company/institution acting alone.

Mr. Bob Downes, Director of Economic Development, British Telecom Scotland

Mr. Downes has been an active participant in TCI since its inception.

Regional development and telecommunications are intertwined, and telecommunications is a major driver of change. 'Part of my job is to see how communities of interest via clusters can benefit BT'.

Networks are an endemic part of clusters, and are greatly assisted by the Internet. The number of Internet users in Asia will exceed that in the US by 2003. Also, as bandwidth increases, there will be a huge demand for all kinds of information. Mobiles and satellites also allow countries and regions to better connect. In terms of E commerce, mobile technology is expected to overtake PCs as the main vehicle in the near future. E commerce currently accounts for 5% of the GDP in USA, by virtue of the major inroads it has made in financial brokerage, computer hardware sales, books etc.

Supply chains are moving on-line. The computer and electronics industries are strengthening their supply chains via on-line technology. Industries to follow are utilities, shipping and pharmaceuticals. 'It's the job of clusters to move these industries into e-commerce'.

Business in a networked economy is characterised by

- Traditional processes being automated first.
- Value chains then being redefined.
- New intermediaries entering the game.
- Industry convergence.

BT considers that the links between the players are critical. BT wants to better understand how to build economies and help regional players to connect via clustering techniques and online/electronic networks. Although BT is becoming increasingly global, it needs to extract revenues from local markets, and this can be done via cluster-led regional development.

Mr. Danny O'Brien, VP - NCR Financial Solutions Group

NCR sees itself as a global leader in providing solutions. The globalisation of supply chains is a major driver of change. This applies in respect of internal as well as external supply chains. With regard to internal supply chains, the key success factors are:

- Creating and protecting core technologies.
- Document handling.
- Consumer interface.

Some of the key factors determining NCR's growth performance are

- Micro factors - design, value chains, access to Internet.
- Macro factors - currencies, GDP growth, inflation, economic stability.

Clusters help business find a common interest, and thereby organise themselves - for example to continue to supply NCR's operations in Dundee.

Professor Charles Sabel, Columbia University, USA

Professor Sabel is a well-regarded academic who has written extensively on the subject of industry clusters. He explained at the outset that while clustering is an intellectually useful concept, which also has integrity, there are limitations.

The attraction of a cluster is the flexibility it provides to firms in certain circumstances. Individual units with craft skills can adjust because they are within earshot - they can easily re-combine and are inherently more flexible than vertically-integrated, bureaucratic organisations or the isolated firm. In these circumstances, clusters can also assist firms to shift from a price to quality focus. Clusters of this sort are quasi-natural entities - they do not have internal governance problems. Firms are actually complementary - if they do compete, they do so in narrow circumstances. There is a natural solidarity and alignment. The only thing missing is that companies may not fully understand that they are a cluster, and therefore do not optimise their potential.

However there are aspects of cluster theory that do not fit the current real world.

The first relates to the increasing formalisation of knowledge. The world has become more complex, with standards being commonplace (e.g. ISO 9000 standards). These standards apply to firms and industries, and cross regional and international boundaries. This can lead to coordination problems, and the organisation of firms and governance can become an explosive issue.

The second aspect relates to poverty and social exclusion, where cluster-based development strategies may not be that effective. The EU has a large program 'Integrated Regions' which is targeted to regions with serious economic and social dislocation - cluster-based strategies tend to focus on wealth creation rather than income redistribution.

The third aspect is the changing nature of government. The orthodox line is that government should operate above the level of the firm, and not become key players in the development of clusters. However the governments we are getting today (e.g. The Scottish Government) are a different entity in that they are relatively more involved.

In terms of do's and don'ts:

- Don't try to build trust - get people to solve a problem (trust is an outcome of problem solving).
- Don't look to build networks for their own sake.
- Worry about governance - some governance structures work, but some don't.
- Worry about the role of government.
- Worry about social justice.
- Don't fool yourself - once you have moved to a point where people are being given the opportunity to transform their operations and relationships, you cannot avoid disturbing things and people. They will want to know whether it is an extension of democracy or its antithesis!

There is a lot of economic growth at present - this is a fact. If clustering is so good, may be it doesn't matter if there is not a massive amount of analysis - clusters force people to ask questions which induces action.

Lastly, what seems to be missing with cluster practitioners is self-criticism - some cluster benchmarking is needed.

Professor Philip Cooke, Director - Centre for Advanced Studies, University of Wales

The neo-Marshallian agglomerations (e.g. in Italy) involve:

- specialisation by many firms in different aspects of production.
- swift communication, formal and informal interaction, common mindsets, shared knowledge.
- skilled labour.
- knowledge, know-how and ideas being 'in the air'.

However to talk about clusters properly, one needs to build in 'localised enterprise support infrastructure' which helps the organic growth of firms.

The advantage of clustering is that it facilitates:

- inter-generational transfer of knowledge.
- imitation of successful practices and innovations.
- inter-personal face to face contact.
- inter-firm cooperation.
- tacit circulation of commercial and technical knowledge.

There are probably 20-30 clusters in the UK - some are old such as ceramics in Stoke on Trent.

A good, newer example is around Reading (Oxfordshire) where the Silverstone race circuit has facilitated the growth of a F1 motor sports cluster involving construction, testing, training - nine racing car groups (e.g. Williams and Benetton) have clustered there, with many suppliers nearby. There was poaching of skilled technicians until the authorities called a meeting and asked for cooperation.

Other examples are in IT and biotech around Cambridge and multi media around Cardiff. Germany also has four biotech clusters, including Munich and Hamburg. Most of these are located close to a source of knowledge.

Old Economy	New Economy
A skill	Lifelong learning
Labour conflicts	Teams
Environmental limits	Growth
Security	Risk taking
Monopolies	Competition
Plants	Intelligence
Standardisation	Customer choice
Status Quo	Agility
Hierarchical	Distributed
Wages	Shared ownership

Certain features of the New Economy are very important in the context of innovation systems. These include venture capital search laboratories, IP-driven development and incubators. *(This thinking is consistent with the establishment of the Alba Centre - see previous Chapter)*

Clusters will grow in importance in the New Economy, given that it requires the revitalisation of old sectors, knowledge transfer and creativity, collective learning, untraded interdependence (favours), spill-over effects from new business formation, and project-based collaboration.

Some concluding remarks:

- It is hard to build clusters from scratch.
- supportive infrastructure is very important.
- clusters enhance new firm formation.
- there is a role for government if market failure exists.
- need to understand that firms in clusters have other priorities - a sense of collective order or thinking about clusters is not always there.
- Agricultural areas can benefit from clusters, but this is not fully appreciated.
- 'A cluster is not a cluster without a governance structure'.

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Dr. Ted Egan, Project Manager, ICF Consulting

Attempts to build IT clusters in the developing world fall into two types - the first and most common is a collection of local-serving IT companies which install foreign-produced software into systems in their local market. The second, rarer type is one in which software developers contribute to the export base, though at a fairly low point on the value chain. Bangalore is an example. Innovative IT clusters have been identified in countries like Taiwan, Israel and Ireland, but these did not occur until these countries became fairly wealthy by international standards.

The key is to understand the evolution of these clusters, in terms of a complete value chain. In some ways, the deck is stacked against developing countries because they have to close a significant gap in terms of competitive advantage. Nevertheless there are grounds for optimism for the developing of IT clusters in DCs:

- Technology allows for the dispersal of production systems.
- There is massive growth, and hence the opportunity for niche developments.
- IT markets in Latin America, Asia, Middle East and Northern Africa are growing fast.
- There are IT clusters emerging in unusual places.

While many developing countries lack the basic infrastructure, the fundamental limitation is the weak penetration of IT into the local economy because of cost and institutional rigidity. Singapore and Taiwan are definite success stories - targeted inwards investment and international sub-contracting has led to cluster development. Israel and Ireland can also be viewed as successes. However, the jury is still out on Malaysia and India, and it is too early to say with regard to East Europe and the Philippines. In Latin America and Africa, there are only a few success stories.

The biggest shortcoming in developing countries is the lack of cluster synergies along the supply chain - however these improve as the cluster develops. The main impediments are the typically small domestic market and the lack of lead users. The need is for a 20-30 year strategy, and a focus on software and export. IT clusters cannot be built unless intellectual capital is built. Developing countries need international partners to develop financing solutions, as well as research and technology networks.

Should DCs really aspire to have IT clusters? It needs to be understood that IT is a key stage of the growth path in developing countries. IT is seen as a major enabler and accelerator because it creates opportunities for other industries.

Dr. Steve Brady, GM - SME Propositions, British Telecom

Cisco is one of the best examples of a company using e-commerce to build their business and value chains. However there are not that many companies in the UK that have that level of sophistication. In the UK over 96% of firms have less than 20 employees. Dun & Bradstreet has found that the use of the web by US companies has fallen in the last couple of years (e.g. the number of firms using email has fallen from 76% in 1998 to 71% in 1999). The reasons for this are not clear, but may be linked to the realisation that IP-based applications are not delivering the cost savings expected by SMEs.

SMEs can benefit from clustering - one reason is that the uptake of R&D is increased by access to advice and support services, as well as knowledge sharing. Clusters deliver economies of scale for infrastructure, create Centres of Excellence, facilitate the transfer of informal knowledge, attract/retain high calibre employees and facilitate links to R&D establishments. In BT's experience, incubators have acted as a magnet to build clusters, to attract SMEs and investors. A public/private partnership is very important - this also encourages investment.

Delphi Park is an example of a cluster. Its features include:

- Co-location of services and network connectivity
- Website design and e-commerce
- Applications hosting
- Systems integration
- Vertical portals
- Office of the future
- Telehouse and e-commerce campus
- Acceleration of e-commerce adoption among SMEs
- Attraction of inwards investors

Large businesses create their own economies of scale, scope and location. SMEs are different - their benefits revolve more around regional clusters.

Mr. Chris van der Kuyl, CEO - VIS Entertainment

Mr. van der Kuyl is in his early thirties, flamboyant and a natural marketer.

VIS has been quoted in a recent survey as Scotland's top computer games company - it has grown from 9 staff in 1996 to 120 at present. The business started in Dundee, where the University has one of the best animation courses in the UK. Another operation was established in Edinburgh, and then Glasgow and the Isle of Wight.

The world video entertainment industry is huge and success hinges on talent. There has been a sea change in Scotland, brought about by bringing like-minded people together. Mr. Van der Kuyl is the co-founder of the Scottish Games Alliance whose aim is to develop and internationalise the industry through joint promotion and co-venturing initiatives. He is also past chairman of the Interactive Media Alliance of Scotland.

VIS does all of its business via London and overseas. Value is built in Scotland, but is then externalised. Their success is built on teamwork. 'The future is small business - small groups of 50-60 people - they create a sense of community and ownership'. Microsoft is smart because it built around individual business units of 50-100 people. If they grow bigger, they are split.

Mr. van der Kuyl was initially sceptical of clustering concepts, but his company's experience and results mean that he is now a believer. Initiatives have been important in driving the process. While he explained that his company could not rely on a single site, it must not be spread too thinly. 'When talent appears, we are there'. Accordingly, VIS has built clusters of expertise in each of its bases, with strong connections between them.

Mr. John Mearns, European Manufacturing Materials Manager, CISCO Systems

Mr. Mearns was with Scottish Enterprise for 4 years, and left only last November.

Three years ago, when still with Scottish Enterprise, Mr. Mearns formed the Competitiveness Cluster Group. The group benchmarked Glasgow against Singapore and Germany. In Singapore, manufacturing is moving offshore to Malaysia. In Germany, the main trends are in the focus on quality, automation and the re-engineering of existing plants.

The name Cisco derives from the company's original home, San Francisco. Cisco's core business is the design and marketing of routers and switches, which control the movement of data. The company is the largest in the world, with a market capitalisation of \$400 billion quarterly revenue

of \$5 billion. They have outstripped their competitors in recent years, namely Lucent, Ericsson, Nortel, 3 Com, Newbridge and Cabletron.

The company prides itself on being customer driven, having 'stretch goals' and doing the impossible. Cisco does all of its business via the web - suppliers and customers must have a web site address. Cisco uses outsourcing extensively and its success is built around building a massive supply chain throughout the world.

By virtual manufacturing, Cisco is able to reduce inventory by 45% and cut the order cycle from 6-8 weeks to 1-3 weeks. It is extremely active in acquiring companies - a full-time SWOT team does due diligence on prospective acquisitions, where the emphasis is placed on a shared vision, a win-win in both the short and long term, and chemistry. Employment is growing by 1,000 per month, and annual sales equate to \$US700k/employee. Cisco places great value on peoples' skills. Everyone in Cisco gets stock options.

Mr. Mearns considers that the key drivers of the Internet Economy are:

- The global economy
- Competitive advantage
- Survival
- Educated leaders
- Profit
- Organisational structure
- New competition
- Empowered workforce
- Productivity

In terms of clustering, Cisco develops simple structures and clusters. It is opening a new plant in Salem, New Hampshire and moving staff from Silicon Valley because of over-heating (evidenced by spiralling house rentals, salaries etc.). In this context, Cisco is looking to build new critical mass in Salem.

Professor Michael Porter, Harvard University

The conference proceedings included a video conference with Professors Porter and Becattini, the latter referred to as by some as the godfather of the Italian clusters. The two are close friends. This summary focuses on Professor Porter's key points.

Evidence points to strengthening patterns of location, and firms clustering more strongly than in the past. There are three likely reasons.

1. Globalisation is true, but it has neutralised many things. For example, if capital is available widely, then it is of advantage to nobody. Likewise the Internet has reduced the gap between those with full access to information and those without. This means that other things count - local factors become more important.
2. The important thing is the way capital is structured and the knowledge that comes with the capital. For example, Californian banks will know the right finance deal for wine companies.
3. Outsourcing is a major trend, and this has strong locational aspects. If firms outsource locally, it delivers the benefits of trust and lower transaction costs (and reduced concerns about expensive legal disputes).

Harvard University now has a locational module, because companies have to think laterally about location - 'bit by bit, companies are starting to understand the importance of their locational positioning and local assets'.

We are concerned that clusters are being understood differently by governments.

Everyone agrees that stable macroeconomic settings are required - but a stable economy and stable politics does not necessarily provide a competitive advantage. A strong micro-policy is also required, to ensure that hard and soft infrastructure is competitive. But everyone can have this advantage too. Therefore the determining factor is often the locational emphasis.

The locational emphasis involves the clustering concept... 'it starts from the premise that any critical mass of industry can deliver benefits - it is also a mechanism and a set of ideas on how industry and government can improve the competitive environment'.

This year's *Global Competitiveness Report* has found a statistical link between clusters and macroeconomic performance.

The role of government should be modest and minimalist. Governments do not need to provide large amounts of money, but it does require an understanding of how public infrastructure impacts on the cluster. Where should government get involved? This is the big debate - there needs to be some market-based critical mass to start with - some sort of market test must be applied. In the developing countries, the emphasis should be building and growing organically - do not try and start a semi-conductor industry from scratch.

As an example of a minimalist government role, there is Boston University where a photonics centre was funded, with training agendas. Another example would be where government works with industry to develop focused export potential, and to pursue these opportunities as a cluster.

'The absolute no-no is for government to intervene in competition, by subsidising'.

Mr. Stefan Salej, President - FIEMG, Brazil

FIEMG stands for the Federation of Industries of the State of Minas Geras, which is in Brazil's east. Mr. Salej provided me with a private copy of the FIEMG-sponsored cluster work. This summary includes some of this material.

The State of Minas Geras is one of 26 in Brazil. It has a population of 17 million, with a high level of urbanisation (78%) and GDP valued at \$US64.8 billion (\$US3,884/head).

Mr. Salej explained that FIEMG started the cluster process 18 months ago when they commissioned McKinsey & Co. The business sector wants results - that is the bottom line. There have been concerns regarding people wanting to reinvent the wheel, and that politicians tend to look short-term, whereas cluster agendas are essentially long-term.

Minas Gerais is a resource-rich State - the world's largest producer of niobium, and Brazil's largest producer of iron ore, lithium, zinc, graphite, cement, steel etc. It is also Brazil's largest producer of coffee and a major producer of pineapples, potatoes, oranges, corn, tomatoes, sugar cane etc. The State has well-developed road and rail infrastructure.

Economic performance in the 1990s has been below the national average, mainly because of the economic opening-out in that period. (The State's industrialisation had been built around import substitution and expansion of exports and a weak currency).

Some of the issues identified by McKinsey & Co. include:

- Declining share of national investment, and the need for decisive action to redress this.
- Strong social pressures to reduce the unemployment rate (6.4%).
- Regional disparities in income.

Cluster Cycles in World Economic History

First generation clusters (19th century)

- Cleveland - steel
- Geneva - watches
- Lancaster - textiles

Second generation clusters (20th century)

- California - wine
- Hollywood - media
- Silicon Valley - IT

Third Generation clusters (21st century)

- Bangalore - IT
- Chile - fruits and wine
- Graz - automobiles
- Silicon Valley - IT
- Tel Aviv - IT

Source: McKinsey & Co. (quoted in 'Crescas Minas' - a Brazilian Project, FIEMG 2000)

The McKinsey & Co. study ('Cresce Minas' which means 'Grow Minas') has involved the identification of clusters with growth potential, spread across 8 blocks of economic activity.

1. Farm produce - coffee, fruits, cachaca, sugar-alcohol, forestry
2. Animal protein - poultry, beef, pigs, dairy products
3. Light industries - footwear, fashion, textiles and apparel, furniture
4. Construction - civil construction
5. Heavy industries - metal machinery, steel
6. Technology - biotechnology, automotive parts, electrical equipment, electronic equipment, software, telecommunications
7. Services - wholesale, tourism, automotive services
8. Traditional - arts and crafts, gems and cutting

The study examines the main issues and challenges for cluster implementation in each of the potential cluster areas. Benchmarking across Brazilian regions, and across countries, is being done as part of this work. In this regard, FMIEG has indicated interest in the linking of clusters initiative (See Chapter 6).

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Professor Michael Enright, Professor of Business, Hong Kong University

Michael Enright is on TCI Board and has been actively supporting its activities from the outset. Advice from a third source is that he did his Ph. D. under Michael Porter, and that a good deal of Enright's research is included in Porter's seminal work 'The Competitive Advantage of Nations'.

Both public and private entities are caught between globalisation and the localisation of competitive advantage. This is resulting in an increasing velocity of forces that locations are having to understand.

For example, in North Sydney, there are 100 IT firms - but Australia is losing major multinationals with strong local management. The country manager is being replaced with a figurehead because of centralisation back to Singapore and Hong Kong. Similarly, we see the death of rural towns in Australia and the US, where distribution companies are being displaced by e-commerce.

What is required is the building up of local bases and injecting them into the world economy. The cluster-based responses to globalisation differ in the following ways:

- Definitions of clusters
- Level and nature of government involvement
- Origins of the industrial base
- Cluster selection
- Targeting of market failure or otherwise.

Singapore thinks of clusters as broad and industry-wide. It used to be said that local government working with industry was best placed to decide where clusters might be facilitated. But what if local government is weak? The answer is to go where the power and influence is. The easier way to approach the question of where to start is to look at market failings, and cluster analysis helps in this regard. Market failure might include:

- Lack of information
- Managerial myopia
- Under-provision of public goods
- Coordination failure ('people just can't organise it')

These market failures play out in different ways in each cluster. There is no single answer or detailed map for cluster development that will work in all cases. The broad guidelines for cluster development are:

1. Formulate clear goals
2. Use sensible criteria for identifying and prioritising clusters
3. Use analysis to educate and build urgency in the minds of participants regarding constraints
4. Identify leaders

Dr. Stuart Rosenfeld, President, Regional Technology Strategies Inc, USA

Dr. Rosenfeld is the author of what I regard as the best, most readable book on clusters - 'Industrial-strength strategies: regional clusters and public policy'. Copies are still available - www.rtsinc.org. He has published more than 100 books and articles, on topics such as:

- *'Competitive manufacturing: new strategies for regional development'*,
- *'Smart firms in small towns;*
- *'Exploring the potential for manufacturing networks'*
- *'Overachievers - business clusters that work'*
- *'Skills for an Information Economy'*.

The most common advantage in locational decisions is access to intelligence - companies can source inputs from anywhere, but they need intelligence.

Governments don't give much attention to clusters in the context of labour markets, but they should because the development of clusters addresses all aspects of an industry. The dynamics of clusters can be appreciated in terms of:

- the flow of information - better knowledge of markets, labour markets, technology. Clusters lead to people 'spilling the beans'.
- ideas - the diffusion of innovation.
- people - especially increased experience. 'People meet in taverns'.
- goods - the strengthening of value chains.
- services - expanded expertise.
- capital - support for plant modernisation and start-ups.

The mapping of information and skills can be a valuable way of identifying the source of ideas, learning of opportunities, finding how to get assistance to address problems, and generally knowing who to call.

The role of regional technical colleges is often not fully appreciated. They can provide:

- regional responsibility and focus.
- a pipeline for new workers.
- a second chance to adults i.e. to retrain for a new career.
- an intermediary for networks.
- a repository of expertise and information.
- a source of skills upgrading.

There are various types of such colleges:

- Hosiery Technology Centre (Catawba Valley) - has been very effective in training entry-level workers, management and customers. It also brokers networks and provides testing facilities - www.legsource.com
- Lettefrack Furniture College (Ireland) - provides furniture production programs and management programs, a Furniture Technology Centre, and also supports new enterprise development.
- Central Virginia Metalworking Centre - begun by a small group of SMEs in need of machinists. They approached colleges, but there was no interest. They therefore sourced equipment from vendors and progressively established their own Centre.
- Silicon Alley (southern part of Manhattan) - has a new media cluster with a training aspect.

Mr. Brian Catts, University of Arizona

Brian Catts has been an active supporter of TCI - and is a key figure in the context of the 2001 TCI Conference.

Universities can be involved at the conceptual level regarding the formation and maintenance of clusters. However their involvement in cluster programs can have other benefits:

- improving access to SMEs
- making connections to high tech industry
- assisting with technology transfer and spinning off technology more quickly
- building a community of support for innovation

In the Arizona context, the University provides research and administrative support, as well as a source of ideas for other players. The future strategies to be pursued by the University include a dedicated cluster analysis centre (which would undertake benchmarking, strategic planning etc.), the extension of the cluster process to smaller communities, and the provision of assistance to cluster organisations to adapt to challenges of the new economy.

The key benefits of the Arizona clusters to date have been:

- Source of ideas and people
- Source of strategic alliances and networks
- Building of buyer/supplier linkages
- Common voice for government people
- Workforce development
- Recruiting tool

The University of Arizona has cluster-related links with universities in Sonora County (California) and in Mexico.

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Dr. Andreu Mas-Colell, Minister for Universities, Research & Innovation, Catalonia, Spain

Catalonia is arguably the most progressive of Spain's provinces - it is the most industrialised, and has extensive cultural traditions. Barcelona is the capital. Catalonia played a prominent role on the republican side (i.e. anti Franco) of the Spanish Civil War. The Catalan Government was restored only in 1977.

Dr. Mas-Colell has been the Minister for this particular portfolio since April 2000 - he was formerly Professor of Economics in various North American universities including Harvard and Berkeley. He is the author of more than 100 research papers.

The notion of clusters is a distinctive feature in productivity building. To explain, at one end of the spectrum, there are bases of production with very little thinking - at the other extreme, there are lots of ideas but little development into viable production systems. As the knowledge economy develops, improved understanding of this spectrum is important. There are clusters developing now with ideas and expertise in more than one location, and with production at yet another location.

In terms of key issues, it should be stressed that while the Internet is a powerful agent, it is not the 'whole thing' of the revolution - it can be likened to a railroad. Informal communication is also very important.

In terms of making the environment suitable for the uptake of clustering, the fostering of an educated population at all levels is very important. The place also has to be well-connected - not just communications, but airports. A properly functioning airport is important in providing a positive first impression for investors. A well-functioning administration is also required.

Contact: Dr. Mas-Colell can be contacted via TCI in Barcelona.

Mr. Nicol Stephen, Deputy Minister for Enterprise, Scotland

Minister Stephen was working with Bob Downes of BT in the 1980s with the aim of getting companies to work together. He had persuaded people that the Food Services Agency should be in Aberdeen (and not Edinburgh) - 'without us it would have been in the wrong place'. Partnering wasn't spoke about then.

It is vital that we all become professional in this area - it is necessary to talk with passion, to care enough to talk about these issues rather than exclusively football, the Olympics etc. We also need to think about India, China, Russia, Brazil and our interaction with them. There is also huge competition out there for the Scots - for example, Scotland has 13 universities and 47 colleges - India has 116 universities and 500 colleges.

Partnerships are often spoken about, as is the importance of industry/commerce and lifelong learning. However there is still a long way to go to get the correct linkages. Project Alba is an example of a success in facilitating collaboration between a university and companies like Motorola, where 500 research jobs have been created.

We have a Knowledge Economy Task force, and Bob Downes is a member. Clusters are a key part of this because they build the critical mass and the commercial environment. Final message - 'get out there and do it'.

Professor Hubert Schmitz, Institute of Development Studies, Univ. of Sussex, UK

There is a need to go beyond the cluster approach at times, because the key players in export industries may not be in the cluster agendas. The work of the University of Sussex is part of a broader exercise on who are the winners and losers out of globalisation.

'We think the losers are the entrepreneurs who are isolated, and the winners are those who are part of clusters.....this view is criticised, but at least we have a significant body of experts who think it is important'.

Competitive advantage can be derived in a number of ways - there can be 'incidental' competitive advantage that occurs in local economies. It can also be consciously pursued through joint action. Then there is a third category that derives from a mix of the two - cooperation and performance, as in the case of Brazil.

Segal Quince Wicksteed, Cambridge, UK

SQW a consultancy group who provided written material to the conference. The Cambridge cluster should be a strong contender for a link with clusters in Australia.

In 1985, SQW released a book 'Cambridge Phenomenon, which charted the emergence of 350 high tech firms in and around the university city of Cambridge. It traced the origins of many firms, through direct and indirect routes, back to the university and the local research community. The originators and factors driving growth were analysed and the vital roles played by a small number of key individuals were described.

Since 1985 the cluster has strengthened significantly:

- By 1998, there were 1350 firms employing 32,500 people.
- Software and related industries have evolved in the last 15 years - specialist research teams of industry leaders have been formed, with Microsoft et al.
- Biotechnology has strengthened - there are embedded laboratories of major pharmaceutical companies alongside university departments, the major Genome research program at Hinxton, specialist incubators and science parks, and a significant group of go ahead companies.
- New firm spin-outs continue to be a feature of the Cambridge scene. There are signs of higher growth ambitions and well-resourced team starts that can get to the market quickly.
- Technology consultancies, a distinctive element of the cluster, have continued to prosper and are beginning to evolve into more rounded technology houses - they are active in the seed and venture capital business
- The scale of the finance and professional services sector has greatly increased.

SQW recently released a new book 'Cambridge Phenomenon Revisited'. It provides an analytical overview of where the jobs are located, together with changes in the university and related institutes. The firms are considered under four chapter headings - start-ups and spin-outs, the long-established high-tech firms, new firms that have moved into the region attracted by its reputation, and highlights of the area's success in terms of software, telecoms, biotechnology and technology consultancy. The final two chapters explore the ingredients of the cluster's success.

SQW indicates that while the biotechnology industry has been a real success story, instrumentation has gone through a difficult period - it is the weakest-performing sector, despite being one of foundations of the cluster. The report probes aspects of the comparative analysis of entrepreneurship, and also provides an econometric analysis that seeks to unravel the success factors of success in new-start firms. Further chapters consider:

- land and property provision (science parks, innovation centres etc.),
- the specialist labour market - how the labour market works - and could work better,
- advanced business services - how they play a vital role in networking and become substantial employers in their own right.

The document is for sale: Part One 25 pounds, Part Two 30 pounds - 50 pounds for both.

Contact: Mr. Chris Green phone 01223 209 400, ccgreen@sqw.co.uk, or www.sqw.co.uk

One North East, Newcastle, UK

One North East (ONE) is possibly the leading organisation for cluster network development in the UK. I was impressed by the then CEO, Alistair Balls, when I interviewed him as part of my SES fellowship on clustering in 1996. Although the organisation did not present a paper, Mr. David Bowles, who is directly involved in investment attraction for ONE, and other ONE representatives did attend. Mr. Bowles has a very good knowledge of Australia.

ONE has a declared interest in building strong partnerships through which information and creative ideas can flow to best mutual and competitive advantage. It sees networks and clusters as driving innovation.

ONE specialises in bringing companies together to secure common business objectives - its experience covers gas technology, e-commerce, management systems, arts and crafts, environment, marine technology, marketing and textiles. The clusters range in size from three to over 100 companies.

“Coming together is a beginning, staying together is progress, working together is success”
- Henry Ford (quoted in ‘Regional Service for Clustering’, One North East)

The services offered by the Regional Service for Clustering, which is a joint venture between One and several local authorities, include:

- Arranging introductions between companies
- Recruiting companies to undertake specific roles in clusters
- Working with clusters to identify market opportunities
- Conducting skills needs analysis
- Undertaking mentoring and learning activities
- Providing research and information services
- Assessing the commercial viability of business strategies
- Advising on funding applications
- Providing discretionary funds to support clustering activities
- Signposting companies to the most appropriate business support agencies.

These services are provided free of charge to companies wanting to collaborate with each other.

Examples of two of the smaller cluster agendas are:

- Pegasus Pipeline Engineering Group - formed in the wake of the closure of the British Gas Engineering Research station in 1996. As a result of the fall-out, several small high-tech companies were created. They have come together to provide a comprehensive range of services to the gas industry worldwide - it now trades internationally e.g. Bulgaria, Saudi Arabia, Brunei, Mexico. The framework has acted as an incubator for several companies under the overarching banner of the Pegasus group. The group currently comprises six companies with a further nine having been involved to varying degrees. The performance of the cluster is impressive - permanent employees have risen by 24, turnover has doubled to 1.35 million pounds.
- Environment cluster - network of four companies with complementary competencies in environmental matters e.g. recycling, odour control, management systems for waste water, environmental and energy control. The group believed that greater market opportunities would be accessible by combining their individual strengths. In the two years to 1999, employment doubled to 24, while turnover almost doubled to 541,000 pounds. The companies have also formed the Environmental Industries Federation.

Contact: David Bowles, phone 0191 204 2303, email maria.connelly@onenortheast.co.uk

Summing Up

Re Role of Government

‘We are concerned that clusters are being understood differently by governments.....The absolute no-no is for government to intervene in competition, by subsidising’. (Prof. Michael Porter, Harvard)

‘The role of government should be modest and minimalist. Governments do not need to provide large amounts of money, but it does require an understanding of how public infrastructure impacts on the cluster’. (Porter)

‘The orthodox line is that government should operate above the level of the firm, and not become key players in the development of clusters. However the governments we are getting today (e.g. The Scottish Government) are a different entity.....Worry about the role of government’. (Prof. Charles Sabel, Univ. of Columbia)

‘Governments don’t give much attention to clusters in the context of labour markets, but they should because the development of clusters addresses all aspects of an industry’. (Stuart Rosenfeld, USA)

Re competitive advantage at the local level

‘The most common advantage in locational decisions is access to intelligence - companies can source inputs from anywhere, but they need intelligence’. (Rosenfeld)

‘There can be ‘incidental’ competitive advantage that occurs in local economies. It can also be consciously pursued through joint action’. (Prof. Hubert Schmitz, Univ. of Sussex, UK)

‘Large businesses create their own economies of scale, scope and location. SMEs are different - their benefits revolve more around regional clusters’. (Dr. Steve Brady, British Telecom)

Re getting started & basic lessons

‘Don’t try to build trust - get people to solve a problem (trust is an outcome of problem-solving)....don’t look to build networks for their own sake’. (Sabel)

‘Initiatives have been important in driving the process’ (Mr. Chris van der Kuyl, VIS)

‘Cisco develops simple structures and clusters’ (Mr. John Mearns, Cisco)

‘My final message - get out there and do it’ (Mr. Nicol Stephen, Deputy Minister for Enterprise, Scotland)

‘There needs to be some market-based critical mass to start with - some sort of market test must be applied’. (Porter)

Classic Comment No. 1

The easier way to approach the question of where to start is to look at market failings, and cluster analysis helps in this regard. Market failure might include:

- Lack of information
- Managerial myopia
- Under-provision of public goods
- Coordination failure (‘people just can’t organise it’)

(Prof. Mike Enright, Univ. Of Hong Kong)

‘The business sector wants results - that is the bottom line’. (Mr. Stefan Salej, FIEMG, Brazil)

‘Formulate clear goals, use sensible criteria for identifying and prioritising clusters, use analysis to educate and build urgency in the minds of participants, and identify leaders’. (Enright)

Re the New Economy and globalisation

‘Clusters will grow in importance in the New Economy, given that it requires the revitalisation of old sectors, knowledge transfer and creativity, collective learning, untraded interdependence (favours), spill-over effects from new business formation, and project-based collaboration’. (Prof. Philip Cooke, Univ. of Wales)

'Globalisation is true, but it has neutralised many things. For example, if capital is available widely, then it is of advantage to nobody. Likewise the Internet has reduced the gap between those with full access to information and those without. This means that other things count - local factors come more important'. (Porter)

'At one end of the spectrum, there are bases of production with very little thinking - at the other extreme, there are lots of ideas but little development into viable production systems. As the knowledge economy develops, improved understanding of this spectrum is important' (Dr. Andreu Mas-Colell, Minister, Catalonia)

Re commercialising research

'The uptake of R&D is increased by access to advice and support services, as well as knowledge sharing. Clusters deliver economies of scale for infrastructure, create Centres of Excellence, facilitate informal transfer, attract/retain high calibre employees and facilitate links to R&D establishments' (Brady)

'There have been specific benefits to universities as well, in terms of...making connections to high tech industry, assisting with technology transfer and spinning off technology more quickly, and building a community of support for innovation'. (Mr. Brian Catts, Univ. of Arizona)

Re attracting investment

'In BT's experience, incubators have acted as a magnet to build clusters, to attract SMEs and investors. A public/private partnership is very important - this also encourages investment'. (Brady)

'People and investors want to know what places will be most attractive in terms of investment - space matters more than ever...Firms benefit from action to build clusters because it builds more attractive locations - this is a combination of immovable and intangible assets'. (Prof. Josef Konvitz, OECD)

Re Supply Chains

'Supply chains are moving on-line. The computer and electronics industries are strengthening their supply chains via on-line technology. Industries to follow are utilities, shipping, pharmaceuticals. 'It's the job of clusters to move these industries into e commerce'. (Downes)

'The globalisation of supply chains is a major driver of change, in respect of internal and external supply chains. With regard to internal supply chains, the key success factors are creating and protecting core technologies, document handling and consumer interface'. (Mr. Danny O'Brien, NCR)

'The biggest shortcoming in developing countries is the lack of cluster synergies along the supply chain - however these improve as the cluster develops'. (Dr. Ted Egan, ICF Consulting)

Re infrastructure

'To talk about clusters properly, one needs to build in 'localised enterprise support infrastructure' which helps the organic growth of firms'. (Cooke)

'The place also has to be well-connected - not just communications, but airports'. (Mas-Colell)

Re making connections

'The links between the players are critical. BT wants to better understand how to build economies and help regional players to connect via clustering techniques and online/electronic networks. Although BT is becoming increasingly global, it needs to extract revenues from local markets, and this can be done via cluster-led regional development'. (Downes)

'Firms are actually complementary - if they do compete, they do so in narrow circumstances. There is a natural solidarity and alignment'. (Sabel)

'We think the losers are the entrepreneurs who are isolated, and the winners are those who are part of clusters'. (Schmitz)

'Much of the existing work concentrates on describing the potential benefits and drivers for forming groupings, but does not explain how clustering takes place on a day-to-day basis. Many commentators stress the importance of building close relations and trust, but they do not explain how this occurs and how cluster development policies can support and stimulate the development of trust and intimacy. (Fergus Lyon & Andrew Atherton, Univ. of Durham - see Attachment 5)

'Clusters help business find a common interest, and thereby organise themselves'. (O'Brien)

Classic Comment No. 2

Clusters lead to people 'spilling the beans'.

(Stuart Rosenfeld, USA)

Re broken china, tensions and upsetting people

'Don't fool yourself - once you have moved to a point where people are being given the opportunity to transform their operations and relationships, you cannot avoid disturbing things and people'. (Sabel)

'Politicians tend to look short-term, whereas cluster agendas are essentially long-term'. (Salej)

'In relation to poverty and social exclusion, cluster-based development strategies may not be that effective.....cluster-based strategies tend to focus on wealth creation rather than income redistribution.....Worry about social justice'. (Sabel)

Re governance

'A cluster is not a cluster without a governance structure'. (Cooke)

'Understanding the changing nature of corporate governance at the firm level is a prerequisite to effectively addressing inter-firm processes of clusters, and inter-sectoral forums that embed and shape these clusters..... larger companies are defining their own form of cluster - one that encompasses a variety of internal growth strategies and external acquisitions - generating an extended firm, or a new form of corporate architecture of a sort not seen in the past'. (Chaiton et al, Univ. of Ottawa - see Attachment 4)

'Individual units with craft skills can adjust because they are within earshot - they can easily recombine and are inherently more flexible than vertically-integrated, bureaucratic organisations or the isolated firm. In these circumstances, clusters can also assist firms to shift from a price to quality focus. Clusters of this sort do not have internal governance problems'. (Sabel)

As indicated earlier, TCI and the OECD are the two key groups. In mid 2000, the OECD convened a Ministerial Meeting in Bologna, Italy, to discuss issues relating to small business. An excellent overview paper on the relevance of clusters was tabled, and I have summarised the main points because they reinforce views expressed in Glasgow and shed further light on innovation and investment aspects of clustering concepts.

Globalisation and Localisation

The OECD notes that two seemingly competing tendencies - the globalisation of economic activity and the localisation of industries - have captured widespread interest in recent years. While trends towards globalisation of industries and companies might appear to reduce the importance and distinctiveness of (sub-national) regions, a tendency towards localisation of certain industries and economic activities seems to do exactly the opposite. Simultaneous globalisation and localisation tendencies have created policy challenges for national and local governments. One response to these challenges has been a dramatic proliferation of development policies based on clusters of firms and industries.

Driven by a range of policy, economic and technological variables, international economic activity of all kinds has been on the increase. World trade has grown significantly faster than world output over the last few decades and foreign direct investment flows have grown faster than world trade.

In 1996, the world-wide stock of foreign direct investment reached US\$3.2 trillion and sales by foreign affiliates, roughly US\$7 trillion a year, were some 30 per cent greater than world exports. Foreign portfolio investment has increased in importance as well. Private holdings of long term foreign securities by United States residents and entities alone reached an estimated US\$1.1 trillion at the start of 1997. And finally, international currency transactions, at US\$1.8 trillion to US\$2.0 trillion a day, dwarf all other forms of international economic activity.

The Localisation of Competitive Advantage

As globalisation has accelerated, interest in localised groups of firms in related industries has grown. This has been due to successful examples of such clusters being found in growing or prosperous regions, in disappointment with economic development models based on large firms, and on the sheer ubiquity of the phenomenon.

Regional clustering can be seen in the industrial districts of Northern Italy or Spain, the metalworking and machinery clusters of Germany, Switzerland and the American Midwest, the high technology agglomerations of Silicon Valley, Route 128, Cambridge, and Sophia Antipolis, the company towns of Ludwigshafen, Toyota City, and Seattle (Boeing and Microsoft), the fashion capitals of Paris and Milan, and the metropolitan business service centres of Hong Kong, New York and London.

The emergence of clusters in non-location sensitive activities, not normally thought of as subject to clustering, can also be identified in Omaha in telemarketing, South Dakota in credit card processing, Ireland in back office processing for financial services, Sydney in information processing, Bangalore in software services, and Manila in data entry. These are only a few examples of mobile activities that one generally thinks of being decentralised FROM places rather than being decentralised TO places. The fact that even such 'placeless' activities have shown tendencies to cluster indicates the strength of the phenomenon.

Large multinational firms that contribute to globalisation also contribute to the clustering process. Examples are motion pictures, pharmaceuticals, and financial services, as well as in activities such as

auto design, electronics design, and biotechnology research, multinational location decisions are actually increasing the geographic concentration of economic activities.

Financial and managerial centres, such as New York, London, and Tokyo, appear to be consolidating their influence. Most major Western financial institutions have their Asia-Pacific regional headquarters in Hong Kong or Singapore. German banks buy British merchant banks, but then move their merchant banking headquarters to London. Meanwhile, European pharmaceutical companies perform biotechnology development in US biotechnology clusters, Asian semiconductor firms design their chips in Silicon Valley, and international auto companies design prototypes in Southern California. In each case, the decisions of multinational firms have reinforced pre-existing clusters.

While the clustering phenomenon is not present in all or even most industries (in fact the geographic profile of different industries varies widely), it is an important part of the economic landscape.

Policy guidelines for OECD governments

There are no hard and fast rules as to how OECD governments should facilitate or deal with the clustering phenomenon. However, twelve suggestions are offered.

1. Implement broad campaigns to introduce the networking concept to the business community. As much as creating a network structure, it is at least as important to create informed demand for network services, with networks preferably addressing precise objectives.
2. Facilitate networking among firms, and between groups of firms and public authorities - in order to foster mutually beneficial co-operation. Policy should seek to create an institutional setting that favours market-induced network formation.
3. Establish realistic time-frames: a commitment of 3-4 years is usually required for a significant business network program. The network broker is key. Training can be an important incentive for brokers, and establishing broker teams and facilitating exchanges among them can help maintain effectiveness and motivation.
4. As regards networks, some degree of financial support, in seed finance, feasibility work, start-up activities, and the costs of network brokerage, is to be expected. However, funding should be modest, and should decline as the participants start to engage more formally and obtain benefits.
5. For cluster development strategies, facilitate the establishment of local partnerships involving private actors, NGOs and different levels and sectors of the public administration so as to arrive at agreements on individual responsibilities - for example in co-locating complementary public investments with related concentrations of private investment.
6. Let the private sector lead in cluster-development initiatives, with the public sector playing a catalytic role. Among other considerations, cluster initiatives can serve as a test of the quality of government policies and programs in serving private sector development.
7. Where possible, match initiatives to the most suitable level of government. The appropriate level of government is ideally one that corresponds to the geographic scope of the relevant cluster. Governments with larger geographic remits often are unable to focus sufficiently on the needs of local clusters. Conversely, jurisdictions that are smaller than the geographic scope of the cluster are unlikely to be able to take the integrated view that cluster development requires. The 'right' level of government should have substantial influence over relevant programs and expenditures.

8. Some prioritisation among clusters is generally necessary due to limited resources. There may also be benefits to working with a portfolio of clusters. In developing nations, before tackling more difficult cases, it is probably better to start with clusters that are relatively advanced but that can more readily improve through collective efforts.
9. Initially adopt a low risk/early return focus. It is useful to generate small but evident gains through collaborative effort at the outset. As success develops, higher risk/longer term activities can be introduced.
10. Target real market failures. Initiatives that target specific market failures are most likely to bring benefits to the cluster. The process of identifying and understanding how, for example, under-provision of public goods and co-ordination failure constrain a particular cluster can point toward fruitful areas of public-private or private-private co-operation. An emphasis on targeting market failures provides discipline that reduces the chance that initiatives will become captured by political interests or that public initiatives will stray into areas best served by the market.
11. Use analysis to build urgency in the minds of participants. It is often advisable to present participants with research and analysis on where they stand against competitors from other locations as well as ideas as to how their positions might be improved. (This is very relevant to Clusters Asia Pacific's efforts to link clusters across countries)
12. Seek to lock-in benefits of existing or embryonic clusters by:
 - considering land-use planning in a way that will strengthen emerging clusters by facilitating access to accommodation for new and small firms. This facilitation can take different forms, but responds to the widely-reported difficulties faced by small firms, and particularly start-ups, in gaining access to industrial real estate. The public role should be to leverage and reduce risk for corporate investments in industrial real estate.
 - promoting the establishment of suppliers' associations and learning circles, and other forms of collaborative undertaking that are made possible by virtue of physical proximity among firms.
 - allowing specialisation and local adaptation in university-industry linkages including experimentation in incentive structures that can encourage local linkages to industry.
 - ensuring effective technical support and information services. Markets may under-supply some business services and certain types of information, especially to small firms. Policy should address market failures where these are seen to be significant and aim to induce private provision as early as possible.
 - ensuring access to specialised infrastructure, communications and transport.

My attendance at TCI in Glasgow conference, apart from reporting back on cluster techniques being used in other countries, was to raise international awareness of Clusters Asia Pacific - and to then use this as a springboard for building a network between Australia-NZ clusters and those in other countries.

Given that TCI and the OECD are the key sources of information of cluster models and techniques, Clusters Asia Pacific has consciously sought to build links with them.

The possibility of linking clusters across countries has been spoken about from time to time. We believe the time has come to progress it. While the reasoning behind the idea is straight forward, some background in terms of the underlying problem will assist the reader.

The basic 'industrial affliction'

Australia's 'industrial affliction' is similar to that of Scotland - a small domestic market, and weak supply chains into the world economy.

However there is a series of other factors at play in Australia that exacerbate the situation and have additional causal effects. These have been documented before, but not in the context of clusters and world supply chains. It offers a sobering perspective and builds on issues raised in Chapter 2.⁸

1. Large distances between population centres and the competing interests of State governments

This fragments the industrial structure. This means that many firms are unable to find the partners they need to develop innovative products and processes.

2. An industrial structure that is biased towards the low-tech end of the spectrum

This is a legacy of protection policies, but our strong resource and agricultural base has been a major factor. This means that companies in higher-tech fields find it even harder to find partners and develop complementary activities. The 'hollowing out' of the heavy engineering industry over the last 15 years is a testimony to this. Australia's capital equipment is now virtually in mothballs - almost all machinery has to be imported.

3. The concentration of economic activity in the hands of a few players.

Industrial activity in critical areas - communications, media, aviation, shipping - takes place in vertically integrated large businesses. In Australia, big companies (i.e. employing more than 200 people or with turnovers of \$200 million plus) account for only 0.4% of the total number of companies - but they employ 38% of all workers, account for 64% of all capital expenditure and 50% of gross industry product. This means that there has been a clear tendency for SMEs to be linked not to each other, but to those of the giants in most sectors.

⁸Some of this section draws on issues identified by Professor Jane Marceau (University of Western Sydney).

The Australian food industry is particularly bizarre:

- Large foreign-owned firms focus primarily on the domestic market as modules of global 'multi-domestic' strategies, and
- local grower-owned firms (mostly SMEs) are attempting to avoid gluts on local markets by exporting fresh vegetables and simply-transformed products - however they lack the supply chains of the foreign-owned firms.

4. Many firms in Australia are part of foreign multinational enterprises

The continuing evidence is that Australian subsidiaries still undertake the greater part of their research and development activities at "home". Jane Marceau was told several times during the course of her 1997 study of the biomedical study that any R&D ideas would be passed back to headquarters overseas and would usually be carried out there. She concluded that not carrying out R&D in Australia creates a situation where links between firms and education and training institutions are not deep or frequent - this creates gaps in the innovation circuits on which innovative firms depend, and makes it harder for governments to find levers to improve national industrial technological capability.

Marceau's thesis is that the dependence of local firms on overseas headquarters may explain why empirical studies in several fields indicate that, while firms may co-locate, they do not co-operate to any large degree. Industrial firms have a presence in Australia but have a rather more significant link directly back to their parent. The knowledge circuits follow the ownership links and the supply chains. Mathews and Weiss (1991), in their study of the textile industry in Australia, similarly noted that there was some concentration of activity in small towns in Victoria, but that this did not imply any co-operative effort.

"The irony of this situation is that the textile and clothing industries.....have traditionally clustered together - but until recently have made little or no effort to achieve any competitive advantage through this clustering. In Victoria, wool producers in the Western District have fed woollen-based industry clusters in both Geelong and Warrnambool. In Warrnambool, for example, a proto-industrial district has existed for most of this century, with woollen mills, blanket mills and clothing firms all co-located. Yet Warrnambool has no resonance in Australia as a 'centre of excellence' in woollen textiles nor as an 'industrial district'. The Warrnambool City Council has no policies to encourage networking between firms located in this vicinity...The Warrnambool Institute of Advanced Education does not conduct any courses in textile technology or in textile-related areas."

(Mathews and Weiss, 1991)

The foregoing simply reinforces the difficulties facing Australia in making headway in respect of:

- the commercialisation of R&D, and
- investments in value added manufacturing/resource processing, and the export thereof.

These interrelated problems are suggested by some analysts as the real reason for Australia's chronic trade deficit, and the weakness of the Australian dollar. New Zealand is similarly affected. The latest spin is that Australia and Zealand are 'old economies'. While this is mostly media hype, the realities are that Australian companies are not embracing R&D to the same extent as most other OECD economies, the trade gap in IT-related goods and services is widening, and there is insufficient growth in the exports of value added minerals, metals, forest products etc. to offset our imports of capital goods and services.

Economic theory dictates that the weakness of the \$A should be feeding an export boom, and bringing about an equilibrium of sorts. What is overlooked by the theorists is that international

supply chains are an increasingly important aspect of commerce - these supply chains involve contractual relationships and alliances built on trust and confidence i.e. price is not the sole determinant.

Scotland's needs are similar, albeit from a slightly different perspective. Moreover, Mr. Stefan Kalej's address to the Glasgow conference referred to Brazil's need to strengthen alliances with international players - it seems that this is the common interest of most of the 33 countries represented at the conference.

It should also be noted that there were quiet concerns expressed at the conference that the least developed countries really have nowhere to go. The consensus is that the globalisation forces are effectively 'supercharging' parts of the world economy. The scenario might be described as:

- the powerful, well-connected economies will power on,
- the 'almosts' will hang on, and
- the least developed countries will continue to lose ground.

R&D commercialisation problems

Regardless of whether Australia is in the supercharged league or the 'almost' league, the downturn in business expenditure on R&D (BERD) in recent years suggests the need for a rethink of our innovation policy settings. Accordingly, the Australian Government convened the Innovation Summit in early 2000. The options canvassed at the Summit were passed to an Implementation Group, which concluded that Australia has to:

"strengthen the development of new firms through leverage gained by clustering of physical and complementary research/industry resources...build regional (and virtual) networks to access and develop entrepreneurial skills, involving Cooperative Research Centres (CRCs), entrepreneurs, mentors, business angels.....establish/strengthen international linkages to build innovation partnerships and alliances" (Preliminary paper, July 2000)

The Scottish cluster agendas are doing all of the above. As illustrated in Chapter 2, the Scots are building networks of various kinds to nurture champions, funding centres of excellence (to act as growth poles) and actively seeking out key companies to act as conduits to the world markets. The Scottish approach has particular advantages not available to Australia:

- the existence of a powerful political/financial supporter - namely the European Commission - to assist in attracting internationally-significant companies to locate in Scotland.
- broad acceptance by the key stakeholders of the role of Scottish Enterprise as a change agent and player in the marketplace - for example, in terms of determining which industries should be favoured, where an investment should be located etc.
- a policy framework - by virtue of its cluster program - within which government action to facilitate inwards investment and R&D collaboration can be justified and measured.

Investment & value adding problems

The second part of Australia's industrial affliction relates to Australia's very patchy record in value adding, resource processing and manufacturing industry. There are many reasons for this, including our trading partners' desire to capture the economic benefits associated with downstream processing - continuing protectionist policies in the EC and Japan are proof of this.

However, this is only a part of the equation. I firmly believe that many investment proposals fail to materialise in Australia - not because they are inherently bad - but because there are 'qualitative' factors working against them, and that many of these relate to what might be described as a 'lack of

connection'. I suspect that this is related to the fragmented nature of the Australian industry and population, a three tier system of government, and the 'she'll be right' attitude prevalent in Australia. The lack of major threats to Australian society has meant that systematic collaboration has not been a regular feature of way of life. While this is a very complex issue, I suspect that competitive instincts tend to outweigh collaborative instincts in Australia - our fanatical approach to sports, the competition between government agencies, and the tendency for most Australian companies to move within relatively small circles reflect this. By way of comparison, Australian visitors to Japan can readily observe their more consensual and collaborative approach to things.

My interest in clustering concepts was actually sparked because of their potential to address various aspects of market failure - many of which appear to derive from Australia's disposition towards competitive rather than collaborative behaviour. This was clearly apparent to me in the field of investment facilitation, which was an enduring part of my responsibilities with the Australian Government during the mid 1970s to mid 1990s. By synthesising all the aspects of investments that that went right and wrong during this period, and my current experience in assisting companies and government agencies to get projects off the ground, I believe that they can be classified to seven broad headings.

1. Insufficient information for the potential investor

- The lack of quantitative, firm data to support many investment proposals.
- The tendency for project proponents, particularly councils, to rely on 'good news' pamphlets and CD-ROMs.
- The lack of feel by institutional investors for projects outside their comfort zone and/or particular locality - due to distance factors, lack of experience or narrow mindsets.

2. Short-term focus by proponents

- The lack of appreciation by proponents that investments and research alliances can take considerable time to reach a meaningful stage - the problem is magnified in cross-cultural circumstances e.g. the generally longer-term perspectives of Asian cultures.
- Short-term perspectives are sometimes caused by the 'thinness of the dynamic' - for example in rural communities the horsepower behind a project can be lost if one of the project champions is promoted or transferred.

3. Weak feedback

- Insufficient reality checks are made by proponents - this is often due to competitive instincts, and the unwillingness to share ideas and information.
- Realistic feedback from government is difficult to obtain because officials - and particularly politicians (who essentially want to be liked) are reluctant to 'say it as it is' - this means that proponents may be operating under false assumptions.
- This is classic information failure.

4. Inadequate skills

- Academics often gravitate to become project proponents - but they can be perceived as lacking commercial judgement and street-smartness.
- The core people often lack experience in running agendas, harnessing support and pursuing collaboration (the 'thinness of the dynamic' again).
- Identifying and maintaining the interest of champions is made difficult by the competitive

behaviour of others.

5. Rivalry & low level of trust

- Australian companies tend to view everyone else in their field as a competitor.
- Rivalry among government departments seems to have become institutionalised - there is less informal liaison and networking between officials.
- The majority of industry associations tend to be immersed in short-term issues of direct relevance to their members' survival, and examples of inter-association collaboration are rare.⁹
- There is generally only spasmodic interaction between city-based investors and rural project proponents - government agencies are also thin on the ground in most regions. This perpetuates the low levels of trust and understanding.
- Government agencies are not playing the required 'honest broker' role because of expenditure cut-backs.

6. Inadequacy of supporting infrastructure

- The three tiers of government and the lack of long-term planning makes it very hard to coordinate hard and soft infrastructure - this leads to infrastructure gaps.
- Even once identified, there are significant time delays in filling infrastructure gaps, due to coordination problems and disputes as to who should pay.

7. Lack of connection between the players

- There are many players involved in making connections with the overseas investment and research communities. However they generally see themselves as direct competitors.
- The links to their overseas equivalents are generally strongest within the corporate sector, patchy within academia¹⁰, weak within the government sector, and virtually non-existent at the regional level.

In Australia, there are four broad categories. They are described below. The more successful of these agencies are those that can make consistent connection with other players and ensure there are no major breaks in the innovation and investment circuits - one might think of innovation as being on the same spectrum as investment, only at the early end.

In summary, efforts to build investment and research links into the global system are hampered by fragmentation of effort, an associated lack of connection, and lack of information, or the failure to properly utilise information because of competitive instincts, uncertainty, lack of forward momentum etc.

⁹ Australian Business Limited, by virtue of its substantial revenue from property investments, would seem to be an exception.

¹⁰ Monash University is an excellent example of an institution building alliances across regions in a national and global context. It has its main campus at Clayton (eastern suburbs of Melbourne) and satellite campuses at Berwick and Churchill (in Gippsland), Prato in Italy and in London.

Agencies involved with global investment and research communities

R&D collaboration agencies

- CSIRO - with each Division having a commercial development arm.
- Universities e.g. Anutech.
- Corporate groups e.g. Rio Tinto, Telstra, BHP, Ericsson.

Investment attraction agencies

- Invest Australia (federal) - headquarters in Canberra, but with State and overseas offices e.g. London, New York, Tokyo, Bonn etc.
- Investment agencies in each of the six States and two territories - the States have overseas offices too.
- There is reasonably close liaison between Invest Australia and the State-based agencies - however there is fierce competition at the State level.
- At the regional level, there are around 200 regional development bodies - principally four groupings:
 - 60-80 State-based Regional Development Boards,
 - around 10 Regional Economic Development Organisations (survivors of the former Commonwealth Regional Development Program),
 - 60 Area Consultative Committees - funded by the Commonwealth Department of Employment Workplace Relations and Small Business.
 - around 30 council-based development agencies in the cities and larger regional centres e.g. Dubbo, Tamworth, Ballarat, Albury-Wodonga.
 - 620 local government councils, each of which has an economic development unit or at least a manager responsible for investment attraction Note Total of 650 councils, less the 30 above).

Corporate Sector

- Companies of all sizes - the major banks, investment firms, superannuation boards, investment syndicates, telecommunications and energy utilities, SMEs etc.
- Land/commercial property developers e.g. Daikyo

Other agencies

- Australian Tourist Commission, and the State equivalents
- Quasi-government bilateral relations groups e.g. Australia-Japan Business Cooperation Council, Australia-Korea BCC
- Marketing Boards e.g. Horticulture Industry Development Board of SA, Meat & Livestock Corporation
- Immigration Department
- Migration agents
- Sister city groups - that promote cultural exchange and business dealings. e.g. Canberra-Versailles, Canberra-Beijing.

The 'Linking Clusters' proposal

The preceding section has explained the problems in some length. We believe that the linking of clusters can address some of the problems in commercialising R&D and attracting investment, because clustering techniques are designed to address many of these problems. Most of the problems are manifestations of market failure as described by Professor Michael Enright - lack of information, managerial myopia, under-provision of public goods, coordination failure.

There are three reasons why the linking of clusters has potential.

First, people and organisations involved in cluster agendas tend to have innate collaborative tendencies. By linking people who have these tendencies, information should flow more readily.

Secondly, the strong parochialism and competitive instincts at both the company and regional level in Australia retard collaboration. There is a theoretical basis for believing that clusters in different countries, because they are not in direct competition, may find common ground in building long-term foundations for international trade and investment. For example, the economic circumstances of Newcastle (UK) and its Australian namesake are very similar, and both cities have robust cluster agendas underway and well-credentialed people to drive them.

Similarly, the horticulture agendas underway in Brazil and central America have similarities with those in Australia - supply chain development to the major international markets, fruit quality, fruit preservation, post-harvest handling, uptake of improved irrigation techniques and pest control. Could joint problem-solving serve as the basis for international collaboration?

The third area of potential is the building of trust. Organisations will collaborate if some basic level of trust exists. As trust and confidence grows, the commercial relationship is deepened. This is critically important in the area of R&D collaboration, where intellectual property issues are uppermost in both parties' minds.

Collaborative tendencies are, in my view, a fascinating area for close study. Why do some people or nations seem to have stronger collaborative instincts than others? Can it be measured? What is the switchover point from competitor to collaborator? I would put it to you, the reader, that on meeting someone in a business context for the first time, one of your earliest thoughts is whether that person is a likely competitor or a likely collaborator, and how much information should you divulge. In the Australian vernacular, you ask a third party if he/she is 'legit' or a 'good bloke' - in other words, someone that might be trusted.

Our particular interest is in linking clusters as means of linking people with collaborative tendencies, and to then use these new relationships to drive innovation and investment. An example of the required mindset is provided below.

The second benefit of linking of clusters is the building of trust that can ensue. Organisations will collaborate if some basic level of trust exists. However experience indicates that as trust and confidence grows with successive 'good experiences', the collaboration is deepened. This is critically important in the area of R&D collaboration, where intellectual property issues are uppermost in both parties' minds.

A person with collaborative tendencies

'I joined a network once but I was disappointed that, as consultants fostering networking, they demonstrated little networking themselves. All a bit too desperate in their own businesses perhaps.

To make a network or cluster work, it needs people with confidence in themselves, a generous outlook to the effect that there is plenty of work available in the world, and a preparedness to take on and carry out action, with open reporting back.

(In terms of establishing clustering agendas)..... finding a market first, and designing/inviting the participants after that, will be the most effective. Australia's low population density combined with, in my observation, the extreme individualism will be the major challenges.

A longer term view, with all resources mustered positively, is needed to achieve the result. Even (or perhaps particularly) at the federal level of government, the time frame for results expected is too short. We need more vision. And not just vision, but goals specified and reported against, with details filling in the vision. The federal bureaucracy has wasted a heap of time and self-congratulatory 'big picture' talk. It has usually been a front for lazy thinking.'

Australian Government official (formerly a consultant)

What & Where

There are three main categories of industry clusters:

- natural clusters i.e. those that have evolved more or less naturally or by accident.
- clusters with structured program support (note that Silicon Valley, although now regarded as a natural cluster, still has program support).
- potential clusters i.e. where various parties are looking to introduce structured program support.

In the following table, we have identified, for the first time, the clusters in Australia and New Zealand. The clusters operating with program support are highlighted (in bold), followed by the natural and potential clusters which are grouped together (in italics). This is an indicative listing which will be progressively expanded by Clusters Asia Pacific.

Attachment 2 provides details on the majority of the clusters operating with program support. We invite organisations involved in clusters in other countries to consider how they might begin collaboration with our clusters.

Industry clusters in Australia & New Zealand

(indicative only)

New South Wales

Newcastle/Hunter Valley

- **Agribusiness**
- **Education & training**
- **Sustainable industries**
- **IT**
- **Building & construction**
- **Mining services**

Contact: Mr. Trevor Pennifold

trepen@idc-hunter.org.au

Bega

- **Agrifood**

Contact: Mr. Rob Owen ppr@acr.net.au

Bermagui

- **Fishing & related services**

Contact: Mr. Rob Owen ppr@acr.net.au

West Wyalong

- **Road transport**

Contact: Mr. Gary Kerr

blandsc@westserv.net.au

Sydney central

- *Film (Fox Studios)*
- *Manufacturing technology & IT/telecoms (Redfern - ATC)*

North Sydney/Ryde

- *IT & telecoms*

Western Sydney

- *Light manufacturing*

Scone

- *Horse breeding*

Wollongong

- *Steel*

Albury Wodonga

- *Environmental industries*
- *Agribusiness*

- *Manufacturing*

Wagga Wagga

- *Light manufacturing*
- *agrifood*

Armidale

- *Education*

Bega

- *Dairying*

Young

- *Stone fruit*

Mudgee

- *Wine*

Dubbo

- *Agribusiness*

Orange/Bathurst

- *Agribusiness*
- *Manufacturing eg. whitegoods*

Northern Rivers

- *Tourism*
- *Food*
- *Furniture*
- *Medicinal plants, nurseries*

Riverina/Deniliquin

- *Viticulture/horticulture*
- *Sustainability & water conservation*

Victoria

Ballarat

- **IT**
- **Education**

Contacts:

Prof. Julian Lowe julian.lowe@ballarat.edu.au

Paul Miller p.miller@ballarat.edu.au

Daylesford

- **Arts**
- **Holistic Health**
- **Plantation Eucalyptus**

Contact: Ms. Paquita Lamacraft

paquita_ann@hotmail.com

Parkville (Melbourne University)

- **Biotechnology**

Eastern Melbourne

- *Consultancy services.*

Warrnambool

- *Dairying*

Geelong

- *Wool textiles*

Yarra Valley

- *Wine/gourmet food*

Monash University/Clayton

- *Medical*
- *Education*

Goulburn Valley/Stbn NSW

- *Horticulture (esp. tomatoes, stone fruits)*
- *Transport*
- *Dairy*

Mildura/Sunraysia

- *Horticulture/wine*

Western Melbourne

- *Defence, engineering*

Latrobe Valley

- *Energy*

East Gippsland

- *timber*

Torquay

- *Surfwear*

Beechworth

- *Tourism*

Mornington Peninsular

- *Wine*

North East Victoria

- *Wine*

Queensland

Cairns

10 cluster agendas underway, including:

- **Cairns Infotech Enterprises**

Contact: Mr Darren Cleland

dcleland@credc.com

- **Cairns International Education Providers**

Contact: Ms. Tracey Scott-Rimington

tsr@credc.com

- **Ecofish TNQ - Seafood & Marine**

Contact: Mr Darren Cleland

dcleland@credc.com

- **Australian Tropical Foods**

Contact: Ms Julie Churchill

jchurchill@credc.com

- **Greenhouse Australia - Nursery**

Contact: Mr Angelo Finocchiaro

angelofin@credc.com

- **Super Yachts**

Contact: Mr John Dean

Brisbane region

- *Biotechnology*

- *IT (games, multimedia)*

New Farm (Brisbane)

- *Transport*

West Brisbane

- *Heavy engineering*

Ipswich

- *Horticulture & food processing*

- *Aerospace*

- *Building products*

Toowoomba

- *Agribusiness*

- *Education*

- *Agricultural machinery*

- *Organic food (grains, milk, beef)*

Labrador

- *Light marine*

Logan./SE Queensland

- *Construction equipment: wall panels, composites*

- *Packaged food*
- *Electronics (measuring equipment)*

Gold Coast

- *Tourism*
- *Health & medical services*

Sunshine Coast

- *Tourism*
- *Food & beverages (ginger, pineapples)*
- *Aged care*

Rockhampton

- *Education*
- *Beef*
- *Mineral processing (nickel, magnesium)*
- *Tourism: surf 'n turf*

Longreach

- *Tourism*

Townsville

- *Minerals processing*
- *Food processing*
- *Harvesting equipment*
- *Defence*

Mackay

- *Coal services*
- *Sugar*

Gladstone

- *Engineering products, services*
- *Mineral processing*
- *Chemicals, plastics*
- *Aquaculture/seafood*
- *Timber & boat-building*
- *Aged & health care*

South Australia

Adelaide

- **Defence**
- **Spatial information**
- **Water management**
- **International tourism**
- **Sport & recreation**
- **Environment**
- **Renewable Energy**

- **Arts**
- **Age Lifestyle**
- **Geoscientists/mining exploration**
- **Convention industry**
- **Geoscience/mining exploration**

Contact: Mr. Hugh Forde
hugh.forde@sabv2010.com.au

Barossa Valley

- **Wine/food**

Contact: Mr. Bill Brook
bld@dove.net.au

Upper Spencer Gulf

- **Remote Resources**

Contact: t.b.a.

Virginia

- **Horticulture**

Contacts: Mr. Rodin Genoff

regenoff@playford.sa.gov.au

Mr. Gerry Davies gdavies@virginiahc.com.au

Northern Adelaide

- **Electronics/Engineering**

Contact: Mr. Rodin Genoff

regenoff@playford.sa.gov.au

Riverland

- *Horticulture*

Port Lincoln

- *Seafood*

Mount Gambier

- *Forestry*

Victor Harbor

- *Aged care*

Western Australia

Albany

- **Agri-engineering**
- **Equine**
- **Food tourism**

Contact: Mr. Len van der Waag

len@albanyworking.org.au

North Perth/Yanchep area

- *City development*

Contact: Mr. Dusan Mills

wave@ideaproject.com.au

Jervoise Bay

- *marine engineering*

Port Hedland

- *minerals processing/energy*

Kalgoorlie

- *mining/minerals processing*

Margaret River

- *wine*

North Perth

- *medical/education*

Kununurra

- *horticulture*

Bunbury

- *minerals processing*
- *agrifood*

Tasmania

Launceston/Tamar River

- *food/tourism*

Hobart (Salamander)

- *historical tourism*

ACT

Canberra

- Environmental industries

Contact: Mr. Rod Brown apd@orac.net.au

Canberra

- *Research/Education*
- *IT*
- *Sport (AIS)*

Northern Territory

Darwin

- *Energy/heavy engineering*
- *Defence*

New Zealand - North Island

Auckland

- **Marine Export**

- **Film & TV**

- **Software**

- **Arts & Culture**

Hawke's Bay

- *Engineering Technologies*
- Forestry, Wood processing & furniture
- Wine
- Production control systems
- Retirement

Howenhenua

- Apparel
- Retirement

Palmerston North

- Defence

Taranaki

- Oil & Gas services
- Engineering

Tauranga

- Processed Foods

Wanganui

- Sports

Wellington

- Creative Capital (Multimedia)
- Earthquake Engineering Services
- Natural Hazards Services
- Software & Wireless Internet
- e business services
- Education

New Zealand - South Island

Dunedin

- Engineering Technologies
- Biotechnology
- Multimedia
- Forestry

Nelson

- Fishing
- Cultural Tourism
- Forestry
- Arts & Fine Crafts

Christchurch

- Electronics
- Floriculture
- Horticulture & Fresh Foods
- Engineering
- Software

Southland

- Floriculture
- Forestry

Footnote

*The clusters **in bold** have formalised mechanisms in place, or in train.*

The remainder have:

- *specific competitive advantages, and potential to benefit from formalised cluster agendas, or*
- *Cluster potential currently being researched.*

The list is indicative only. ANZAC members are progressively updating it to assist collaboration, including linkages to like clusters in other countries via TCI.

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January 2001

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How & When

The preceding section has indicated where the formalised cluster agendas are active in Australia and New Zealand. Each of the formalised clusters involves members of Clusters Asia Pacific Inc. We accordingly **welcome approaches from cluster participants in other countries** to contact us through the Executive Director, Clusters Asia Pacific Inc., at apd@orac.net.au or telephone/fax Australia 02 - 62317261. **This can commence immediately.**

It is proposed that Clusters Asia Pacific network will act as the initial coordination point for with the overseas groups. As part of the follow-up to the Glasgow conference, seven early birds have indicated their interest in early discussions. They are outlined below, together with some preliminary comment as to which clusters they might connect to in Australia and New Zealand.

1. Breault Research Organisation Inc., Arizona

Mr. Bob Breault of Breault Research Organisation Inc. in Tucson, Arizona indicated that cluster to cluster relationships are best, and that this has been shown in respect of Arizona, Scotland, Ottawa, Vancouver, Rochester NY, Florida and elsewhere.

He suggested that there is scope to link clusters between Arizona and Australia in respect of optics/photonics, software and environmental industries. He considered that the cluster agendas in Newcastle, Parkville, Ballarat, Cairns and Adelaide have potential for collaboration with those in Arizona. He also felt there may be synergies between the proposed Bermagui NSW fishing cluster with one in Vancouver.

Author's Comment

The Adelaide Defence cluster is an obvious candidate for initial contacts. The Australian Technology Park in Sydney also has a world-class photonics capability that would be of relevance. The University Technology of Sydney (Prof. Sheather) would have contacts.

Given that Arizona is hosting the next TCI conference (around October 2001), Clusters Asia Pacific members should begin liaison now with a view to face to face discussions in Arizona.

2. FIEMG, Brazil

Mr. Rodolfo Koepfel of the Federation of Industries in the Menas Gerais (FIEMG), which is a key state in the south east of Brazil, indicated subsequent to the conference that his organisation would be very interested in sharing information and ideas with clusters in Australia. He referred to previously harmonious dealings with Australian firms in the mining industry. FIEMG is also involved in a range of other clusters. (Refer to earlier summary of address by the President of FIEMG)

Author's Comment

There appears to be very interesting potential cooperation with the Agribusiness cluster in Cairns, Queensland. The Riverland region in South Australia, although without a formalised cluster agenda, would also have synergy.

3. One North East, Newcastle, UK

Mr. David Bowles indicated that ONE decided to measure their performance, and received a grant of 3 million pounds from the EU for a project that took 2 years. The project identified 9 processes, and 700 companies have been benchmarked. He believes that this data can be used to benchmark clusters. As indicated earlier, ONE has a dynamic cluster agenda underway.

Author's Comment

ONE is attractive to any companies within clusters at the performance measurement stage, or looking for a bridgehead into Europe. There seems to be excellent symmetry with its namesake in Australia.

Regions undergoing major structural change (e.g. Gippsland, Upper Spencer Gulf) should also be interested.

4. ANGLE Technology, UK

ANGLE Technology is a significant consultancy operation in the UK and US - their main products are cluster analysis and development strategies. ANGLE facilitated the development of Scottish Enterprise's Biotechnology Cluster Development Strategy from 1996-1999 and more recently has led the mapping of England's North West Biotech Cluster. They have worked on a number of other cluster projects in the UK and the EU in many technology sectors - from the computer games industry to IT. The company is very interested in working with Clusters Asia Pacific Inc.

Author's Comment

ANGLE Technology is of interest in terms of undertaking cluster analysis in a joint venture with Cluster Asia Pacific interests, or in identifying joint venturers for Australian or New Zealand companies in the UK or Europe.

5. Oxford Research, Denmark

Oxford Research, based in Denmark, has indicated interest in being involved in linking clusters between Asia Pacific region and elsewhere.

Author's Comment

This company has a similar background and possibilities as ANGLE Technology above, and thus of particular interest. We are awaiting further information.

6. Danish Ministry for Trade & Industry

The Ministry feels the linked clusters concept is very interesting, since it is always very keen on international knowledge-sharing. Consideration is currently being given to areas of potential. It is publishing a report on 29 Danish 'clusters of competence', the political consequences of which are to be discussed at a large conference in February. The report will be translated into English and forwarded to Clusters Asia Pacific.

Author's comment

Based on discussions with the Danish Government, there is strong interest in clustering within that country. Accordingly, we have forwarded an outline of the Asia Pacific clusters to enable their February conference to consider the scope for international collaboration based on linked clusters.

7. Foundation for SME Development, Durham, UK

The Foundation for Small and Medium Enterprise Development at the University of Durham has indicated interest in both linking clusters and educational opportunities. It has had 30 years of experience in training and capacity building for economic development and entrepreneurship in over 50 countries around the world. Previously this was the Small Business Centre at Durham University Business School (DUBS).

Staff of 25 staff covering a wide range of research and training expertise relevant to cluster development and a number of courses at the Certificate, Diploma and Masters level. Tailored programs and internships. The internship program has been running for four years with participants from a wide range of countries including UK, France, Jordan, China, India and Kenya.

The training programs are underpinned by extensive cutting edge research on cluster development. The Foundation for SME Development believes that appropriate support for entrepreneurial economic development should be based on a thorough understanding of the practices of businesses themselves. Therefore the teaching materials are built out of existing research.

Comment

- There would be alignment between this Foundation and the interests of the University of Technology, Sydney, Ballarat University, the University of Adelaide, and also the University of New England - all are members of Clusters Asia Pacific.

Concluding Remarks

The above examples highlight some of the possibilities. As referred to elsewhere, the purpose is to commence a process of engagement between otherwise unconnected groups. This generally takes time, although the parties should be looking for some short-term wins to build momentum.

The early interest is mostly from the UK, mainly because of the attendees at the Glasgow Conference where the concept was first raised. However, we are aware of interest in South America and Asia, and indeed there are possibilities in respect of Mauritius as well as some of the Pacific nations that are looking for improved means of sustained economic development.

Given the OECD's strong leadership to date in the area of clustering, we invite the OECD to join with Clusters Asia Pacific Inc. in further developing this initiative, including the dissemination and monitoring the results achieved.

ATTACHMENTS



Mission

To improve the competitiveness of localities and industries within Australia and New Zealand by enhancing cluster-based development initiatives.

Key Roles

1. Facilitate increased awareness and uptake of industry clustering techniques, as means of building economic capacity at the local level.(AWARENESS)
2. Provide a reference point for parties with a commitment to concepts associated with competitive advantage, sustainable development and collaborative pursuits. (REFERENCE POINT)
3. Facilitate[BSC1] training and accreditation of practitioners. (TRAINING)
4. Influence policymaking at all levels of industry and government about the importance of 1-3 above. (INFLUENCE)[BSC2]
5. Prepare submissions, provide consultancy expertise, and undertake lobbying on behalf of ANZAC members to secure funds for projects to build economic capacity at the local level. (FUNDING)

Key Activities

1. **monthly newsletter**
2. **preparation of articles for newspapers, business journals**
3. **conduct of Workshops by accredited practitioners**
4. **Speaking engagements at conferences**
5. **Development of submissions**
6. **Identification of appropriate program funding and sponsorship**
7. **Identification of individuals and organisations supportive of ANZAC objectives**
8. **Provision of consultancy services**
9. **Lobbying of key industry and government players [BSC3]**

i n n o v



Clusters Asia Pacific Inc.
examples of agendas underway

ATTACHMENT 1

ATTACHMENT 2

ATTACHMENT 3

ATTACHMENT 4

ATTACHMENT 5

Clusters Asia Pacific Inc. - examples of agendas underway

Adelaide, South Australia (The Business Vision 2010 Agenda)

Adelaide, the capital of South Australia, has a population of around 1 million. Their cluster agenda is the most developed in Australia. It began in the early nineties as an initiative of the Multifunction Polis (MFP) project, which was a joint venture between the governments of Australia and Japan, together with the private sector, to build a futuristic city where scientists from around the world could work together in quality surroundings.

The MFP two country concept faded in the mid 1990s because the vision was too grand for sceptical taxpayers, and general confusion about its purposes. However one of the best outcomes of the MFP process was the establishment of a cluster program in South Australia.

The program is managed by Business Vision 2010, which is supported by the South Australian Government - it is based on identifying and engaging stakeholders across industry and government, with co-chairs appointed to lead each cluster. Action Agendas are developed, with an emphasis on early outcomes to maintain interest. Some very significant results are being achieved. Program has been developed with the assistance of Collaborative Economics Inc. of Silicon Valley (Doug Henton and Kim Walesh).

- **Defence**

The defence industry cluster was formed in the early days of the program, and is a very good example of co-option to create critical mass. The commercial successes its members are starting to accrue are testimony to the value of collaboration. Once regarded as fragmented and lacking capacity, the defence capabilities of South Australian companies are now officially recognised by the Department of Defence. This is reflected in contracts placed with South Australian companies to a value in excess of \$80 million, and in negotiations underway with American and other firms on further leading edge technological opportunities.

This cluster has co-opted rivals in Eastern States as members of the Defence Teaming Centre - this highlights the value that can be added to South Australia's global competitiveness through the collaborative process.

- **Water**

The water industry cluster is also one of the original cluster agendas. Its formation was associated with government outsourcing initiatives, that have freed-up management to form alliances and to access specialised competencies to compete for major overseas turnkey contracts.

Commercially-based alliances among cluster members are energising the local industry. Some 150 companies now actively identify with the cluster and are participating in enterprise improvement programs to make them export ready. Programs are being designed with the University of South Australia to educate managers in collaborative best practice, with a view to working with SA's universities and research organisations to commercialise emerging technologies.

- **Spatial**

South Australia is already an acknowledged leader in this industry.

The spatial cluster is an example of a new emerging industry that is profiling itself around existing and new spatial information technologies and the integration of learning by a number of professions cooperating with each other for the first time. Integration of learning and effort is enabling local

companies to respond vigorously to previously unforeseen applications of spatial knowledge databases - many of which have laid passively in the filing systems of government departments, local councils, libraries and museums.

Critical mass through co-option of firms as members of the Spatial Alliance is giving the private sector a greater say in the industry's development. This is manifested in the clearer delineation of relationships and alliance formation between the private sector, government and Fujitsu, itself a world leader in the spatial industry.

A world first Biennial International Spatial Conference was held in Adelaide in April 2000. All parties to the Spatial Cluster, government, Fujitsu and the private sector were involved in its successful outcomes, which included high level negotiations with overseas customers.

• **Sport and Recreation**

The Sport and Recreation Cluster reflects another type of new global industry, developing to meet demands associated with changing lifestyles. New knowledge-based specialist capability is being developed in areas such as sports medicine, sports health, sports coaching, sports media.

Much of the innovation is coming from sole operators. South Australia is uniquely placed to take advantage of the concentration of these sole operators, many of whom have worldwide reputations. The cluster process is seen as a relatively non-threatening vehicle to encourage cooperation among them, as a means of developing lucrative product and service packages for worldwide customers.

A complementary demand is growing to design, build and manage overseas sports facilities; to develop and manage major events, and to provide facilities for sports training camps in South Australia.

The three main characteristics of this cluster are:

- co-specialisation of innovators;
- co-option of leading firms of professional engineers, architects, designers, product and service providers; and
- integrated learning that adds power and credibility to tender submissions and major negotiations.

• **International Tourism**

The International Tourism cluster is an excellent example of the value of integrated learning. Hitherto driven by the South Australian Tourism Commission, there has been a surprising paucity of major firms competing in the international market. While the cluster process is not yet complete, it has already improved the integration of learning between the industry and the Commission in respect of a consistent approach to branding, development of target markets and new products for these markets.

The eventual outcome will be the development of uniquely products to appeal to the second wave of international tourists who are seeking lifestyle experiences as opposed to photographing tourist icons. Another outcome will be the attraction of more firms to compete internationally to meet growing demand. Evidence of this demand is the increase in tourist numbers to South Australia last year relative to other states.

Mawson Lakes Technology Park

This Technology Park, in the northern suburbs of Adelaide, is a cosmopolitan and innovative community - it is developing to accommodate 10,000 residents, 6,000 workers and 5,000 students in a 600 hectare site.

It incorporates a new urban precinct and Lakeside Town Centre, Technology Park Mawson Lakes, University of South Australia campus, research institutes, schools and recreation facilities.

Some 2,500 workers are already located at the Technology Park. The attraction of international investors to the Park is one of the key aims. The majority of the cluster groups have strong linkages to the Technology Park.

• Environment

The Commercial Environment cluster is only recently formed, but it has been progressing very well. Action teams involving a cross-section of the industry are working with enthusiasm to establish key initiatives that will establish it at the forefront of this industry.

The key initiatives presented at its second meeting (December 2000) were the establishment of:

- An incorporated association to lead industry development and collaboration in SA.
- An environment training institute.
- An annual event to bring together investors and inventors in the environment industry.
- An industry policy advisory body to Government, and
- A number of collaborative projects including the feasibility of an integrated resource recovery demonstration industry hub.

• Renewable Energy

Data is currently being gathered on the scope and strength of this industry, to determine whether it has the critical mass to justify a cluster in its own right, or whether it would best be served as part of the Environment Industry cluster.

Expected outcomes from this cluster are:

- New commercial opportunities through teaming and joint marketing.
- Technology partnering agreements.
- Collaborative forums to address industry initiatives.
- Enhanced linkages between industry and education and R&D sectors
- New infrastructure and additional skilled staff in targeted disciplines to meet industry needs.
- A demand framework for government support.
- A new generation of industry leaders, and reduced reliance on government.

• Arts

The objectives of the Arts Industry cluster are to:

- Add value to the arts by extending collaboration with the business sector.
- Grow the arts sector through an action focus, leadership, collaboration, strategic thinking and a partnership with industry.
- Form a leadership group of business and arts industry players operating from a virtual organisational base, with operational/administrative support to drive collaboration.
- Energise the arts industry by following the lead of the health, education and wine industries by adding value through new technologies.

- **Healthy Ageing**

A key and growing area of global demand is emerging as the world's population ages, and governments and individuals seek a wide range of products and services that minimise dependence and maximise effective resource usage.

There is significant economic potential in tapping markets represented by older people who are in good health and who have purchasing power. For example, some 50,000 Australians retired in 1998 taking home more than \$5.5 billion in super and lump sum payments. The over 50's market, which represents 25% of the population, controls over 75% of Australia's assets, and accounts for 50% of consumer spending.

South Australia is well placed to understand the needs of this huge target market. It has developed a number of leading edge pilot studies leading to innovation in aged care, acute health care and in the coordination of care. As a consequence opportunities have arisen for local industry in building design, construction, facilities management, equipment and systems of care and lifestyle packages, as well as in pharmaceuticals, therapeutic goods, bio-medical engineering, injury rehabilitation, training and health related software.

The objectives of this cluster are:

- To profile an industry sector that is at the cutting edge of innovation and R&D in order to identify industry needs, evaluate its growth prospects and create a collaborative competitive advantage for South Australia.

- To identify and focus on initiatives that will attract investors, create wealth and jobs and add value to the lifestyle of older South Australians.

- To establish a collaborative approach between AGAL Management, Products and Services (AMPS) sector, government, tertiary institutions, R&D agencies etc.

- To develop a development model for this emerging industry that is transferable to other states and internationally.

- **Geoscience/mining exploration**

South Australia has a strong record of innovation in mineral exploration, and there is a community of some 50 highly skilled and cost-effective independent geoscientists. The problem is that as individual operators they are restricted to those market areas where work is won on the basis of personal contact or reputation. Without critical mass and an ability to deliver a spectrum of service, the group will have little or no access to the emerging global 'Experience Economy'.

Working with the South Australian Business Vision 2010 Industry Cluster Project Manager, Hugh Forde, over a two months period, the Group formed its own Association with some 40 Founding Members and launched an Incorporated Association known as Global Geoscientists Services with its own Board and operational executive.

The aim is to access new export market opportunities through teaming and joint marketing. The Group is actively seeking ways of 'spreading their wings' and demonstrating South Australian expertise anywhere in the world. The Government Export Services Export Unit (GSEU) is identifying global marketing opportunities and assisting in tender completion. This cluster is an excellent example of a threat being turned into a market opportunity.

- **Convention industry**

The conferencing industry in Australia is a giant quiet achiever. In 1997 it generated \$7 billion of expenditure. The opportunity for the industry in South Australia arises from the major infrastructure upgrading at the Exhibition Centre and Adelaide airport.

This cluster has the following aims:

- To increase the capability to manage the growing demand generated by the investment in infrastructure.
- To identify and integrate supporting services within the cluster e.g. transport, tourist attractions and catering.
- To position the industry within the community of South Australia, and to improve awareness of its part in creating a welcoming environment
- To develop a comprehensive tertiary education program to support the professional development of the industry.
- To develop strong links across other cluster initiatives, particularly International Tourism and Sport and Recreation.

City of Playford (Northern Adelaide)

The City of Playford has developed a whole of government approach to cluster development in northern and western Adelaide. This region comprises 70 per cent of South Australia's manufacturing output, and is home to some of Australia's leading knowledge-intensive manufacturing and service industries.

Playford has developed a bottom up strategy in partnership with Salisbury Council, the Electronics Industry Association, Department of Industry and Trade, BV2010, Food for the Future and the Adelaide Area Consultative Committee. It is currently undertaking around 200 in-depth company interviews to assess manufacturing performance in following industries:

- Electronics and defence
- Plastics
- Metals and engineering
- Food Processing

This strategic industry intelligence not only underpins one of the most comprehensive industry audits undertaken in the region, but the analysis of supply chain structures and relationships have directly informed the cluster process.

Over the past year cluster initiatives have been activated in the electronics and food processing sectors (see Virginia and Barossa agendas below) resulting in new export development and investment opportunities.

The success of Playford's approach is based on building the capabilities of inter-regional supply chains. It has galvanised political support at a whole of government level to avoid costly duplication between government agencies. This has also enabled it to tackle issues of inter-regional infrastructure issues at a local government level.

Commonwealth resources from the Department of Transport and Regional Services have been deployed to create cluster strategies well beyond Playford's boundaries, such as in the Barossa. Resources from this project are assisting this region to activate its food gourmet cluster.

The "Playford Model" is attracting considerable interest in South Australia and Commonwealth officials in Canberra.

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Virginia, South Australia

• Horticulture

Virginia is a horticultural community within the Playford City Council area - about 30 km north-west of Adelaide. Some 1200 growers produce 50% of the State's output of horticultural crops, mainly tomatoes, capsicums, potatoes, lettuce. There is a strong ethnic influence (Italians, Greeks, Vietnamese etc.).

A strong network has developed with the assistance of the Virginia Horticulture Centre (VHC) established in the mid 1990s with funding from federal, state and local government agencies. It is a best practice facility designed to coordinate R&D, technology transfer, education and training, export and marketing. The VHC is currently examining the upgrading from a network to a cluster program, where collaboration with European and Asian food clusters has strong prospects.

The scoping analysis for the identification of Action Agendas has recently been completed and the report is available to interested parties in Australia and overseas. The AAs include:

- The establishment of an Exporters Network.
- The employment of a top-line export facilitator, especially to assist the smaller companies grappling with the complexities of export business.
- A study to determine the practicality of establishing a Virginia brand.
- Development of a Water Efficiency Network, to introducing improved water technology and equipment into the industry.
- Development of a 'biosecurity' agenda, to address major environmental issues.
- The investigation of a service centre at Virginia, as a means of co-locating refrigerated storage, materials handling equipment and transport infrastructure.

Barossa Valley, South Australia

• Gourmet Food

The Barossa Valley is Australia's best known wine region. It is situated about 90km north of Adelaide in a beautiful setting. It has strong German traditions. It is widely referred to as home to Australia's most dynamic and long-standing clusters, where growers and wineries have collaborated and competed over the last one hundred years to put the region on the wine map.

The local development agency, Barossa Light Development Incorporated, is currently facilitating a network of gourmet food producers who are looking to capture economic benefits associated with the wine and tourism industries. A scoping study was completed in 2000, with a view to the Action Agendas serving as the base for a formalised cluster agenda. There is strong potential to link with gourmet food clusters anywhere in the world. The issues being canvassed include:

- Wine-Cheese Complementarity - initiatives to grow the cheese industry.
- Export Facilitator - the joint deployment (with Virginia) of an export facilitator.
- A 'Barossa Brand' - feasibility study re modus operandi.
- Community Kitchen - feasibility study.
- 'Barossa' snapshot document - preparation thereof.
- Water Infrastructure - to address some major environmental issues
- Barossa Food Basket - as part of a regional branding initiative.

This cluster has been supported by Playford City Council because of the inter-regional development opportunities.

Upper Spencer Gulf Region, South Australia

People from businesses, institutions and government from across northern South Australia are responding to a call to collaborative action to address persistent economic decline affecting the whole Upper Spencer Gulf Region. Overall employment and population have been falling. People, including the young and qualified, have left to live elsewhere. Yet the region has one of Australia's largest concentrations of metal trades and maintenance skills for the mining and processing sector, including structural fabrication, labour hire and re-manufacturing of metal spares. There is a formidable problem-solving capability in fitting, turning and boiler-making skill adapted to addressing the wear and tear associated with heavy resource processing.

The Vision is to bring together a regional cluster of businesses, institutions and government agencies to create a sustainable, competitive advantage as an exceptional supplier to the resource development and processing sector across Australia, with the eventual intention of servicing international markets.

A regional response is necessary to restore its capacity to grow. Utilising clustering concepts, over 50 stakeholders met at the University campus and identified 5 initiatives for action:

- Workforce skill development
- Market Intelligence
- Building local confidence and trust
- Global alliances
- Enterprise improvement to become global suppliers.

The process of renewal will begin from this platform and be continuous now that linkages have been formed across all sections of the community, which embraces three rural cities, Whyalla, Port Pirie and Port Augusta situated in what is known as 'The Iron Triangle'.

Newcastle/Hunter Valley, NSW

Newcastle (population of about 500,000) is about two hours drive north of Sydney. Newcastle is at the mouth of the Hunter River, and is one of the most desirable locations in Australia in terms of climate, geography and economic/social infrastructure. The closure of a major steelworks in 1999 and the restructuring in the coal industry through the late 1990s, although creating some structural dislocation, makes Newcastle and the Hunter a very attractive region to investors over the long-term.

New businesses and employment have grown out of the efforts to broaden the economic diversity of the region. Full time employment numbers have increased by in excess of 15,000 over the past two years.

A detailed action Plan agenda exists for each of the Industry Cluster areas. The following provides an overview of their scope and focus.

• Information Technology

The Information Technology cluster represents a diverse range of information-based industries that service and support all industry sectors. The IT cluster in the Hunter comprises of over 200 companies.

The Hunter Technology Consortium (HunterTech) has been formed by the leaders of 60 IT organisations. HunterTech members work together to provide economies of scale and scope to service the needs of the industry in the region and beyond.

The Hunter IT cluster has available to it a highly educated and skilled workforce. The IT faculties of the University of Newcastle and the Hunter Institute of Technology represents a core commitment to IT research and training.

- **Education & training**

The Hunter is home to a world class University and TAFE Institute and a wide range of accredited private providers of education, training and skill development.

Hunter EdNet was incorporated in 1999 and includes 13 of the region's leading players. The objectives of EdNet are to provide high quality education, training, research and consultancy services to Hunter businesses and to develop new and collaborative business opportunities in national and international markets, particularly into the Asia-pacific region.

The principal advantage of the cluster is the integration of training and educational products and services across school, vocational providers and the University.

- **Sustainable industries**

The environmental goods and services cluster "Sustainable Industries Inc" comprises 38 organisations and businesses that offer goods, services or practices that contribute to sustainability.

Sustainable industries focus is on three key areas;

- renewable energy and energy management
- products and processes contributing the economical sustainable development
- air, water and land quality management

The increasing emphasis on sustainable development has led to a number of initiatives such as:

- a 600kw wind energy pilot program
- Hunter region councils (13) adopting a coordinated policy for reducing landfill by year 2010.
- The establishment of an eco industrial park called "Steel River", on a site previously operated by a steelworks.
- The pending relocation of the Australian CSIRO Energy Technology facility to the Steel River site.
- The establishment by The Newcastle City Council of the Australian Energy Improvement Centre (AMEIF), recognised nationally and internationally.
- The establishment of the Centre for Sustainable Technologies at the University of Newcastle.

- **Building & Construction**

Industry stakeholders belong to a newly formed cluster group called "Global Build". It includes the Housing Industry Association (HIA - 1100 members), the Newcastle Master Builders Association (MBA - 1200 members), Hunter Export Centre, Austrade, University of Newcastle and the Industry Development Centre.

The focus of the cluster is primarily on developing new market opportunities for building and construction systems, design and training in export destinations in the Asia -Pacific region.

- **Mining services**

Australia is the world's largest coal exporter and the Port of Newcastle is the largest coal export port in the world, shipping over 78 million tonnes during the year 2000.

The Hunter Mining Network comprises companies offering mining services to local and international mining operators. Members are able to provide a range of product and services including process design and control (e.g. computer designed modelling and analysis), operating equipment (custom designed under ground equipment), maintenance services, training, safety and environmental management. The current focus is on providing specialist and niche services to other Australian markets, South America and SE Asia.

Cairns, Queensland

Cairns is a city of some 115,000 in Far North Queensland. It is a world-famous tourist destination (adjacent to the Great Barrier Reef, Daintree Forest etc.) and an important commercial and trading centre. There are 10 cluster agendas underway. The six most developed are described below.

- **Cairns Infotech Enterprises (CITE)**

Cairns Infotech Enterprises (CITE) was formed in 1998 to address identified opportunities, obstacles and issues that need to be addressed to assist the IT & T industry in Far North Queensland to strengthen and expand its activities both within and outside the region.

Membership of CITE includes a broad range of industry representation including software developers, hardware engineers, multimedia application developers, IT retailers and wholesalers, telecommunications providers, educational institutions and government.

CITE is working towards:

- Developing & promoting positive working relationships among individuals within the industry.
- Establishing the Cluster as the first point of reference in FNQ for IT & T business development opportunities and issues.
- Establishing a credible & professional profile for the Cluster in the region and with major client stakeholders.
- Establishing a reputation that the FNQ region is an innovative leader in the development of practical applications of information and telecommunications technology by growing essential communication and IT segments to meet the needs of regional industry.
- Developing export capabilities for IT businesses in the region.
- Promoting growth of the regional multimedia industry.
- Undertaking effective R & D that underpins the IT industry.
- Improving access to venture capital for industry growth.
- Supporting initiatives to establish a technology precinct in the Cairns region.
- Working to establish IT Business support in the Cairns region.➤
- Developing and promoting e-commerce.

CITE is implementing a \$2 million project to provide local call access to the internet in remote Far North Queensland communities. The need has been identified to provide a telecommunications infrastructure allowing affordable Internet access to those located in remote communities of Far North Queensland. These facilities will offer various other services including training, access to PCs and basic multimedia equipment, and other standard office-type functionality to a number of communities covering an extensive physical area with a relatively small town based population of 11 566 persons.

The project is particularly seeking to provide low cost Internet access to rural communities that currently do not have local call access via an Internet Service Provider (ISP) with a local Point of Presence (POP). This particular project covers 11 rural communities of which nine are not currently being serviced by an affordable ISP.

The project has five components aimed at providing infrastructure that will develop and promote internet access, awareness and use within remote Far North Queensland.

1. Establishment of Local POPs.
2. Training and Internet awareness.
3. Installation of local Public Internet Access Points (PIAPs)
4. Local Information
5. Marketing and Management.

CITE has recently collaborated with members on the development of a prototype multilingual online Touchscreen Information Kiosk. This project was made possible thanks to financial assistance from the Queensland Government under the Multimedia Applications Development Fund. Commercial production is underway.

CITE and Apple Computing Australia have signed a Memorandum of Understanding to develop & promote a positive working relationship to foster cooperation. Apple will carry out activities to increase the level of IT & T product development through research and cooperation with CITE. The parties intend to co-operate to facilitate the identification of specific projects or partnerships between Apple and CITE member companies that could lead to IT&T research and development cooperation.

- **Cairns International Education Providers (CIEP)**

CIEP Inc was formed as an incorporated association in November 1999. The incorporation formalised the cluster of education providers in the region who, with the assistance of the CREDC, had come together since 1998 to address common issues in relation to the development of the emerging International Education industry of the region. The potential for growth in the industry sector had been identified in the region's Economic Development Planning Processes. It had been identified that the region held a competitive advantage in the development of the industry for a number of reasons including it's natural beauty, lifestyle considerations and existing reputation to the international visitor.

During 2000, CIEP commissioned a research study in to the economic value of their industry, its linkages and synergies with other industries in the region, and its growth potential. This base information was then used in the development of their Strategic Plan for 2000 - 2004. The collective aim of the cluster for 2001 is to employ a full-time Market Development Manager to promote the region as a study destination in the international marketplace.

This industry offers diversification to the regional economic base and builds on some of the regions existing strengths.

- **Ecofish TNQ (Seafood & Marine Cluster)**

The commercial fishing industry is the region's third largest industry, and Cairns boasts the largest fishing fleet in Australia. It employs 1600 people and injects approximately \$150 million each year into the local economy. The local industry is a major contributor to Australia's \$1.49 billion seafood exports.

Ecofish is a non-profit organisation representing the seafood and marine industry in Far North Queensland. The industry cluster was established in 1999 to ensure the industry's long term survival and to maximise the economic benefits to the region. The members are a mix of fishers, fish processors, wholesalers and retailers, chandleries, slipways, engineers, paint and fuel distributors, and other support services such as legal and financial.

In most cases, clusters are formed to achieve economies of scale, acquire new technologies and enter new markets through greater industry collaboration. However, the principal motivational factor in the initial stages was the threat of Government regulation to the ongoing viability of northern fisheries. As a result, much of the initial stages of the cluster focussed on survival rather than the conventional developmental issues. The commercial fishing industry is constantly under threat from environmentalists, government and the recreational fishing sector. Over recent times the industry has faced restructuring in the Gulf of Carpentaria Inshore Gill Net Fishery, Northern Prawn Fishery and East Coast Trawl Fishery.

In relation to the East Coast Trawl Fishery, analysis undertaken for Ecofish in association with the Queensland Government Statistician's Office has shown the East Coast Trawl Fishery as it relates to Cairns and FNQ contributes approximately \$50 million annually to the regional economy and employs some 550 people. We have calculated that the restructure involving the initial capping of the fishery to 1996 levels coupled with a further 25% reduction over the next five years may result in the loss of nearly 200 jobs and \$17 million annually to the regional economy.

Given the public demand for environmental accountability, there are few in the fishing industry not voluntarily pursuing new practices. Rather than rely on legislators to dictate the future of environmental management, those who remain in the industry intend to take a proactive approach and are working to establish sustainable Environmental Management Systems (EMS) for our fisheries. Our local fishing industry is in a leading position to shape the environmental management of fisheries for the next century. We are grasping this chance now and are working to establish EMSs to a level that have only been developed in a few fisheries across the globe.

For most fisheries, particularly those like ours that export, environmental certification is likely to become essential. Ecofish TNQ has identified a number of actions to ensure the long-term survival of the industry by promoting the importance of the industry and improving its lobbying capabilities.

Ecofish is the future of fishing and is committed to:

- Securing long-term participation in Far North Queensland Fisheries.
- Raising the awareness and understanding of the importance of the industry.
- Ensuring the industry actively pursues world's best ecologically sustainable fishing practices.
- Working with educational bodies to improve industry training opportunities and standards and to develop attractive career opportunities.
- Establishing Ecofish as the informed spokesperson on industry matters in the FNQ region.

To this end Ecofish has focused on three strategic areas:

- Industry lobbying on regulatory issues resulting in significant restructuring of the industry.
- Public relations and marketing to improve the industry's image resulting in greater public support for the industry. These activities have been as diverse as developing a local seafood festival, undertaking school group industry visits and general advertising.
- Implementation of improved environmental management and accreditation for our fisheries.

- **Australian Tropical Foods**

The Australian Tropical Foods cluster represents all sectors of the food industry. It comprises some 40 small food businesses including producers, suppliers, processors/wholesalers, manufacturers, chefs and retailers.

The aim of the cluster is to develop a sustainable tropical regional food and beverage industry that will focus on industry needs in positioning Tropical North Queensland as a premier food and food/tourism destination, and will deliver significant and economic benefits to the Far North region.

One of its tasks is to raise domestic and international awareness of Australian Tropical Foods as a brand name - to identify all TNQ food industries with a common slogan and logo differentiated only by business name. The registration of the Australian Tropical Foods business name for use by local businesses attempts to provide the region with this opportunity to grow collectively into a recognised food destination synonymous with Margaret River in Western Australia and King Island in Tasmania.

The food cluster has been involved in the following activities:

- Represented at Tasting Australia Adelaide
- Regional Food Awareness industry luncheon and product promotions
- Sponsoring celebrity chefs visiting the region
- Salon Culinair industry cooking competition
- Queensland Signature Dish regional food competition
- Compilation of an exotic tropical fruit and vegetable calendar of the region
- Promotion of tropical foods at the Sydney Olympics for international business representatives

Australian Tropical Foods members are represented at regional food events including:

- Port Douglas Wine & Food Festival
- Hook Wine & Sinker
- Cairns Show
- **Greenhouse Australia Nursery Cluster**

Far North Queensland looks set to develop as an international epicentre for excellence in tropical horticulture over the next few years.

Cairns Region Economic Development Corporation successfully applied for Regional Assistance Program funding to conduct a study to develop a Capability Profile for the Garden and Nursery industry. The profile was completed in September 2000 and the Garden and Nursery Cluster was formally established then.

The cluster has been extremely active on a number of fronts:

- Models are being explored to develop a process for industry members to export with 'minimum hassle' through one central marketer, and to also grow to contract. A comprehensive web site is being developed which will list the products and production capabilities for participating businesses. These processes should allow all interested nurseries an opportunity to consider participating in export, no matter how large or small their production capability. Collective exporting also has the advantage of reducing some of the costs and assisting participants through shared knowledge of the export process.
- The region has been branded 'Greenhouse of Australia' to highlight the major competitive advantages of the region - the climate, faster growing times and the ability to supply southern and international markets with out of season products. Plans are underway to develop collective marketing strategies for the local and international markets using the brand name. The larger initiatives planned for 2001 include organising a stand for the region at the National Horticulture Show in Brisbane and organising a trade show to occur in conjunction with the QNIA conference at the Novotel Palm Cove Resort in November 2001.
- There is a wealth of tropical horticultural expertise in the region to underpin efforts to establish this region as the international epicentre for excellence in tropical horticulture. Through links with other tropical regions around the world, we can benefit from marketing our expertise and product, as well as potentially marketing skill development programs in tropical horticulture. Big plans with big possibilities!
- The Garden and Nursery Cluster is widening its focus to include landscapers, designers, architects and contractors to improve communication between the various groups and improve tender forecasting. This will allow nurseries to grow according to anticipated landscaping tenders for the next 12-24 months. This initiative also aims to promote gardens as an essential part of any building or road design, rather than being the after-thought in the process.

- The cluster is also working to identify and remove constraints to industry growth. For example, there are many environmental regulatory constraints on exporters and production nurseries. Meetings are being arranged for affected members of the cluster to meet with relevant staff from these departments and partner with them to explore ways to overcome these difficulties.

- **Super Yachts**

About 30 local operators have formed a group to promote Cairns as an ideal port for the world's luxury super yachts. The cluster has members from industries that cater to the needs of such vessels, including ship refitters, agents, spare parts distributors, paint suppliers and shipbrokers.

The cluster recently attended the Fort Lauderdale boat show in Florida and is lobbying the Federal Government to relax shipping laws that restrict the itinerary of luxury vessels.

A recent refit of the super yacht Princesa Valentina utilised the services of 220 local tradesmen at a total cost of \$5 million.

Ballarat, Victoria

The City of Ballarat is one of the largest inland cities in Australia, with a population of 79,600. A radiating system of highway and rail links provides easy transport to Victoria's regional centres. Ballarat is in a key strategic position at the centre of some of Victoria's most important freight, tourist and commuter transport routes. Key industries are retailing, manufacturing, and health & community services.

Ballarat is located close to important farming areas in western Victoria, which is ideal for processing farm products. Key manufactured items include food and beverages, mineral products, fabricated metal products, and machinery and equipment. Ballarat has a diversified business structure - there are a significant number of large manufacturing enterprises in Ballarat, including 17 firms that employ more than 100 people.

Clustering is recognised as having great potential for the region, especially in

- manufacturing,
- food and beverages, and
- information technology

The School of Business at the University of Ballarat is involved in "regional connectivity" and is examining the creation of virtual clusters of rural towns using information and communication technologies. The School of Business has undertaken a cluster study of the food sector and is currently engaged in cluster projects in the forestry, arts, wine tourism, and information industries.

Daylesford, Victoria

Daylesford is 90 minutes from the Melbourne CBD, nestled in mountain ranges. It is in the midst of the Victorian Goldfields, where the 1850s gold rush led to major expansion and internationalisation of the Victorian economy.

- **Arts**

The Victorian Goldfields have long been a chosen habitat for creative people across a wide range of the arts. The Goldfields Business of Art Cluster is in early stages of development. There are activities centred around Daylesford, Maryborough, Castlemaine, and of course Ballarat and Bendigo. However until recently these have not been linked to develop their synergies and collaborative opportunities.

There are two main initiatives being planned:

- the development of a campus with no new walls program, bringing top people in a wide range of arts fields into the region, and promoting top achievers in the same way, to give Master Classes throughout the Goldfields in 2001/2. This would use currently under utilised facilities throughout the region, like character-filled town halls no longer in active use, community halls, natural amphitheatres and open space settings, plus existing well developed performing arts centres, galleries, studios and workshops.
- Regional Arts Links Conference in November 2001 in Bendigo: Regions that are working with developing their arts sector to share networks, techniques and resources

Other activities include:

- Development of Artist in Residence program - several venues with studio and accommodation have already been identified.

- Communications issues: development of pinboards in local cafes with "What's on" posters, linking of web sites across the Goldfields

- Artist roster at the Visitor Information centres
- Business of Art fortnight, with skills development available - every 3 months
- Application and document presentation tools - workshops on funding and submission writing
- Integration of arts into all civil works and events - a developing initiative.
- Marketing workshops
- Branding
- Artists trail - and how to keep privacy for those who prefer this.
- Arts and holistic health - relationships and structures to be mapped and developed.

- Projects in the area will use the arts for their communication - e.g. interpretative trails will use the local arts community.

• **World Centre for Plantation Eucalyptus Technologies**

There is a potentially strong cluster of forestry activities at Creswick, some 15 km from Daylesford. The University of Melbourne School of Forestry has operated there for a century, and the Victorian Timber Industry Training Centre and the National Landcare Nursery are now co-located there. The latter provides seed stock and harvest techniques, interpretive trails and education resources, documents and activities.

These three centres are currently in discussion with ancillary supply chain and support industries to develop a World Centre for Plantation Eucalyptus Technologies. This initiative, conceived by a resident of Hepburn Springs (near Daylesford), will include the new private plantations networks across the western half of Victoria, the robust boutique native hardwood artisan activities, as well as activities in Tasmania and the Gippsland in the east of Victoria. Linkages will include also permaculture.

The cluster is currently developing a strategic plan to coordinate the various activities. This will be completed by the end of April 2001.

• **Holistic Health**

Hepburn Springs (3 km from Daylesford) is the centre of the largest collection of mineral springs in Australia - over 65 springs each with different mineral qualities. Most of the springs are effervescent and the waters have long been associated with healing properties. For over 100 years people have come to the region to bathe in and drink the waters.

Building on this heritage, a wide range of practitioners in alternative therapies has been drawn to the region. There are also farmers growing organic herbs and related products. Lavender fields abound among Swiss-Italian farm heritage buildings and ultra-modern spa facilities. The region is also home to spiritual retreats, day spas, holistic health teaching venues, manufacturers of healing and therapeutic products - the cluster program is designed to strengthen collaborative activity in the region and to link with similar clusters overseas. Marketing strategies are being refined to maximise commercial opportunities with the holistic health centres of New Zealand, Europe and North America.

Arts and healing have strong synergies and initiatives are being developed in respect of artist in residence programs associated with these linkages. A Holistic Health Cluster Development Strategy will be completed to Stage 1 by the end of April 2001.

Canberra, Australian Capital Territory

Canberra is Australia's capital city - population of 400,000 and three hours drive from Sydney. It is a planned city, laid out by US architect Walter Burley Griffin and inaugurated in 1927. It boasts Australia's highest GDP/head and is home to booming IT-related industries.

• Environmental industries

In 1998, the ACT and Commonwealth governments funded a scoping study - 'Turning Green to Gold' - to establish an environmental cluster. The study was accepted by the ACT Environment Taskforce as the basis for a cluster agenda, and various initiatives are now being pursued by the Taskforce. They include:

- Joint Venture Club - establishment of a vehicle for consortia development.
- Partnering - encouragement of increased partnering between local environment companies and prime contractors in the defence market
- Environmental Showcase - using public buildings to showcase environmental goods and services.
- Sustainable City Declaration - as a means of stimulating distinctive industry development and an environment culture.
- R&D Teaming Centre - a centre for collaboration on environmental research and commercialisation to world's best practice standards.
- Export consortia - the development of consortia to bid for off-shore environmental contracts associated with World Bank, AusAid etc. projects, as well as the environmental aspects of private sector construction projects.
- Centre for Regional Environmental Excellence - a major 'rally point' for the region's environment industry.

i n n o v



The Schizophrenic Corporation:

Corporate Governance in a Clustered World

- 1. Introduction**
- 2. Corporate Governance and Shareholder Concerns**
- 3. The Case for Stakeholder Governance**
- 4. Global Architectures and Local Ecologies**
- 5. Cluster Development - Nurturing versus Attracting**
- 6. Conclusion**

A paper presented to The Competitiveness Institute, 3rd Annual Conference, Clusters in the New Millennium, (Glasgow, Scotland, October 4-6, 2000)

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1. Introduction

The purpose of this paper is to examine the changing governance context of firms and clusters, and then to formulate the considerations for a regionally based strategy for sustaining their growth. This paper argues that in order to foster a solid foundation for clusters to expand and adapt continuously, the cluster must first be understood internally - both within and across company boundaries, as well as externally - from a regional dimension.

Accelerated by globalization, the empowerment of local factors creates the need for effective collaboration and territorial-based alignment - factors shaping new governance capacities for the locality as a whole [Storper 1997]. Partnerships among all stakeholders become the stated norm, along with new and immense coordination challenges across all sectors. As this new environment reshapes local and regional development capacities, organizations in all sectors must adapt - both individually and collectively.

One result of this changing landscape is a growing emphasis on embedding clusters locally. In fact, a key premise of this paper is that sub-national forums - city-regions particularly - are quickly displacing national systems as the central locus for business-government-society relationships. While the nation-state is not about to disappear, particularly as an actor in the transnational environment shaping new governance regimes, it is locally where the value of multi-sector governance must be understood in order to foster successful approaches for cluster growth.

Yet, at the same time an exclusive focus on the local dimensions of economic clustering is incomplete. New business models increasingly involve networks that extend globally as well as locally, and it is not uncommon for leading enterprises to be present in a significant way in multiple cluster settings. Adding a corporate governance dimension to understanding clusters allows for a better inclusion of the new parameters of market activity, both globally and locally, and the resulting consequences for new mixes of both competitive and collaborative strategies.

The interdependence between the changing nature of both intra-firm and inter-firm linkages on the one hand, and the collective performance of city-regions on the other is not one that has been well examined in the literature. Our objective, then, is to explore a possible nexus between corporate governance and regional governance, and how a better understanding of these ties can underpin more effective multi-stakeholder strategies to nurture competitive clusters.

2) Corporate Governance and Shareholder Concerns

Governance is fundamentally about guiding systems for decision-making and coordination in a world of dispersed power, knowledge and information. With globalization, technology and innovation creating spaces for new business models thriving more on change and less on stability, it is natural that along with such shifts come underlying debates as to how corporations govern themselves. Indeed, understanding the changing nature of corporate governance at the firm level is a prerequisite to effectively addressing inter-firm processes of clusters, and inter-sectoral forums that embed and shape these clusters.

What is a corporation? Fundamentally, it is a mechanism to allow a variety of partners to cooperate. To facilitate such cooperation, rules have evolved over the past few centuries in order to create a generally accepted regime of business practises (at least, and particularly in the Anglo-Saxon world). These rules have emphasized limited liability rights, transferability of interests, legal personality and centralized forms of management.

Yet, it is important to underscore that the corporation remains a nexus of contracts and relationships, and it is this nexus that is being redefined today. Globalization has created a forum where different visions of this nexus - and the governance regime that results - clash. Most prominently, there is a contrast between the Anglo-Saxon notions of the corporation as the private property of its shareholders versus the more Asian-European view of the corporation as a social institution [Allen 1992].

In the private property conception, the corporation is nothing but shareholders (in the radical version), or rather it is considered to be in the best interests of society if the property owners act as if they were the sole owners, for it entails a better management of the corporation. In this property-based vision, the only relevant providers of capital are those who supply finance to companies. Thus, good corporate governance entails the design of structures that increase and maximize shareholder return. In such a world, an expansion of the firm to include outside partners is strictly limited to formal bonds of financial investment and shared (in a legal sense) entities. The market becomes the sole judge of corporate behaviour and as a result, the focus is primarily - and often exclusively on the formal decision-making apparatus of the corporate structure. In such a case the Board and the Directors are accountable only to shareholders - and the central challenge that results is the principal agent problem.

In the more institutionalist conception, the corporation is perceived as a compilation of various constituencies that provide various sorts of capital - i.e. financial, intellectual and social. Thus, the Board should be accountable to all relevant stakeholders, as they may be regarded as trustees charged with augmenting the value of the collective assets and balancing the various claims of different capital providers.

The responsibility of the corporation is the same in both environments-to maximize returns. In the shareholder model, the benefit to be maximized is clear-profits-and so the corporate governance mandate is also clear. In the more institutionalist world, the much broader notion of stakeholders encompasses the entire network of capital providers - of all sorts (financial, human, and social). The differing agendas of the multitude of corporate stakeholders make the corporate mandate extremely difficult to fathom. The challenge to the corporation in that case lies in assessing the nature and distribution of the benefits to be provided.

The resulting challenges of good governance focus on both coordinating these competitive activities and sharing the relevant forms of risk and returns that arise from this socially-embedded view of market behaviour. At the same time that the shareholder and stakeholder interests need to be balanced by the corporation, the balance of inputs and outputs among all the stakeholders must be found. These are new and sometimes daunting challenges that tax the talents of managers brought up (and successful) within the traditional shareholder model and governance style.

Numerous forces have brought about clashes between these camps and what they imply for the governance process of organizations, particularly modern corporations. The acceleration of technological change, the globalization of finance, investment, and production processes, and the information and communication revolution have been central [Marshall 1994; Paquet 1997]. On the one hand, the expansion of markets, and market-based appraisals augments the case for property rights and the power of shareholder measures of return. On the other hand, the growing complexity of the value-chain that defines successful forms of business innovation demands an approach more conducive to networks of stakeholders, formally and informally.

3) The Case for Stakeholder Governance

We might suggest that, in the terminology of Michael Enright, the “globalization of competition” fosters a shareholder perspective, while the “localization of competitive advantage” fosters the stakeholder view. Note too that corporate collaboration represents only an extended example of the

shareholder model, where all partners share the imperative to maximize profits. They have simply decided that they can do so better through collaboration than by going it alone. The distribution of profits between the partners is generally negotiated through a legal agreement.

Yet, collaboration among firms is only one dimension of a collective governance template which includes non-market actors as well. Evidence suggests that in order to better understand complex environments of competitiveness, learning and collaboration, the stakeholder view provides a better foundation on which to build.

In a knowledge-based economy, defined by technological, economic, and institutional evolution, Best characterizes the complexity and creativity of corporate behaviour as characteristic of the entrepreneurial firm, emphasizing flexibility at the expense of size. For the entrepreneurial firm, the key success factors are ongoing capacities for product, process, and organizational innovation - abilities dependent on learning systems (similar to Cohen and Levinthal 1990)¹¹. Weiss and Birnbaum [1989] conceptualize a link between the entrepreneurial firm and its institutional environment which they call the technological infrastructure. Their fundamental conclusion is noteworthy: technology strategy is about institution building—it is about defining the boundaries of an extended enterprise, or in other words it is about stakeholding.

The case for stakeholding has been made in a variety of ways: first, as a way to describe better what is really going on; second, as a way to design a more effective collaborative mechanism; and third, as a way to acknowledge the notion of property as a bundle of rights. For Donaldson and Preston [1995], this third approach would appear to be the most persuasive.

But one may add to this view and tie it to many of the new realities that have expanded the prominence of clusters. In the old world of competition (to borrow the phrase of Best), governance enjoyed greater clarity and stability. The normal corporate governance model for publicly traded companies was based on three pillars: the sovereignty of the shareholder, the delegated authority of the Board on behalf of the shareholders and the compliance of management [Bowman and Useem 1995]. But in today's more turbulent environment, new forms of organizations and new forms of governance regimes become both conditions for survival and strategic imperatives for success. As such, new corporate models such as Dell and Cisco redefine themselves according to process as much as product (and in these examples, even the shareholder-defined mechanism of performance would appear to recognize their success). The new challenge of governance is to ensure integration and coordination through non-centralized arrangements that allow constant renewal through learning and adaptation.

In a production age that is both global and digital, wealth creation now depends on a diversity of stakeholders with unique sets of competencies and specialized investments at risk. For some, there is a need to shift from corporate-based management to more contractual forms of governance, where rights and obligations become formalized through a nexus of treaties [Kester 1992; Blair 1995]. While there is little doubt that this contractual view of the world is an important dimension of the value chain that defines the new business model, it does not tell the whole story; absent are the more relational forms of governance activities based on trust, and at times, proximity.

It is in this sense that the notion of a cluster has found renewed interest since the 1980s. The idea of groups of companies sharing conditions for production and innovation is not new, as it dates back to Alfred Marshall's early vision of industrialization. Yet, whereas Marshall could be interpreted as having some recognition of the stakeholder view (his intangible elements that define the industrial culture of companies), Michael Porter's more recent contributions to clustering, and the business

¹¹ Best provides an interesting distinction with respect to firms and learning: "learning suggests that a distinction be made between information, a core concept for the conventional theory of the firm, and knowledge and its refinement. Creating production knowledge by problem-solving involves more than the flow of information: information is already existing; problem-solving is the creation of knowledge. The latter is the secret weapon of the entrepreneurial firm" [Best 1991, p. 38].

and policy strategies that result, centred almost exclusively on an implicit embracing of the shareholder world. For Porter, it was the locus of competition, aided by proximity that explained global success - and the competitive dynamics between companies merely re-enforced the internal dynamics of successful companies.

In the Canadian setting, D'Cruz and Rugman partially recognized the shortfall here, suggesting that clusters are really business networks - where competition and cooperation are both at play (much like Best's new competition). Saxenian's more recent contribution, from within the much-lauded environment of Silicon Valley, attempts to tie these elements together to some degree. She recognizes that corporate governance (corporate organization in her model) must co-evolve with external networking strategies (industrial structure) and the contributions of local stakeholders (local institutions and culture).

Yet, all of these models, while useful in shedding light on the multi-stakeholder dynamics of networked-based governance, suffer from taking only a superficial look at corporate governance. This means that the specific nature of different types of firms are poorly examined. Also, as stated at the outset of this paper, the over-reliance on the factor of proximity in these same models oversimplifies the governance dynamics at play - revealing local linkages but ignoring their interdependence with global pressures and transnational business models. Thus, our view is that it is unwise to choose between global and local processes; rather, they must both find a place in an effective regional strategy for cluster development.

In this way, we might argue that there may be a space in which both the shareholder and stakeholder models are reconciled. If it is true that the stakeholder model, through localization strategies, does in fact produce the best results over the long term for the corporation, then the shareholders' interests are best served through the stakeholder model. Yet, this reconciliation may not occur if the shareholder-based system of accountability is not properly sensitised to stakeholder relations and their link to performance: in the absence of a proper value attached to a local stakeholder strategy, some level of conflict may still ensue.

Our view, however, is that there is a case to be made for linking the globalization processes that would appear to favour a shareholder approach with the localization context of stakeholding. Indeed, making this link is absolutely essential to understanding clusters that often comprise actors with systems of governance that transcend this global - local quandary. In other words, corporate governance is equally about the global federated architectures of modern corporations and the locally embedded networking dynamics of learning regions. A strategy to facilitate the growth of clusters must first understand these new parameters of corporate activity, and their likely impacts on the locality.

4) Global Architectures and Local Ecologies

The nucleus of localization lies within a setting of interactions and interdependencies rooted by territorial proximity. In terms of embedding these clusters in their multi-stakeholder environment, the key message is that good local governance provides a capacity for integrative local action [Stoker 1996]. Such an integrative view of local action, however, implies that corporate activity may be exclusively focused on a single locality - an increasingly dubious assumption to make.

Thus, two dimensions define the evolution of an existing cluster. First, clusters encompass new sets of linkages between firms of various sizes, and the emergence of this locally based value chain is now as much a part of the firm's decision-making systems as what goes on inside of the company. This new value chain is as much about "stakeholding" as it is about shareholder value. While successful entrepreneurs have often been ahead of the much-relied upon market analyst's view of the world (one leaning strongly toward shareholder value - particularly the Anglo-Saxon view of the world), new business models such as those typified by Cisco and Dell suggest that this emerging ecologic

web of intra-company linkages is being recognized. In this sense, larger companies are, in fact, defining their own form of cluster - one that encompasses a variety of internal growth strategies and external acquisitions - generating an extended firm, or a new form of corporate architecture of a sort not seen in the past.

Yet, the second dimension is based on the equally important premise that clusters can only be partially based on proximity. Technological and economic forces that drive globalization are also extending the boundaries of the new business models beyond any single country or region. Thus, clusters must be understood from a global perspective (the changing parameters of the industry and its players), as well as from a local perspective (where the company is embedded).

In an important contribution to this discussion, and its relationship to these changing corporate structures, Dicken [1994] synthesises the many schools of thought on the different characteristics of transnational business organization. Building on the work of Bartlett and Ghoshal [1989], Dicken distinguishes between the Multinational, the National, and the Global organization.

In terms of their structural configuration, a continuum of federalist to centralist principles is offered. The multinational organization is denoted as a decentralized federation, with decision-making authority vested in different regional or national units. The international organization is a coordinated federation, with some flexibility coupled with a notable degree of autonomy. Finally, the global organization is a highly centralized operation with assets, resources, and responsibilities for decision-making concentrated in a single location; operations outside of the home country are little more than the delivery agents of this unified architecture.

Dicken then describes the different management mentalities associated with each model, and how they differ. Whereas the multinational model is viewed as a portfolio of largely autonomous units, the global model imposes order on an operation that is dispersed geographically, but not in any real governance sense. In between these two poles, the international model attempts to coordinate power-sharing, often creating forms of transversal governance arrangements in the process.

Two trends are noteworthy since this dichotomy was proposed as such. First, the centrepiece of this continuum, the international plane, has emerged as the gravitational centre of corporate activity and the shareholder governance regime. Yet, whereas new technologies offer capacities to coordinate decision-making across a transnational environment, the need for empowerment, entrepreneurship, and intrapreneurship across a knowledge workforce pulls in the opposite direction. This latter set of forces is also strengthened by the production and learning externalities offered by select locales. The net impact is that international firms struggle to find a balanced and workable form of federalism, with important consequences for countries and city-regions.

Therefore, a key consequence of the emergence of international federated business models is the second trend of the 1990s, which is the shift in federated boundaries from a global - national spectrum to one that is global - local. Not only may companies operate in multiple locales across the globe, but lines of accountability may no longer be drawn according to national boundaries. In fact, there is a need to distinguish between those truly international organizations with global reach, and those corporations, growing and aspiring to such stature, but still relatively rooted in a single locale.

The consequences for clusters are profound, as any locally-based strategy for cluster development must make an effort to encompass the transnational and shareholder dimensions of corporate governance on the one hand, and the local and stakeholder dimensions of both corporate and collective governance on the other. A starting point for action is to therefore understand the new industrial composition of firms within a cluster, and how their performance will be shaped by their place within such a continuum.

Locally, there are three classifications of firms that can help guide us, each of which characterizes a firm's attachment to local governance in a separate way: they are flagship enterprises (FE), emerging

enterprises (EE) and small and medium-sized enterprises (SME) [Rudolf 1998; Paquet, Roy and Rudolf 2000]. Each of these industrial types is responding in a unique fashion to the shareholder - stakeholder tensions described above.

For flagship enterprises, these actors are the multinational entities referred to by Dicken and others. Their operating spectrum is international, and their local presence is significant to a degree where a local cluster is identified as prominent if it comprises one or more such companies. In the past, such companies were recognized primarily by nationality; today, their identity is increasingly federated via multi-country mergers and acquisitions and also by their presence in many locales across the world. What may well matter more than the national identity of such a company is their home base locale, where the local linkages may be particularly vibrant. Yet, increasingly flagship companies are forging transversal strategies to embed themselves in world-class settings, the key measure of which being human and intellectual capital - and as a result, it may be necessary to differentiate between those flagship companies rooted with their home base in a specific locale (e.g. Cisco in Silicon Valley), flagship companies with significant operations in a particular place (e.g. Nortel Networks in Ottawa), and flagship companies on a global scale but with only fleeting operations in a particular locale (e.g. IBM in Ottawa).

For emerging companies, their dependence on a single place, defined more likely by a locality than a country, is much stronger - even as they aspire to becoming more transnational in size and scope. These companies often carry the strongest identity of a locale, as they represent the future opportunity for global success as the cluster evolves and expands. While the factors that shape the successful performance of such companies are complex, their relative emphasis may be said to be greater on financial or investment capital in order to expand operations and market boundaries.

For SMEs, the notion of a cluster is considered to be a necessary condition for positive incubation to occur. The presence of flagship and emerging companies will itself be a positive force in spurring new SME creation - but only if this proximity-enabled opportunity is coupled with effective governance linkages - of the stakeholding variety - to share ideas, find capital investments and forge the competencies necessary to both launch and sustain a new corporate entity. While the market focus of SMEs may well be global, their launch and initial survival are likely to be highly dependent on the dynamics of place. Thus, effective entrepreneurship is a collective effort.

Each of these different corporate types responds uniquely to tensions between shareholder and stakeholder models of governance. For flagship companies, their increasingly global operations are under close scrutiny by global market structures that emphasize strong shareholder accountability. As a result, their loyalty to any one particular locality (with the possible exception of their home base locale) may well be low, particularly if the stakeholder linkages in that locality are not adequately valued and linked to performance.

For emerging companies, the connection to place (and likely, one particular place) may be relatively higher and as such, the importance of stakeholding is greater. The paradoxical impact of shareholder governance may mean that a weak performance locally, recognized and valued by the market as such, could render such a firm an attractive takeover target by a global leader. Yet, even if this fusion takes place, the global company will be under enormous pressure to remain locally embedded - only if the conditions of that locality warrant such a presence.

For SMEs, the market responsiveness to the "dot.com" phenomenon has sparked new waves of companies attempting to go public, de facto looking to shareholder-driven models of growth. Yet, even though the volatility of the stock market has served as a warning about such instantaneous results, the most recent studies of successful start-ups demonstrate that the importance of stakeholding will be more crucial to the early stage development of entrepreneurs.

A dynamic and globally competitive cluster will encompass firms from all three categories. Thus, the foundation of a cluster development strategy must be to foster local actions which respond uniquely to the peculiarities of each case, while rallying collectively around a common vision for local

success. Being aware of the importance of shareholder capitalism's market boundaries is necessary to understand how local clusters may be tied to or dependent on global processes; yet, acting locally, more likely in favour of aggressive stakeholding will be crucial for new and emerging companies - and for the virtuous circle of clustering dynamics that can ensue.

5. Cluster Development - Nurturing versus Attracting

To summarize the argument made to this point, in order to forge an effective strategy to grow clusters, a working template requires some understanding of the inter-related dimensions of corporate governance, competitive clusters and relational networks of stakeholders.

The link between corporate governance and the cluster must emphasize firm size, firm identity, and the nature of the local environment that supports both innovation and competition. Rather than traditional notions of nationality, by identity we mean the degree of organizational embeddedness of a company within a given locality - and while the location of corporate headquarters may be one indicator it is not exclusive in representing strong ties. At the same time, proximity alone does not define cluster boundaries, as so much of this market activity takes place within dimensions that are simultaneously global and local.

These competitive and cooperative forces are linked by a value-chain that is largely market-driven. The presence of an environment where shareholder models of governance are powerful forces for transnational corporate entities must be understood. To some degree, this new global order presents constraints not only on traditional forms of national action, but also on local action that cannot be easily dismissed. As such, collective factors such as taxes, regulation and incentives must be mindful of an international environment to comply with its rules and compete with its participants. More than countries, the emerging order of participation will be denoted by city-regions.

Yet, these market components must be understood to be elements of a broader local ecology (or at least an ecology that is partly local) encompassing a dynamic set of stakeholder relationships that contribute specific elements to the growth potential of a cluster - and as such, to its corporate participants. Accordingly, a well-defined local strategy must be based on local action to stimulate those segments of the cluster most reliant on local interdependence. The necessary starting point is to decompose the cluster composition according to firm type (FE/EE/SME), while also differentiating flagship enterprises based in a locale and others with significant operations there.

The next phase of cluster development is to recognize the three basic capital requirements that shape the collective governance of a cluster. They include: financial capital - or investment capital supplied by the markets to underpin market expansion; human or intellectual capital - the skills and research that are found both in the local workforce and research infrastructure; and social capital - the degree of trust and collaboration, and the presence of collaborative networks to effectively nurture inter-firm ties within the cluster as well as productive linkages between clusters and non-market institutions. While all companies share requirements for each of these capital sources, their relative need varies according to size and socio-economic circumstance.

The interactions of these two layers of analysis will yield appropriate sets of local action to strengthen the cluster's growth potential. What must be understood are the potential contradictions at work between the globally-based pressures of shareholder governance and the more localized incentives of a stakeholding strategy. The choice cannot be between them, but rather what must be understood is how the latter strategy is crucial for both corporate and community success, even as the former context shapes a certain portion of market-based activity.

We consider two forms of strategic localism that contrast endogenous-based action with a more exogenous-based strategy aimed globally.

1) Nurturing - this endogenous view of cluster growth suggests that social capital and trust among stakeholders locally is the central ingredient of a collective strategy for entrepreneurship. Other forms of capital (financial, human, intellectual etc.) will grow in importance when and if a start-up is nurtured from its inception into a viable entity. As such, limited public resources and civic partnerships must be mobilized in specific and complementary efforts to help incubate new ventures and socialize risk.

2) Attracting - this exogenous view remains valid provided there is a reframing from traditional efforts at international promotion aimed at specific firms (i.e., seeking inward investment) toward a people-centred strategy (i.e., inward flows of people and ideas). A strategy to attract human and intellectual capital is meant to focus on the entire quality of life, educational opportunity and workforce expansion picture of a locality that will determine the location choice of workers, rather than companies. Such a strategy is equally about creating a vibrant setting to both attract students to local institutions and retain them beyond educational tenures.

Our central line of argument is that there is little question that all three types of action are required to both levels of strategy. Nurturing is fundamental to SMEs and most EEs, whereas attracting human talent and research resources requires a collective strategy aimed less at promoting a locale's strengths internationally and more at nurturing them in order to attract interest across both an increasingly mobile workforce and increasingly open markets.

Paradoxically, the shareholder governance pressures rooted in globalizing economic markets may well re-enforce the need for strong stakeholder strategies locally - as international marketing is made less costly and nearly redundant in a smaller, more competitive and wired world. In the new economic context, the best exogenous strategy appears, in fact, to be to achieve endogenous success within a locality which, in turn, will attract attention globally via the corporate, media and human channels of exchange that provide the fabric of globalization.

Ottawa as a case study:

The industrial composition of Ottawa will be examined by pooling together participants from two of the area's leading clusters, Telecommunications Equipment and Microelectronics. In fact, demonstrating the importance of dynamic and open definitions of clusters as opposed to rigid boundaries, these two clusters have many companies which overlap both. Such a mix augments the importance of looking at corporate governance within a cluster, as specific sub-units and spin-off operations from within the same corporate family may look to nurture connections and collaborations within separate but quite related clusters - as they have been defined by a locality.

Within Telecommunications and MicroElectronics then, a profile of some of the leading companies reveals an impressive foundation of corporate activity.

FE - Nortel *, JDS Uniphase **, Cisco, Nokia, Alcatel

EE - Mitel, Tundra, Corel, Mosaid, Cadence

SMEs - Over 1000 such companies in the Ottawa area

The evolution of these clusters is interesting and typically dynamic of an industry shaped, and often reshaped by a global logic of capitalism that clearly leans to a shareholder logic. JDS Uniphase, the

only flagship member truly based in Ottawa, has grown into an internationally prominent leader by virtue of its international acquisitions - particularly those in California's Silicon Valley. Nortel is rooted significantly in Ottawa - though based elsewhere in Canada, Cisco and Nokia are recent arrivals to the Ottawa scene and as such their operations remain at a modest scale, and Alcatel's entry came via their acquisition of Newbridge Networks (a good example of a locally rooted emerging enterprise).

In terms of the group of emerging enterprises, it is here where one finds companies which simultaneously possess the greatest capacity for global - flagship status and the greatest dependence on the Ottawa locale for such a realization to take place. These companies are shaped by both a shareholder and stakeholder logic: in terms of the former, their aspirations are global, as to some degree are their accountability systems via the marketplace; yet, their performance capacities are strongly rooted in the three types of capital that comprise the Ottawa governance system. For companies of such a size, the most dramatic of circumstances aside, outright relocation is virtually not an option - and it would be impossible for such companies to recreate the degree of local identity and embeddedness that they possess in the Ottawa area.

A company such as Newbridge Networks demonstrates the partial danger of this reality, as the Ottawa-born technology star, itself the mother of over fifteen spin-off operations in the Ottawa area, now finds itself a node in the Alcatel global federation. To a large degree, this acquisition was in response to, and facilitated by shareholder governance forces responding negatively to Newbridge's recent performance and positively to Alcatel's expansion prospects - of an accelerated variety. While some local commentators suggest that the loss of local ownership is a blow to Ottawa, the countervailing force - in favour of stakeholding - is the tremendous pressure on Alcatel to effectively embed themselves in the Ottawa area in order to retain the critical intellectual and human resources that led them to purchase Newbridge in the first place. Yet, the debate may not be settled until an economic downturn reveals the degree of local strength as it is valued within an Alcatel value chain based elsewhere.

At the level of SMEs, the case for stakeholding is strongest - even as a significant infatuation with shareholder returns permeates the cluster. The recent purchase of SkyStone Systems, an Ottawa-based start-up for nearly CDN\$90 million by Cisco is indicative of the capitalization logic that is significantly permeating the local economic culture of the area. The potentially negative consequence of this transaction for other firms is to suggest, even implicitly, the opportunity for "striking it rich" quickly—in other words, the market logic of acquisitions and initial public offerings (IPOs) shortens the strategic outlook and may look for quick and extraordinary financial returns, even at a time when recent market instability demonstrates that a fundamental business logic remains crucial to survival.

This logic is primarily about stakeholding - and any interpretation of the new economy taken to mean that shareholder-driven models alone can harvest collective economic success, beyond a few exceptional cases for a cluster or region as a whole, is misguided and dangerous. Moreover, as a successful economic climate attracting a growing segment of venture capital and inward acquisition-rooted investment, social capital becomes a more crucial ingredient for most SMEs. Thus an effective strategy for nurturing clusters cannot be centred on the exceptional and volatile considerations of a global market place driven by shareholder logic. Rather than rejecting the logic itself (a clear motivator within the global - local dimensions of the market place and its clusters), the regional or local dimension to growing clusters must be based on the central premise that cluster development - of a sustainable sort - requires an effective stakeholder logic to both nurture success and lever such success into the only sort of international promotion that will properly garner attention within the global and shareholder-rooted marketplace.

7. Conclusion

The dynamics of clustering involves more than inter-firm linkages enabled by proximity. A cluster is an increasingly diverse forum of companies of multiple sizes and structures, with varying degrees of connectivity, loyalty and attachment to any given locality. While many companies are increasingly consumed by a logic of corporate governance rooted in a shareholder perspective, the collective intelligence and shared performance of a cluster, in turn the economic engine of the locality, remains closely tied to a stakeholder logic.

In this sense, the nurturing strategies of a locality must be focussed on efforts to sustain SMEs in their early stages, to build on the strong connectivity between emerging enterprises and their home base locales, and to encourage positive stakeholder actions that strengthen the interest and local presence of flagship enterprises. In those rare instances where a globally-recognized flagship company is rooted in a particular locale, this company must be recruited as a key local stakeholder and an important international ambassador.

The logic of stakeholder governance within a given locality is itself complex, dependent on not only inter-firm proximity but also intra-firm networks and strong partnerships between market and non-market actors. In this sense, the greater the degree to which cluster participants are rooted positively in collective efforts for the locality, the greater the likelihood that the virtuous circle of local success breeding global attractiveness will take hold. Conversely, a locality, particularly the non-market actors with the greatest responsibility for collective action of a stakeholder variety, that ignores this logic and allows the infatuation of shareholder governance globally to guide strategic action runs the risk of merely attempting to duplicate the sorts of functions best undertaken by the marketplace. In this sense, the most effective local strategy for attracting is, in fact, locally rooted processes of collaborative engagement that can strengthen the nurturing power of existing clusters to spur both new firms and new clusters.

As the market place links corporate governance and clusters, non-market actors at the local level can strive to strengthen the vibrancy of stakeholder strategies - aimed at both the most precarious market-based firms and the locally tied emerging enterprises. Yet, such action will require stronger linkages across the market sector and non-market sectors such as public bodies, education and research and the community at large. These non-market dynamics are the work of civic entrepreneurs and new forms of collaborative governance mechanisms that, in turn, demands a complementary focus on initiatives that strengthen the collective logics of clusters and their non-market supports.

The shareholder model of governance was well suited to the world of the old competition, exemplified by the increasing pressures of the "globalization of competition". But as today's turbulent environment has emerged, new forms of organization and new governance regimes become a condition of survival. Speed, flexibility, variety and innovation call for organizations to become "learning organizations" capable of adapting faster locally, organizationally and managerially. The challenge of the new governance regime is to ensure integration and coordination through non-centralized arrangements, and has to be built on sufficient compactness and solidarity to ensure organizational learning and a greater capacity to transform.

As we have seen, in the complex production process of the late 20th Century economy, the wealth-creation potential of firms has come to depend on a diversity of stakeholders. Many of them have significant specialized investments at risk. As noted by Blair:

Their rights and obligations as owners should be formalized through compensation schemes, organizational forms, or other arrangements that place significant amounts of the company's equity under the control of the at-risk stakeholders and that assign control responsibilities commensurate with their equity stake to this group [Blair 1995:17].

Yet this shift from traditional corporate governance to contractual governance, in the sense of a nexus of treaties [Kester 1992], remains rather ill-defined. Systems of contractual governance may span a broad continuum, ranging from a nexus of explicit and detailed contracts enforceable by courts of law to a nexus of relationships based on implicit, relational contracting that are informally enforced. To the extent that a stakeholder approach to governance generates a broader net of relationships that cannot be easily formalized, it represents a dual move along that continuum: first, away from the absolute property rights of shareholders in the tradition of the English-speaking world, and second, away from the formality of market contracting toward relational, trust-based and moral contracts. Without attempting to spell out a typology of all the new circumstances generating pressure on existing governance systems, it is possible to identify some of the pillars on which this new model is based. It marks nothing less than redefining the rules of the game or the rules of engagement for all stakeholders, including corporations.

We suggest that there are two key pillars of this new type of governance: all groups have to buy in to the model and to the specific operational mechanism for implementing the relationships locally; and all groups have to honour their commitments. These are the minimum requirements to engender the social capital and trust need for such collaborative decision-making.

But key questions remain. How are the inputs and outputs, i.e. the specific contributions of each group and the benefits to be expected, to be determined so that all groups are prepared to buy in and to honour their commitments? And how are the operational mechanisms to be organized in a way that meets the approval of all groups?

Our view is that government cannot set the terms of this network of relationships, because the other partners will not long accept their predominance since the government's agenda and objectives will not meet the requirements of the other two sectors, especially business (outwardly oriented, straddling shareholder and stakeholder logics). In the same way, the private sector cannot be the lead group, because the other sectors will be suspicious that its stakeholder approach will before long morph into a purely competitive shareholder approach, thereby diminishing the benefits they as locally-based actors are seeking. Therefore we hypothesize that new forms of civic initiatives rooted in multi-sector partnerships will be the preferred honest broker in this nexus of relationships.

The Centre on Governance at the University of Ottawa is currently exploring this issue through a three-year project funded by the Social Sciences and Humanities Research Council of Canada that compares the experiences of three successful technology communities that exemplify different forms of the stakeholder approach-Silicon Valley, Ottawa and Glasgow. We will be reporting regularly on the results of this study. In this way, we hope to identify the new forms of collaboration, based on new forms of governance, brokered by the not-for-profit sector, that provide maximum benefits for all stakeholders in meeting the pressures of the globalization of shareholders and competition on the one hand, and the localization of stakeholders and collaborative advantage on the other.

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A business view of clustering:

Lessons for cluster development policies

Abstract

How do businesses interact within clusters?
What roles do firms play in building up clusters?

What are the processes of business clustering?
How can clustering activities be supported?

These are all questions commonly raised by cluster development practitioners. This paper tackles these complex questions and sets out a framework for understanding the processes of clustering and identifies appropriate opportunities for support

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SECTION I. INTRODUCTION

Ask a business what the term cluster means to them, and what response do you get? Some associate no meaning with the word, whereas others view it as academic jargon. There are some businesses, however, who understand the concept of clustering as a strategy for extending the capabilities, resources and responses to levels that would not be achievable as an individual firm. These businesses do not necessarily use the term cluster, but see significant advantage in working with other businesses on joint activities and projects for mutual gain. This 'hands-on' or 'learning-by-doing' approach presents a different and more applied notion of clusters which is grounded in the business development aspiration and goals of groups of businesses.

This paper proposes a framework for understanding the process of clustering from the perspectives of businesses. Our goal in taking a business-led approach to understanding clusters and how they function is to gain better insight into how businesses work together and, as importantly, why they work together. Findings from work in the North East of England indicate that this approach offers tangible opportunities for focused and pragmatic assistance to and stimulation of clusters.

This paper draws on the views of companies in the North East of England and the ways in which they build up clustering links. Over 100 in depth interviews were undertaken in 2 surveys that covered a number of areas of the North East economy and a range of players that include private enterprises, business support organisations and universities. There was particular interest from businesses because of their interest in building relationships and improving their competitive advantage.

The growth of interest in the concepts of clusters and clustering has led to a plethora of policy responses and a wide range of approaches to business development and support. This diversity of approaches is partly due to the wide and differing uses of the term clusters. The rationale for policy maker's interests in clusters is due to the evidence of regional success stories where there is a localisation of production and services combined with the pressures of globalisation. The interest in clusters is fuelled by the potential and perceived benefits, such as rapid innovation and growth, that are envisaged by those embarking on cluster development approaches. These benefits have been shown to have particular impacts on the fortunes of particular regions (Silicon Valley, Italian leather fashion, medical devices in Massachusetts).

Porter describes the following beneficial outcomes:

- Better access to suppliers and flexibility;
- Access to specialised information through personal relationships;
- Joint marketing;
- Local rivalry and peer pressure;
- Innovation through having information on new markets and technological advances;
- Complementary products (e.g. tourist attractions);
- Reputation of an area;
- Pool of experienced labour;
- Access to institutions and public goods;
- Conducive to new businesses.

While there are lessons that policy makers would like to take from regions which have experienced rapid growth, there is debate and uncertainty as to what lessons can be transferred. One way forward is to identify the 'ingredients' and critical success criteria for a specific case and then extract those principles that may be transferable. What is required in this scenario is the ability to take the lessons of specific cases such as Danish insulin production or Italian tile making, and learn how and why

they occurred. These lessons can then be identified and applied in other contexts that turn them into appropriate locally adapted policies for another region and another industry. Successful policies have to be tailored to the specific conditions of an economic area or space, but built on principles from successful cases. Such a tailored approach starts by building on what businesses are doing already, rather than trying to bring in models from very different contexts.

Much of the existing work on cluster development concentrates its efforts on describing the potential benefits and drivers for forming groupings, but does not explain how clustering takes place on a day-to-day basis. Many commentators stress the importance of building close relations and trust, but they do not explain how this occurs and how cluster development policies can support and stimulate the development of trust and intimacy.

Understanding the processes of clustering raises particular difficulties as they may be unobservable or hidden within day-to-day practice. For example, linkages between clusters are often based on relationships of trust and reciprocity that are built up over past experience. Indeed, within the cases of clusters studied, businesses spent resources building up close relationships with others in the group. Attempts to examine the process of clustering have concentrated on those aspects that can be observed and measured easily such as formalised links and associations. The study on which this paper is based found that informal ties are often drawn on and businesses value these links highly.

This paper is divided into four sections. Following this introduction, we present a working definition of clusters and clustering based on the experiences of businesses we interviewed. A number of definitions are examined and common themes are summarised. The importance of looking at different scales of clustering is demonstrated and a framework for categorising clusters is set out. We look at the process of clustering and the importance of understanding how clusters can develop. This entails a focus on clustering, rather than attempts to conceptualise a static cluster with defined boundaries. The third section explores this process of clustering, drawing on the analysis of clustering activities of 100 firms in different industries in the North East of England. A number of anticipated outcomes from clustering are demonstrated and the types of linkages used to reach those ends are identified. The fourth section shows which types of linkages are used by businesses for different anticipated outcomes and how the framework can be put into

practice by business support organisations, policy makers and businesses themselves.

SECTION II - THE PROCESS DRIVEN APPROACH TO UNDERSTANDING CLUSTERING

2.1 The three Cs of clustering

The term 'cluster' has been interpreted in many different ways and there are many different definitions used. Broad definitions have been taken from the publications of DTI, Scottish Enterprise and the work of Michael Porter. These are:

- "A group of organisations in related industries that have economic links" (Scottish Enterprise, 1999).
- "Geographic concentrations of interconnected companies and institutions in a particular field" (Porter, 1990; 1998).
- "Concentrations of competing, collaborating and interdependent companies and institutions which are connected by a system of market and non-market links" (DTI, 1999).

By extracting common themes, three underpinning principles of clustering can be identified. These are present in different degrees regardless of structure, size and sector.

1. Commonality; i.e. the businesses are operating in common fields or related industries with a shared market focus or sphere of activity.

2. Concentration; i.e. there is a grouping of businesses that can and do interact.
3. Connectivity; i.e. interconnected/linked/interdependent organisations, with a range of different types of relationships.

All scales of clusters share the three common elements that describe the process of clustering, as described above, with linkages of different kinds. There are a wide range of scales of clusters from a small number of companies up to whole sectors and combinations of sectors. For example in the offshore industries cluster on Tyneside in the North East of England, there is a commonality with the shared market focus on the provision of products and services to the offshore oil and gas industry; there are concentrations of firms in the Tyneside area, especially along the River Tyne; and there is connectivity with firms having multiple relationships for innovation, delivering products, marketing and training. These relationships range in scale from inter-firm linkages and alliances to an industry wide trade association, the Northern Offshore Federation. Within clusters are a range of types of relationships, both vertical and horizontal, formal and informal. These types of linkages and relationships are discussed further in section 3.

2.2 Why a process model of clustering?

The results of two studies in the North East of England demonstrate that businesses develop multiple interactions with other organisations and institutions that they may use for many business goals. This allows them to build up cooperation and relationships that can result in extended reach and economic advantage. These activities of formation and reformation of ties, can be considered clustering, i.e. the process or means of cluster development. By understanding the processes of clustering, support can be targeted at the activities and actions that companies and other relevant institutions need to undertake to develop clusters.

There are three reasons why cluster development policies can benefit from understanding the process of clustering:

1. Clusters are not static and do not have fixed boundaries.

Different organisations within the cluster area may have links outside the cluster which get drawn on at different times. The nature of relationships are highly dynamic and are constantly evolving because businesses change and develop new opportunities. So attempts to understand clusters through a snapshot and to fix boundaries are not realistic. An examination of the activities and processes of businesses and supporting institutions in particular areas allows cluster development approaches to follow these linkages and relationships as they evolve and develop.

2. Clusters have different stages of development.

An understanding of the processes of clustering not only allows cluster development to work with existing or 'working' clustersⁱⁱⁱ, it also allows for a consideration and segmentation of clusters that includes those that are potential and emerging. Emerging clusters are not just based on concentrations and commonalities, there are also some forms of connectivity starting to form. With potential clusters there may be concentration and commonality but without connectivity or linkages.

3. Cluster development approaches should be based on what businesses do at present, using the language they use and their 'styles' of doing business.

An understanding of the processes of clustering allows cluster development support to build on what is already growing and existing rather than bringing in models from other industries, other locations and drawn from the enticing case studies that are often interpreted as transferable models. Frameworks of how clustering can take place allow us to take ideas of how business can learn and harmonise them to a locality. Support approaches that are grounded on the existing processes of clustering are more likely to be appropriate to and supported by businesses in a locality.

SECTION III - ANTICIPATED OUTCOMES & ACTIVITIES OF CLUSTERING.

3.1 Clustering activities

Much has been written about the potential benefits of clustering, drawing on case study material from around the world and from different industries. The list of potential outcomes from clustering, given on page 1, is part of the attraction of the cluster approach as the case studies imply that these are the factors that result in dramatic economic growth in those locations. However, these are a mixture of the outcomes that tend to fall into two categories: firstly benefits that might accrue to a group of businesses (information from relationships, joint marketing etc) and secondly policy perceptions (rivalry, complementary products, reputation, pool of skilled labour, conducive to new business).

The research on carried out with 100 businesses in the NE of England identified a set of business activities or processes that are the outcome of clustering. The clustering activities in most businesses fall into one of the 7 categories shown in table 2. These activities can be carried out by businesses alone or by drawing on linkages with other companies. They may also be undertaken in different ways when in a group compared to when they are carried out by individual companies:

Table 1. Clustering activities

Activity/outcome	How undertaken in a group
New product development	Joint R and D, sharing information and ideas, peer review of R and D, influencing the research agenda of universities
Getting Finance	Closer access to finance bodies (especially venture capital), supplier credit
Getting and keeping business	Referrals, joint marketing, gathering market information, improving the image of an area
Providing products and services	'Just in time' delivery, help supplier improve quality and reduce costs, joint purchasing and transport, share equipment, technical assistance, bench marking
Training	Joint courses, setting curriculum with training providers
Lobbying	To influence the business and regulatory environment
General networking	Get contacts to help with other activities, put something back into the community

3.2 The nature of linkages and structures of cooperation

Analysis of the clustering processes in 100 businesses demonstrates that different types of linkages are used to reach the outcomes identified above. These links are constantly evolving and can also be drawn on for reaching other outcomes. Businesses may use a number of different types of linkages with a number of different businesses or groupings of businesses in order to meet their goals. The research showed that clustering involves multiple linkages which are horizontal and vertical, as well as informal and formal. The following kinds of links for collective action were reported by the businesses in the survey.

Table 2. **Types of linkages**

Linkage for collective action	Definition and description
Vertical supplier links	Relationships with individual customers or suppliers used to provide a better service. These are usually based on interpersonal relationships although they can be supported with contracts
Horizontal informal links	The ability to contact other firms for information, assistance, referrals and learning. Built up through reciprocity over time and previous knowledge of each other. They are seen by businesses as a safety net and a “bank of goodwill”
Horizontal formal collaboration	Collaboration between a small number of companies (less than ten) for joint activity. Relationship supported by formal agreement or contracts
Formal associations	Membership clubs, trade associations and networking groups that are set up by service providers.
Gaining access to common assets and resources/services,	Government bodies (local, regional, national and international) that provide education and infrastructure which individual companies could not provide themselves. Some private sector organisations can provide these goods if there is demand from companies e.g. training colleges.

1. Vertical supplier links

The linkages between suppliers and customers is an area that is well documented and there has been considerable attention given to ‘supply chain development’ by companies themselves and those supporting them. These are used to develop better services for the customer in terms of timeliness and quality of service. The vertical supply chain links are found to varying degrees in all types of firms. Examples of these types of links include advertising and PR companies’ links to designers (web and paper based) and printers, or ‘just in time’ systems for high volume manufacturing. These links are particularly well developed in the automotive sector. Firms supplying manufacturers and engineering firms can decide to locate staff on their customers’ site to ensure the service is improved and problems solved rapidly. Examples found in the North East of England automotive cluster include paint suppliers for car part manufacturers and chassis makers co-locating with assembly plants.

Vertical supplier links are often centred around individuals within the companies although many companies try to develop links between staff at different levels and the corresponding number with the supplier/customer. These links can build up over long periods of time and involve the development of relationships based on strong bonds of trust. In many cases the use and nature of the links are underpinned by the power of dominant customers. This is illustrated by car manufacturers working closely with suppliers to ensure costs are reduced. The co-operation is based on the power exerted by the customer rather than the trust that has been built up.

2. Horizontal informal links

All businesses were found to have a large number of linkages with other firms in related fields who were not suppliers or customers. They may remain dormant or hidden until they need to be called upon for a certain activity. In this regard they can be seen as a safety net and a bank of goodwill and favours that are built up through the exchange of referrals, information equipment or other support. These kinds of links allow individuals within firms to contact other firms and individuals as and when needed. These links may also come in the form of visiting each others companies and support bench marking. The links are developed through reciprocity such as helping out when in trouble and referrals to each other.

These forms of links are dependent on personal trust, confidence and respect being built. This occurs through experience of working together, following 'unwritten rules'. The way companies may build up trust is not always apparent to the companies themselves. When many of the companies were asked how they knew they could trust the others, they said they did not know as they had not thought about it or made a calculation. This is seen as a gut feeling, 'you get a sense of who you can trust', or 'it is an instant thing'.

Trust can be built on existing links and ties. These may be through friends and family or from previous work. One of the most important mechanisms by which ties and information on reputations is spread around a cluster is through the movement of staff. Businesses will often place a high value on recruiting people with existing networks. All of these aspects tend to grow with use and are reinforced through using the linkages built on trust.

3. Horizontal formal collaboration

Some forms of horizontal links are formalised through having a contract or written agreement. This may be a partnership in product development or collaborative research projects with technical agreements and confidentiality contracts. Some groups of companies form a separate umbrella company and present themselves as a joint venture. The wording used in each case will differ according to the industry as the terms used have to be understandable to clients.

The type of formal link used depends on the expected outcome of collective activity. For new product development, formal links are usually in the form of a number of bi-lateral joint ventures, as larger groups result in greater difficulties in managing intellectual property. For other activities such as joint marketing, larger groups are more appropriate.

Some forms of formal collaboration can also be initiated because the companies involved are part of a group of firms that have a common owner or shareholder. In such cases, the co-operation is more of a 'top down' process, dictated by the owner of the businesses rather than through the development of a working relationship over time.

4. Formal associations and networking fora

Formal associations include membership clubs, trade association, and events hosted by service providers, such as solicitors or accountants. Groups can also come out of publicly funded business support organisation activities that have networking activities. Two of the most important roles of formal associations are acting as a means for micro scale linkages to develop and lobbying national bodies and regional/national government.

There are a number of ways these are built up and established. For many businesses, their participation in the functioning of associations is through paying membership fees and attending meetings. There are many associations which are not sustained, as the members may not feel they are getting results and the cost of participation in terms of time and resources is too high. Factors that are seen to contribute to successful associations include:

- Set up by a respected institution or individual.
- Leadership qualities, enthusiasm and self sacrifice by the initiators.
- Climate of trust and affinity amongst members.
- Organisation is responsive to members and there is a critical mass to ensure members get benefits. Funding of some activities from external sources can support this although this can lead to the association becoming dependent and therefore unsustainable.
- The need to compete against competition or dominant firms. In these cases, businesses stated that there is an element of pressure to co-operate due to their inability to get certain services and benefits on their own.

5. Gaining access to common assets and resources

A final clustering process involves decisions to locate or remain in a particular location because the relative proximity allows the business to use common assets and resources. These assets may be tangible infrastructure and facilities such as university equipment and libraries, transport networks or training facilities. They may also be intangible assets such as a pool of skilled labour, the reputation and image of the area, and the general regulatory environment. These assets are ‘public goods’ that are available to all or most businesses within an area.

When individual companies cannot provide these services, education and infrastructure themselves, provision can be undertaken by the public sector. The most common structure or linkage is through government bodies (local, regional, national and international) and increasingly through public/private partnerships.

Businesses themselves do not play a direct role in building collective action within the enabling policy environment, apart from lobbying and agreeing to follow laws and regulations. The ways that public sector bodies can support clustering linkages is categorised by Enright (2000) into those policies that are catalytic and those that are more interventionist. The ways in which public bodies will operate depends on the political persuasion of the government, the form of local, regional and national governance. These issues are discussed in detail elsewhere, and are not part of the remit of this paper.

SECTION IV - A FRAMEWORK FOR SUPPORTING THE PROCESS OF BUSINESS CLUSTERING

The previous section has set out the role of the private sector in clusters by looking at the potential outcomes and nature of the linkages. This section presents a framework for understanding the process of clustering and may be used by cluster development practitioners to identify opportunities for support.

4.1 A framework

Building on the research carried out with 100 companies in the North East of England, this section proposes a framework that can be used as a tool for identifying appropriate cluster development activities and support. It is a three step process:

1. Identifying the anticipated outcomes of clustering, the reasons why businesses may want to cluster (Table 1)
2. Documenting the existing types of linkages, structures and forms of organisation that can be used in clustering (Table 2)
3. Mapping the expected outcome to the most appropriate type of linkage and then identifying where linkages can be strengthening.

Table 3 demonstrates the relationships between the first and second dimension, although it must be noted that it is an overview and hence a simplification of a complex set of interactions. This table shows that for each type of linkage there are many different activities. The table below is based on clustering in the North East of England and can be seen as a menu of potential opportunities arising from a particular set of studies.

The table can also be used in its ‘empty’ form as a framework for building a bottom-up approach to cluster development in a particular region. In such cases, cluster development practitioners can document the clustering activities currently taking place. Therefore it can be used to pin point what are the reasons why businesses want to cluster, what are the activities that they do together and the nature of the linkages that they use to get there.

4.2 Forms of Support

Three forms of external support can be considered:

- Facilitating the development of clustering linkages of different kinds
- Providing funding for groups of businesses to carry out activities
- Provision of common assets (education, infrastructure etc.) and the regulatory environment.

Table 3 **Relationship of the type of linkages to the outcomes of clustering**

	Vertical supplier links	Horizontal formal collaboration	Horizontal informal links	Formal associations	Gaining access to common assets
New product development		Carry out R and D Peer review	Get and share ideas	Exchange ideas	Influence research agenda Information on technological trends
Getting Finance	Supplier credit		Access to finance bodies		Improve area's reputation with financiers
Getting and keeping business	Referrals	Referrals Joint marketing	Referrals	Improve the image of an area Provide market information Organising trade fairs and delegations	Improve the image of an area Market information Information on customers and competitors
Providing products and services	Guarantee quality and timeliness Reduce costs of suppliers Get technical help Go the extra mile Joint purchasing and transport	Economies of scale Get technical help Share equipment Joint purchasing	Share equipment Get technical help	Bench marking General information on technology, exporting etc	Improving the regulatory environment Business' access to skilled labour
Training		Joint courses			Set training agenda and curriculum
Lobbying				To influence the business environment	To influence the business environment
General	Get contacts	Get contacts	Get contacts	Get contacts	

The first element can play a vital role in building up the links of different kinds between companies. There are two ways to support businesses in this way. Firstly firms can be supported and made aware for the benefits and means of clustering by specialised network brokers. Secondly, support and training can be provided to individuals and firms who can or are already playing facilitatory roles. There are a wide range of people and firms that are business support providers from the public and private sector and include business service providers such as accountants, solicitors, management consultants and other advisors as well as individuals in business support organisations funded by the public sector. Their abilities can be improved though training in the processes of clustering and details of the particular industries in the cluster.

There is a danger of concentrating only on formalised groups as these are easily measurable and satisfy the needs of public sector funding body evaluations. However, informal linkages are also important, although measuring them presents particular challenges because they may remain hidden until a critical moment and they are not easily observable.

Support can be provided to formal association and potential and emerging associations. The type of support should build on lessons from existing formal associations as described in section III. It should be noted that there are already a large number of public sector promoted networking associations which are competing for the time and interest of businesses. The issue of funding groups of businesses to carry out activities needs to be treated with sensitivity. This may be needed if the companies would not be able to carry out the activity, are not aware of the benefit or feel it is a public good which would not be cost effective for them to provide.

Finally, clustering can be supported by the provision of common assets or public goods such as education and training, physical infrastructure and other services that support innovation. In the North East of England, as in many other areas of the UK, there are many initiatives and programmes in these areas. The challenge for cluster development approaches is to engage businesses and their representative associations in the decision making process so that resources are invested in those areas that meet the needs of the clustering firms. Deciding which clustering areas to support and which to ignore becomes a political decision. Policy makers can be supported in this decision if there is information on three key factors of a national or regional economy:

- the growth potential of a clustering area
- the evidence of existing linkages
- the extent of concentration in the region.

These factors and ways of measuring them are addressed elsewhere.

4.3 A methodology for supporting cluster development

The objective of this paper is to identify how cluster development policies can engage with the clustering processes of businesses. Drawing on research carried out in the North East of England and comparing it to other studies, a four step process for cluster development can be identified. Of particular importance is the recognition of entry points for cluster development that are based on how businesses engage with each other and act collectively. The research has shown that there are a number of different reasons why firms work together and cluster, and there are a number of different types of linkages that each company may develop. These may be vertical or horizontal, formal or informal.

The framework presented here allows for policies to be developed that respond to the uniqueness of each locality or context. Rather than replicate a model from elsewhere, cluster development requires policy makers to look at the resources, institutions and current approaches to business in the area and build on them. The process given below outlines the steps that can lead to cluster development policy that is based on what businesses are doing and so embedded in a particular locality.

A four step process for tackling cluster development is given below.

1. Identify and clarify the expected outcomes

There are a number of benefits from clustering and these may cover several business processes: new product development, getting finance, getting and keeping business, providing products and services, training, lobbying, general networking. Firms need to identify the potential of these activities and clarify what they want from the collective action.

2. Map out different types of linkages appropriate for each expected outcome

There are a number of types of business linkages that firms can use, including: vertical supplier links, horizontal formal collaboration, horizontal informal links, formal associations, gaining access to common assets. Each of the activities listed in step one can be achieved through one or more of these types of linkages. Therefore detailed clustering action plans can be identified for each clustering activity based on building up different types of links. The process of building up links requires an understanding of how trust and relationships are strengthened.

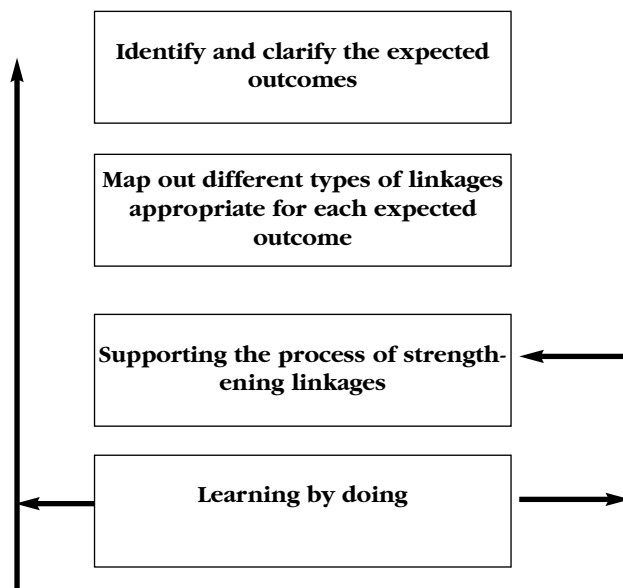
3. Supporting the process of strengthening linkages

Once businesses have identified why and how they want to cluster, cluster development support organisations can identify where they have a role to play, and more importantly, where they do not. Support can come in the form of identifying best practice from the locality and elsewhere, facilitating the process of building relationships and finally provision of common assets such as infrastructure, skills and reputation of a locality.

4. Learning by doing

This step model is an iterative process that requires those supporting it to be continually innovating their support as the firms they are working with may be innovative in terms of product development and organisational structures. In each case the history and context of the cluster will mean that different strategies will need to be taken.

Figure 1. **Four step process for cluster support**



Benchmarking Clusters

There was good discussion at the Glasgow TCI conference on this. At a workshop, there a consensus reached that it would be possible. A discussion was held on what types of indicators should form the basis of a benchmarking exercise. It was thought that around 4-5 reasonably straightforward indicators might be best viz.

- Skills/education qualifications
- Number of entrepreneurs
- Number of patents issued

Ms. Irene Hepburn (Angle Technology Ltd, Aberdeen) referred to an EU study of high tech clusters that used a scorecard. Shrewsbury UK and a locality in Germany has done some benchmarking in respect of their hospitality clusters.

The workshop concluded with agreement that a group be formed to share information and to develop a system for benchmarking clusters across countries.) offered her strong support, but needed to take a rain-check on her availability in terms of involvement. It was therefore agreed to call the group the G7 on Cluster Benchmarking, with membership as follows:

- Ms. Irene Hepburn - co-convenor (Angle Technology Ltd, Aberdeen)
- Mr. David Bowles (One North East, Newcastle)
- Prof. Harvey Gibson (Cogent Strategies International Ltd, Glasgow)
- Mr. Arvin Jelliss (Agriculture & Agrifood, Canadian Government)
- Mr. Bjarne Jensen (Oxford Research, Copenhagen)
- Mr. Jan Larosse (IWT, Brussels)
- Mr. Rod Brown (APD Pty Ltd, Canberra)
- Ms. Tracey Scott-Rimington (Cairns Region Economic Development Corporation) - subject to availability.

Mr. Angus Garrett (Regional Service for Clustering, North Tyneside UK) attended another benchmarking workshop held simultaneously. His view was that the identification of the right indicators is the challenge, and that quantification is difficult. The need is to look for collaboration, and some measure of whether companies are in fact collaborating

The City of Playford's Cluster Strategy for Industrial Renewal: Building Regional Systems of Innovation



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City of Playford

January 2001

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Abstract

The City of Playford, is building its regional and industry development initiatives on an understanding of the dynamics of growth and regional innovation systems.

This report explores the new global challenges facing local government and how the use of cluster approaches have been tailored by the City of Playford to meet the demands of the new economy.

It particularly refers to the way in which business to business e-commerce is transforming global supply chains and the implications this has for local economies as companies compete to enter global markets, or re-enter existing ones.

Working in partnership with Professor Graeme Sheather, Director of Manufacturing and Management at the University of Technology, Sydney, the City of Playford has developed practical methodologies to measure enterprise best practice and supply chain performance.

Results from a study of 44 original equipment manufacturing (OEM) firms, and their 143 first tier suppliers, in the electronics and related industry sector, operating in the region are reported.

This industry intelligence has been employed to create a number of clustering initiatives in the region.

New market and export development opportunities are in train, along with the prospect of facilitating technology diffusion amongst companies in the food processing and electronics sectors.

Results of this work over the past twelve months have begun to yield important commercial breakthroughs.

Project collaborators, the Electronics Industry Association estimate that once these clustering initiatives are fully implemented they can be expected to generate between \$28 million and \$57 million in additional revenue for these networked companies.

As important as these commercial initiatives are, these breakthroughs are also creating changes in culture - both in business and government.

The City of Playford, (formerly Elizabeth and Munno Para Councils) is a local government authority in the northern region of Adelaide, the capital of the State of South Australia. The State is national leader in manufacturing export growth .

Key economic strengths in the northern Adelaide region are the automotive, electronics, defence, plastics, food processing and horticulture industries. Playford accounts for 16 per cent of South Australia's manufacturing employment, and 40 per cent of the State's horticultural production.

The combined northern and western Adelaide regions account for 70 per cent of the State's manufacturing output, and is home to some of Australia's most innovative companies.

1

1. Introduction

Clusters: A New Economy Industry Policy Architecture

Can the Australian economic miracle last? With 37 consecutive quarters of growth, Australia is experiencing the longest period of sustained growth since national accounts were first established in 1957.

In fact Australia has out performed the OECD average for economic and employment growth, and challenged the impressive productivity growth record of the United States.

So with economic fundamentals in place; low inflation, low interest rates, the most open economy in the world and prospects of slowing growth to take the heat out of the economy, is this as good as it gets?

Had one asked this question a decade ago, the answer would certainly have been yes!

However, despite these apparent successes and an enviable economic record, international perceptions of Australia's economy are not positive. Australia is seen by global financial markets as a commodity producing country - an 'old economy'.

Although Australia is ranked third by the OECD for spending on information technology (IT) as a percentage of GDP, the old economy tag remains.

Australia must counter some of the old economy perceptions held by the financial markets. For this to occur, a dynamic global presence is required in the knowledge intensive, manufacturing and services industries. These are the fastest growing areas of world trade.

There is a problem, however. This is 'where Australia's trade deficit is increasing most rapidly [and] must clearly be treated as an urgent priority'. (Genoff and Green 1998; Green 1999)

New economy policy responses are called for. At the forefront of this new policy framework is industry clustering as illustrated in Exhibit 1.

Exhibit I: Rationale for cluster development

The experience of successful economies around the world shows that [these issues] can be addressed not only by large international corporations but also by smaller firms which cooperate as well as compete through industrial clusters at the regional level.

The rationale for cluster development is the emergence of flexible organisations, which gives firms and organisations the ability to combine the advantages of smaller scale, more flexible production with the global economies of scale associated with inter-firm linkages and cooperation. (Green, 1999)

There is no doubt that success in the global economy depends on a nation's ability to enter new markets. And this, in the 'new economy', means being innovative and at the cutting edge of product development.

In turn, successful regions also have strong local innovation systems. As Porter (1999) concludes 'the enduring competitive advantages in a global economy lie increasingly in local things - knowledge, relationships, motivation - that distant rivals cannot match'.

Old economy industry policy, with its focus on sectoral strategies, is no longer suited to the new competitive forces found in the global economy.

New economy industry policy is about understanding the dynamics of regional innovation and growth. It focuses on the innovative capabilities and technology pathways within and between industry sectors, and within and between regions and nations.

The development of relevant and responsive industry policy must reflect these dynamics of growth. And the industry policy architecture in the new economy is not a 'one size fits all' - but a focus on moving firms up the competitiveness ladder to compete in global markets and building the connectivity between enterprises, sectors, regions and the global markets and innovation systems which link them together.

Global supply chains also link regional, national and global systems of innovation.

As the OECD (1999) observes:

'Networks of innovation are the rule rather than the exception, and the most innovative activity involves multiple actors. To successfully innovate, companies are becoming more dependent on complementary knowledge and know-how in companies and institutions other than their own.

Innovation is not the activity of a single company (like the "heroic Schumpeterian entrepreneur"), but rather it requires an active search process to tap new resources of knowledge and technology and apply them to products and production processes....

Companies are developing strategies to cope with their increasing dependency on their environment such as more flexible organisation structures and the integration of various links in the production chain through strategic alliances, joint ventures and consortia....

The main goal of most strategic alliances has been to gain access to new and complementary knowledge and to speed up the learning process.'

Regions with well developed science and research infrastructure and supporting institutions, and companies anchored in the knowledge intensive manufacturing and services industries, together act as a magnet for the uptake of new technology arising out of regional, national and global systems of innovation.

As illustrated in Exhibit 2, the process of clustering can directly enhance knowledge generation and diffusion in regional innovation systems. However this depends on strong regional leadership to build local competitive advantages.

Accelerating and embedding this process of global and regional innovation systems is the growth in business to business (B2B) commerce, and the development of new global supply chains and preferred supply chain arrangements.

The latter are especially important because these relationships are built on trust, diffusion

of technology and know-how, and product development to build new markets.

These are new changes to the way companies do business, and the development of new products and markets are influencing patterns of regional growth and investment.

Virtual enterprise structures and organisations challenge traditional locational investment decisions. In fact these new global forces simultaneously build on the dynamics of successful regions moving them further up the international competitiveness ladder, whilst unleashing further adjustment pressures on weaker regions, which are less industrially diversified and have poorly integrated regional innovation systems.

Yet competitive advantage is something which is and can be created. Globalisation is resulting in opportunities for international technology transfer unparalleled in the modern era. But for regional economies striving to move up the competitiveness ladder, this is a double-edged sword. Technological advances are being increasingly concentrated in the most industrially advanced nations and global corporations.

Ireland has succeeded. It has adopted new industry development approaches based on clustering, and a strong commitment to developing 'knowledge capital' (Green, 2000). The Irish approach dramatically demonstrates how previously disadvantaged regions can experience a sustainable industrial and technological renaissance.

Building on the success of the Irish model, the European Union has created a 'new generation of regional development programmes' for 'less favoured regions', to build competitive advantage and increase local incomes. The major priority for this program is 'building regional innovation capabilities' through collaborative industry clustering approaches. (Landabaso and Morgan, 1999).

Whilst traditionally industry policy has relied on the deft hand of government intervention, a new industry policy architecture is built around increasingly more sophisticated partnerships between companies, and between the private and public sectors.

The City of Playford's Strategic Industry Approach – Making a Difference

McKinsey's catch phrase of 'lead local and compete global' has been embraced by the City of Playford to maximise local employment and investment opportunities.

It is therefore not surprising to increasingly find cluster analysis and development as the focal point of economic and industry policy. As Porter (1998) put it:

Clusters, broader than industries, capture important linkages, complementarities, and spillovers of technology, skills, information, marketing and consumer needs that cut across firms and industries ... fundamental to competition, to productivity, and especially, to the direction and pace of new business formation and innovation. ... Viewing a group of companies and institutions as a cluster highlights opportunities for coordination and mutual improvement in areas of common concern without threatening or distorting competition or limiting the intensity of rivalry.

Playford's strategy is not so much about picking winners or losers, as much as working with what you have and building upon the local dynamics of growth.

Exhibit 3 below summarises Porter's thinking on the policy architecture required to build clusters and strengthen competitive advantage from the enterprise through to the industrial and regional level. These include:

- Collection and dissemination of industry intelligence
- Export promotion
- Development of specialised factors
- Science innovation and technology policy
- Regulatory and market reform
- Attraction of foreign investment

The major strength of Playford's approach is a significant investment in the collection and dissemination of industry intelligence.

As outlined in section seven, the gathering of industry intelligence on enterprise capacities and capabilities is instrumental in the City's clustering approach and allocation of scarce resources to create new jobs and investment opportunities.

Clustering activities focus on developing export opportunities which can result in sustainable and longer term growth. Growing the market pie and returns to shareholders has been the strongest short term motivating factor in generating collaboration between companies.

A regional skills audit and review of the region's industrial performance is currently being prepared by Playford's local government neighbour, the City of Salisbury, to assist the process of building enterprise capability and ultimately factor conditions.

To stay competitive in the long term requires new investments in plant and equipment, a commitment to the uptake of new technology and skill formation.

To this end the City of Playford is a major partner in the University of South Australia's Institute of Manufacturing Management Smartlink project. This is a national \$1.3 million technology diffusion initiative. Smartlink builds directly upon regional systems of innovation and links together the region's science and engineering infrastructure.

Perhaps the City of Playford's most significant move has been to foster a collaborative approach to the development of inter-governmental relations to reduce government duplication, and maximise efforts to create projects *which can make a difference*.

Fostering a whole of government approach has been the key to the City's recent success of generating a feeling of ownership at the enterprise level, and developing a new culture of collaboration and partnership building.

2

2. Regional Challenges for Local Government in a Global Economy

Regional industry development policy makers are becoming increasingly aware, sometimes as a result of painful miscalculation, of the folly of trying to predict industries of the future.

As the dynamics of the global marketplace filter through to local economies, critical decisions are being made which can irrevocably influence a region's industrial trajectory.

And as policy making becomes more sophisticated and incorporates an understanding of new regional systems of innovation, industry development in some regions is being based more on rational and logical examinations of their current position, than trying to read the future.

In particular it is well recognised that countries with strong economies have relatively high levels of investment in research and development, education and training, infrastructure and human capital.

Successful countries also place a premium on innovation. Government's of these countries are nation builders.

Yet the drivers of prosperity are often found in a nation's regions. As McKinsey & Co (1994) observe in *Lead Local Compete Global*:

Regions have been often regarded as the poor relation in the mainstream economic debate. This does not do justice to their pivotal role in growing the economy. In today's world we find that it is increasingly regions that compete - not countries; that regions have a key role to play as agents of change; and that regional issues mirror national challenges.

They also reveal that :

70% of all investment growth in regions comes from existing businesses that are growing, and many of the businesses that relocate to a region are attracted by growth of local businesses.

In the meantime the pressures of globalisation are resulting in regional inequalities and even declining standards of living in regions which were once prosperous.

So, where do these changes leave the role of local government in economic and industry development?

Had one asked this question 50 years ago or even 10 years ago in Australia, the answer would have been relatively straight forward; local government should stick to 'rates roads and rubbish!'

The City of Playford owes its very existence to the type of nation building described earlier - the creation of the region's manufacturing base contributing to the wealth of the State, the nation, and the prosperity and employment security of its local community.

In the new millennium, however, the City of Playford's challenge as a Council and regional stakeholder is profound.

At a global level manufacturing is no longer protected by high tariffs. Manufacturers and other businesses must continually reinvent themselves in order to remain competitive in local or global markets. Generally, product quality is improving, they are becoming cheaper, and often require fewer people to produce them.

Economic growth alone does not necessarily translate into new jobs. New jobs are also dependent on new markets and product development.

Innovation, ingenuity and an entrepreneurial spirit are critical success factors in the new economy.

The nature of work is also being transformed. Traditional career paths are in many instances, a thing of the past. Continuous and life-long learning means a person's working life is characterised by change and opportunity. Equally, for many who are unable to participate in upskilling, it may be a time of great uncertainty.

3

3. The Key to Industrial Success is 'Working with What You Have'

These changes present new challenges for government. The industry and regional development role of government is no longer just protecting industry and jobs as it once was.

State and Federal Government policy instead aims to enhance market conditions (competition policy and microeconomic reform), while reducing the level of direct assistance for industry development.

At the same time local government amalgamations and regional consolidation are placing greater expectations on local government to deliver new employment and investment outcomes. Yet Federal and State funding to local government has not increased to match these new expectations.

Nor has such funding increased to meet growing business and community expectations. For example, there are heightened community expectations that the quality of education and training must meet the requirements of an increasingly knowledge based economy.

Business is increasingly demanding tailored extension services to assist it in the process of transition to new industries and investment opportunities. And where the costs of globalisation outweigh the benefits, regions are calling on government to provide appropriate social and adjustment programs to ameliorate transition costs.

Councils and regions are at the front line where the issues and demands for action are first voiced by the community and business. They are also where the costs and benefits of globalisation are most visible.

The City of Playford is meeting these regional challenges and has taken the rational approach in its industry development strategy, titled *An Innovative City*.

Playford's strategy is built on a seemingly simple insight. That is that a region's technology trajectory usually comes from its existing industrial structure, and is built from the ground up - or in other words, 'work with what you have'.

This approach has been forged through practical industrial initiatives developed by the OECD and elaborated upon in the Australian Business Foundation's Report, *The High Road or the Low Road* (1997).

Professor Laura Tyson, President Clinton's former Chief Economic Adviser reinforces the idea that industry development initiatives should be built around existing industries. This is especially so in high technology industries such as defence, electronics and engineering which are key drivers of industry development in Northern Adelaide.

Lags in the international diffusion of knowledge mean that first-mover advantages accrue to innovative firms, industries and the regions in which they trade. Knowledge is often embodied in company-specific production processes and tends to 'cluster around similar activities generating self-reinforcing localised externalities through the germination of "specialist" inputs and informational networks'. (Tyson 1992).

This experience and know-how accumulates to develop the dynamic, competitive advantages of industry clusters. As Tyson observes:

Studies of technological change demonstrate that technological capabilities develop in conjunction with production. In other words, they cannot be acquired simply by purchasing a product, rather they are 'hands-on' or 'tacit' capabilities that depend on active involvement in the production process itself.

Such dynamic path dependency also has important implications for direct foreign investment. Tyson concludes:

... when a country has its own indigenous technological capacity in a particular industry based on its own firms and workforce, foreign investment is more likely to enhance local economies. In contrast, if the host country has limited technological capabilities in an industry, foreign investment is more likely to drive out local competitors and further reduce such capabilities.

The last thing a region needs is investment in footloose companies at the expense of developing the local or indigenous technological capacity and capabilities.

Providing regional policy makers follow the fundamental principle of 'working with what you have', and implement policies which build industry complementarities, companies will receive the tailored and relevant policy architecture to assist them to invest and prosper.

It's about putting existing markets to work, and getting the support framework right to ensure collaboration enhances competitiveness.

In Playford's case, the existing industrial structure is substantial and, in many areas, at the leading edge. Northern and western Adelaide are home to some of the nation's leading manufacturing and high technology companies.

These manufacturing companies with a strong outward and export orientation are leading the way in Playford. They are either the smart survivors of intense adjustment pressures experienced over the past two decades, or new dynamic small to medium sized enterprises.

For instance, General Motors Holden will invest around \$1.8 billion to increase automotive production volumes at its Elizabeth factory in the heart of the City of Playford. Building on the dynamics of local proximity, GMH is currently working with the State and local governments to establish an automotive park adjacent to its production facilities to supply parts as the company expands into new export markets.

In turn, Intercast & Forges, Australia's largest independent metal forging business has opened its national head quarters in the region's Cast Metal Precinct. These investments in state-of-the-art technology significantly contribute to the region's manufacturing and knowledge intensive engineering infrastructure.

Scholle Industries, developers of the plastic wine cask, now produces, with its US parent company, 65 per cent of the world's production. Scholle plays a key role nationally in the wine industry's research and development effort.

The region also comprises of state-of-the-art packaging and distribution companies such as Comit and Mondella Farms (both of which have recently won the Premier's award for leadership through innovation), and emerging exporters such as Bellis, the manufacturer of fruit bars.

Such companies are competing in international markets while holding their own in highly competitive and unforgiving global supply chains.

In order to support industry development initiatives, we must first embrace a clearer understanding of the role manufacturing continues to play in the new economy.

4

4. Manufacturing Accounts for Much New Economy Research and Development

The new economy is characterised in the media by dot coms and advances in information technology and communications.

This brave new world, we are told, is set to transform the way we work, communicate and spend our leisure time.

But is this an accurate description of the new economy?

Or is a more real world explanation provided in Exhibit 3?

Exhibit 3: Real world new economy definition

The New Economy is not about making computers or microchips.

The New Economy is not a set of new industries; rather it is a set of new sources of competitive advantage faced by all industries.

The New Economy is about speed, quality, flexibility, knowledge, and networks.

It is about applying knowledge and new ways of doing business to a wide range of products and services, from agriculture and apparel to business services, retail and software. (Collaborative Economics, 1998)

Behind all the dot com hype are vast arrays of economic activities which provide employment for most of the workforce.

Some of the most important of these activities can be found in manufacturing.

But what has manufacturing got to do with the new economy? It is not after all perceived as part of the problem rather than as part of the solution?

In a modern economy nothing could be further from the truth.

Genoff and Green explain in Exhibit 4 how manufacturing is both a major producer and consumer of new technology, and often accounts for up to 65 per cent of an economy's research and development.

Exhibit 4: Why manufacturing is knowledge intensive

'...high tech gravitates towards state-of-the-art producers'... and that means a vibrant manufacturing sector, since embedded within manufacturing is a knowledge infrastructure essential to a dynamic economy.

In this sense, 'we are experiencing a transition not from an industrial economy to a services economy but from one kind of industrial economy to another' (Cohen and Zysman).

While jobs growth in the future will be in services, it must have links into the state-of-the-art [knowledge intensive] manufacturing, because without it these service jobs will be by definition low wage [and unskilled]. (Genoff and Green 1998)

With parts of manufacturing in South Australia well integrated into the rest of the economy, considerable scope exists to activate what Brain (2000) calls 'super multipliers'.

These super multipliers occur when industrial expansion results from export development, investment in new technology or import replacement.

Such growth has the propensity to create much stronger local spinoffs, compared to growth associated with meeting domestic demand.

For example, Exhibit 5 summarises data prepared by the South Australian Department of Industry and Trade (1999) on the contribution manufacturing makes to the South Australian Economy, and the 'super' flow-on effects it exerts.

From a new economy industry policy perspective, it makes sense to develop a region's manufacturing capacity and capability - especially when it is export orientated.

South Australia, including northern Adelaide, have some important competitive advantages which are being expressed through export growth of knowledge intensive ETM's. In creating jobs and technology spinoffs, they directly contribute to the bottom line of the nation's current account.

Exhibit 5: Manufacturing super multipliers

- For every \$100 dollars of output from the manufacturing sector, other sectors supply \$55 in inputs to produce that output.
- The manufacturing sector also accounts for 57 percent of business expenditure on R&D. This share of expenditure is almost four times its share of GDP.
- In turn, manufactured exports typically account for 65 percent of total merchandise exports from South Australia, a figure which has grown over the last seven years from 54 percent.
- Significantly, annual growth in elaborately transformed manufactures (ETMs) has been strong in recent years, with average annual growth of 13.6 percent over the last five years, compared with 8.4 percent for exports overall.
- In input-output terms, exports of manufactured goods directly support in excess of 25 percent of State GSP.

However there is still a long way to go.

Success and failure will largely be determined by the region's ability to increase its international competitiveness through the development of an appropriate and responsive policy architecture.

For our knowledge intensive manufacturing and service industries, this means ensuring that they become major players in new global supply chain procurement programs.

5. B2B and Strategic Supply Chain Partnerships in Regional Innovation Systems and Global Markets

The old economy supply chain is relatively linear, starting with manufacturers value adding raw materials, progressing through to the final consumer.

In the new economy, however, Penelope Ody of the London based Financial Times (October 25, 2000) writes:

[The] ideal supply chain is becoming so lean that it may one day really conform to the sell-one/make-one model - small wonder ...[the] business to business commerce marketing manager at Oracle calls it the 'supply chain nirvana'.

High profile dot com's attempts to capture the retail business to consumer market have stalled.

The real e-commerce success is in business to business (B2B).

B2B e-commerce is being used to generate efficiency gains in many areas, from demand management and forecasting to the streamlining of inventory processes.

In the new economy where suppliers produce and/or design components, multinational corporations are forming global procurement programs as illustrated in Exhibit 6. (see also Apple, 2000)

In this new regime of hyper and time-based competition, there will be winners and losers.

Companies will compete head-on to be part of such global procurement programs as will regions.

Governments will compete to ensure their local companies are linked into this new global marketplace, making the need for strategic and flexible industry development measures all the more important.

Although in some respects old fashioned competition is merely taking on a new guise, the reality is that companies competing on price may face auction style internet trading.

Companies in traditional and segmented supply chains are often characterised by high transaction costs with intense rivalry in mature markets. Increased pressure on profit margins means these companies are vulnerable to on-going adjustment pressures.

On the other hand, integrated strategic supply chain partnerships (SSCPs) are characterised by networked first and second tier suppliers.

Exhibit 6: Global procurement supply chains

In early April 2000 14 energy chemical companies including BP Amoco and Royal Dutch Shell announced that they would establish an internet procurement exchange to buy and sell oil exploration and refining equipment.

They stated they would use the web for 'a significant amount' of their US\$125 billion in combined procurement. BP Amoco CEO John Brown has said 95% of their procurement would be done on line by the end of the year. (Source: Internet search: Bloomers News April 11 2000)

Ford, General Motors and Daimler Chrysler - have banded together to form a huge electronic commerce exchange where they can buy all of the goods and services they need to make cars. The expected turnover of the exchange, dubbed Covisint, is \$US250 billion. (Source: *The Australian Financial Review*, 26 June 2000)

However the Big Three have competition. Their portal will compete with other on-line parts exchanges that have already been launched, such as Tokyo-based Toyota Motor Corp's I-Star... (Source: Internet search: www.computerworld.com, Big Three automakers team up with a second B2B venture, 7 December 2000)

[Meanwhile the] big suppliers are responding in kind. Bosch, the German electricals group, has joined with other large auto suppliers to set up their own exchange, which might eventually link with Covisint. (Source: *The Australian Financial Review*, 26 June 2000)

They in turn network with original equipment manufacturers (OEMs) and/or final consumers.

In other words, these firms are integrated vertically and horizontally within the supply chain network.

OEMs and final consumers tend to have strong partnership relationships in research, and product and market development.

These strategic relationships are supported through a region's research and development infrastructure and other supporting institutions which together make up the regional innovation system. See Exhibit 7.

The key issue is that first mover advantages are often no longer measured in years, but rather in months. In fact:

Japanese electronic companies' consumer products now average a mere three-month life cycle. Sony introduced a staggering 5,000 new products in 1995. ... Wim Roelandts, chief of Hewlett-Packard's computer systems organisation, observes that most of his company's revenues are derived from products which didn't exist a year ago. (Jeremy Rifkin, 2000)

Collaborative partnerships to compress research and product development cycles are at a premium, especially as individual companies on their own may not possess the capabilities to undertake rapid product development.

Dr Anderson of Anderson Consulting and Dr Lee of Stanford University (2000) agree. Supply chain integration they say

requires a coordinated set of actions involving all relevant supply chain partners. Unlike traditional supply chain strategies which focus on improving operations inside the company, [SSCPs] strategies require coordinated cross-functional and multiple partner decision making throughout the entire supply chain.

Not surprisingly SSCPs require a level of trust which goes far beyond the traditional winner takes all approach of the old economy. The benefits of SSCPs are outlined in Exhibit 8.

**Exhibit 7 : Strategic Supply Chain Partnerships:
meeting the challenge of reduced product cycles and time based competition**

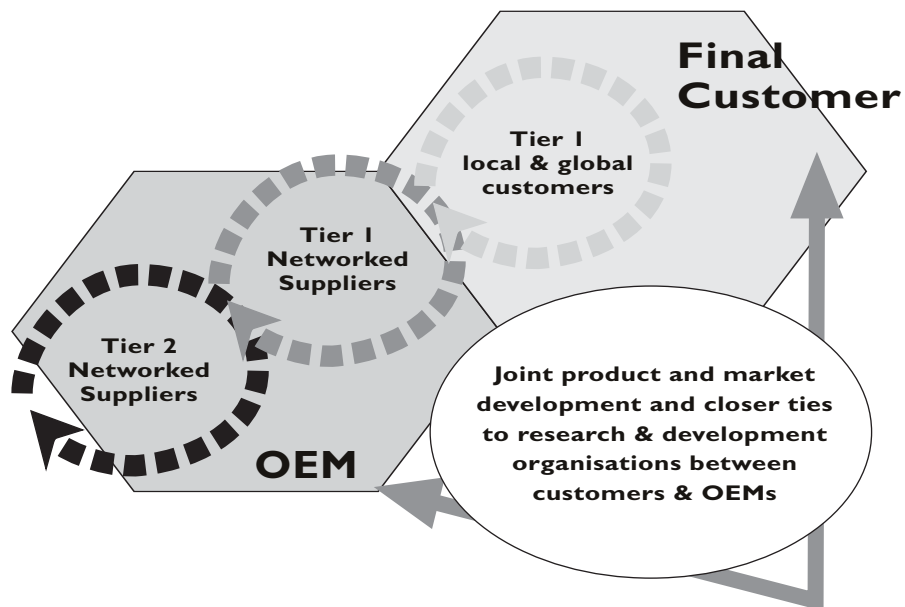


Exhibit 8 : Benefits of Strategic Supply Chain Partnerships



Exhibit 9: Participating in strategic supply chains means SMEs will need to have:

- Computer Integrated Manufacturing and Computer Aided Manufacturing systems;
- managers with the ability to participate in the management of the entire supply chain;
- strong strategic alliances with other core members of the supply chain;
- an open risk sharing, information sharing and communication system;
- a sound financial balance sheet so that the risks of continued innovation can be covered;
- a workforce involved in life-time learning;
- full-e-commerce enablement (work sites, integrated systems);
- skill acquisition on a world-wide basis (the sole use of local inferior skills not an option); and access to appropriate design and development skills.

See National Economics (2000)

In addition, a new generation of virtual fourth party logistics (4PL) providers are emerging which manage product assembly, packaging, and handling through to the consumer. 'This sort of model' writes the *Financial Times* 'is already appearing in the electronics sector, notably for mobile telephones, where the distribution contractor is effectively taking over product assembly as well.' (ibid)

Keeping a step ahead of these global changes to production and distribution present challenges to Australian companies.

National Economics believes that Australian small to medium sized enterprises will need to dramatically improve their productive capacities and capabilities in a significant number of areas if they are to participate in SSCPs. These as summarised in Exhibit 9.

National Economics also express serious concerns that Australian SME's lack sufficient capacity and capability to ensure they can

remain competitive in the long term.

Even if they are part way right in their analysis, then the need for cluster strategies and strategic industry policy initiatives are indeed urgent.

As the Irish experience suggests, a region's future is not pre-determined by what old economy economists or financial markets think!

As suggested earlier - competitive advantage is something which can and is created.

Regions which provide leadership in developing their manufacturing and service industries, are the ones best placed to participate in global procurement supply chains and innovation systems.

Such pro-active regions can then expect to increase their share of direct foreign investment, and may even experience a sudden turnaround in the sentiment of financial markets!

Ultimately this positive investment and self-reinforcing investment cycle leads to greater investment in indigenous SMEs.

Who a decade ago, would have predicted that this would be precisely the road now being travelled by the Irish?

And guessed the tag - the 'celtic tiger'?



6. Understanding What You Have: Measuring the Capacity and Capability of Clusters

It is imperative that the dynamics of growth are understood so that policy makers ask industry the right questions and the right data is procured. Only with sophisticated industry intelligence can informed policy directions be taken and resource allocation optimised.

In this respect the City of Playford's cluster methodology involved:

1. Economic modelling.
2. Analysis of Technology Diffusion Clusters.
3. In-depth company interviews to assess best practice manufacturing, operational performance, and supply chain connectivity.

As interviews were undertaken, and industry leaders emerged, the process of cluster engagement was activated, which in turn assisted industry practitioners to undertake further in-depth company interviews, leading to a further round of engagement. This process can best be described as an action research approach to clustering.

(At this stage it is worth noting that the conventional process of measuring regional or industrial strengths and weaknesses often begins and ends with official government data, which are usually between two and four years old. A fuller discussion of problems arising from relying predominantly on traditional forms of data collection and analysis are explored in Appendix 1.)

A Region still Vulnerable to Adjustment Pressures

Economic modelling prepared by National Economics reveals that the regional industry structure in northern Adelaide is still vulnerable to international adjustment pressures and likely to experience significant employment pressures arising from a correction to the Australian economy during 2001.

When the region is benchmarked against similar manufacturing regions in Melbourne and Sydney, skill formation emerges as a likely future impediment to growth.

While the region has some of the most innovative and technologically advanced companies in Australia, its industrial fabric needs to be dramatically strengthened.

Technology Diffusion Clusters

Understanding supply chain relationships and developing cluster strategies to develop SSCPs, is critical to move companies up the competitiveness ladder. However the industrial dynamics of regions is more broadly determined through the level of integration not only within industry sectors but also between sectors.

Technologies become bunched together in clusters of complementary and integrated activities. The OECD has defined five basic technology diffusion clusters (TDCs): Transportation, Consumer Goods, Materials, Fabrication and Information. (The Information TDC is a key enabling cluster within the economy as a whole).

For example, the Transportation TDC is comprised of automotive and components sectors, shipbuilding and the aerospace industry. Technological advances in aerospace and microelectronics are important in the development of fast ferries, with spin-offs into the automotive industry.

The City of Playford analysed the strengths and weaknesses it has present in each of these TDCs as shown in Exhibit 10.

This research, combined with interviews with Playford's leading companies and SMEs, reveal an 'Innovative City' which is engineering rich and knowledge intensive, with a strong research and development orientation.

But it also suggests that clustering initiatives are required to lock in greater regional input to create more local jobs.

EXHIBIT 10

Cluster Classifications		
Cluster	Presence of Industries in City of Playford	
	Strong Presence	Weak or No Presence
Information	Electrical machinery	Computers, communication and semiconductor equipment; instruments.
Transportation	Motor vehicles; other transportation	Shipbuilding; aircraft.
Consumer Goods	Food; textiles	Beverages and tobacco; apparel; footwear.
Materials	Agriculture; construction; chemicals; rubber and plastics.	Mining; paper and printing; wood products, stone, clay and glass; ferrous metals; non-ferrous metals; pharmaceuticals; petroleum refining.
Fabrication	Other non-electrical machinery; other manufacturing.	Fabricated metal products.

7

7. Best Practice and Supply Chain Analysis For The Electronics Industry

(The following section of the report has been prepared in conjunction with Professor Graeme Sheather, Director of Manufacturing and Management of the University of Technology, Sydney.

Research on this industry mapping project is still in progress. However research results have been employed to activate cluster initiatives in the electronics and engineering industries in Northern Adelaide. The full report will be released in June 2001.)

Introduction

Globalization of markets means products and services are now demanded in "zero time", so that competitive advantage relies on time-based competition. Critical processes in this challenge to 'take time out of the system' are the adoption of 'best practice' and improved efficiency in 'supply chain management' acting as strategic weapons to leverage the international competitive capability of enterprises.

This study reports on a project to test these claims amongst 44 original equipment manufacturing (OEM) firms, and their 143 first tier suppliers, in the electronics and related industry sector, operating in the Northern Adelaide Region. (A further 100 in depth company interviews are currently in progress).

The aim was to identify those best practice firms and the structure of the supply chain and procurement networks operating between the OEMs and their supply firms.

The demonstration of competitive advantage through adoption of best practices, procurement collaboration and industry clustering in the electronics industry can be used to confirm the methodology and as a basis for extending the pilot survey.

Best practice

Best practice scores were obtained by questionnaire from the OEMs comparing their Operational Practices (adopted in technology and management programs) to leverage their Business Performance (in terms of competitive capability, profitability and operational

outcomes). For each of the 44 sites, measures of these two scores were plotted to establish a site capability, as shown in Figure 1 below.

Linear regression determined the 'line of best fit' between the two measures, with top and bottom quintiles (20% of sites) used to identify 'leader' and 'lagger' firms. The remaining firms fall within a 'mid-range' performance category.

Whilst there is a clear continuum of sites along the line of best fit, there are a number of 'outlyer' sites that have excellent performance achieved with minimum adoption of new technologies.

There are also sites that have invested in numerous technologies, but with marginal results in performance. This can be explained by the lag effect of implementation, reliance on existing infrastructure and legacy management systems, the 'experience curve' effects of production skills and methods, amortized technology, and long standing customer/market dominance based on quality and service, rather than investment in the latest technology.

Leader firms are a mix of mid (50-100 employees) to large (200 plus) reflecting their ability to fund investment in training and new technologies. They also have to adopt best practice and quality certification as a condition of vendor management policy with major customers, and as a requirement of entry into international markets. Recent entrants into the electronics industry sector with new and innovative technologies obviously employ latest design, engineering and manufacturing technologies.

Lagger firms are exclusively small (less than 15 employees) and predominantly specialized products/services, and operate as agents/brokers/marketers, and design consultants. They all indicate a need for management systems, business skills and basic training, before they can move to mid-range and leader status.

Opportunities and management assistance to these firms is an essential platform for strategic industry policy if the electronics and engineering sector is to realise its full and future potential within the region.

Industry Structure

This section explores the industry structure and potential for clustering amongst the 44 OEMs and their 143 first tier supply firms.

Companies in the survey reflect the size and age structure of the industry with:

- 70 percent small (less than 10 employees),
- 16 percent SMEs (25-100),
- 14 percent large (greater than 100),
- 20 percent established
- 80 percent recently established operations.

At the 2 digit ANZSIC code level they are predominantly 'Other machinery and equipment (including electronics and electrical)', 'Other manufacturing' and 'Other not specified (e.g., computing, IT, communications)', and 'Fabricated metal products' completing the major categories of business.

The 44 companies are a mix of OEMs selling to final customers in the marine, agriculture, and retail sectors, specialized industrial instrumentation, and government agencies. The balance are first tier suppliers to the major automotive, defence, mining, agricultural and aeronautical sectors.

Supporting these OEMs is a wide range of component/sub assembly, fabricators, and finished goods manufacturers, producing electronic systems, visual control, instrumentation, safety, testing hydraulics, transponders and microprocessor products.

Characteristic of such specialized and customized industries, there are a wide range of service providers; agents/brokers, design consultants and computing software development houses. Importers and wholesaling agents provide the integration and supply chain linkages necessary for the competitive success of the sophisticated high tech electronic industry clusters of the region.

Innovation and intellectual property development is a key competitive platform of the region supported by Cooperative Research Centres and a number of research and development firms.

The basic structure of the exchange relation-

ships between the sample companies can be illustrated in two ways.

First, by mapping the structural networks operating between the OEMs and their first tier suppliers to show the spatial web of inter-dependencies and also the centrality of key suppliers who serve multiple customers.

Figure 2 below illustrates the supply web for the top 20 companies, based on the intensity of their procurement transactions. Both single OEMs and multiple suppliers are shown, plus transactions between individual OEMs.

Multiple linkages reflect suppliers that offer a wide range of products (either standard or specialised), whilst single suppliers provide a mix of preferred, highly customised product sets, and/or substitute options for the OEMs. Obviously the region is a complex mix of supply chains and procurement networks or webs.

The second method for illustrating the supply chain structure of the region is to group the OEMs based on the similarity of their supply chains and networks.

This component's of Playford's research (which is still in progress), distinguishes between groups of OEMs based on both the number, and utilization of common, suppliers.

So far eleven distinct blocks or groups of OEMs emerge to reflect the underlying procurement structure of the region. At the lower end they range from OEMs that choose not to disclose their transactions for 'commercial-in-confidence' market reasons. The mid-range group of OEMs relies on 7 or 8 single suppliers.

This analysis identifies those firms that share common supply chains and/or networks, and could benefit from establishing formal cross-industry clusters of service, design, R&D, procurement auctions, manufacture, and marketing of *integrated* electronic products and services.

Such clusters would clearly enhance the efficiency and market potential of Northern Adelaide Region firms to operate in both local and global competitive arenas.

Expanding this pilot sample of sites to capture *all firms* in the electronics and related industries would provide a strong argument for strategic industry development to achieve super regional multiplier benefits.

Business Alliances and Collaborative Networks

As a basis for building potential industry clusters, the survey collected data on company participation in business networks, supplier to customer/buyer partnerships and joint supplier alliances. Such collaborative ventures were undertaken by 40 percent of the OEM sites involving a mix of formal networks.

Extensive involvement in supplier and sub-contractor partnerships and dealer networks is undertaken to improve strategic collaboration, which may take the form of formally constituted networks and informal operational alliances to improve supply chain management and JIT deliveries. In both cases, strategic co-operation covers all the areas of procurement, product and process development, marketing/sales, after sales service, and distribution.

Less emphasis is placed on alliances for commercialization and export purposes. An interesting statistic is that the majority of 'older' established and 'large' manufacturing firms do not participate in networks or alliances. Start-up and 'younger' firms involving small enterprises in brokering and agencies, design and consulting services, and specialized sub-assembly and component manufacture, are extensively involved. Most probably to overcome barriers to entry and to leverage market penetration in traditionally guarded supply networks.

The increasingly complex inter-systems nature of the electronics industry demands participation to integrate all facets of the product life cycle, plus continuous involvement in innovation and R&D activity.

Identifying sets of suppliers common to multiple OEMs, and also the linkages between OEMs, by the supply chain mapping and cluster analysis methodology, will assist firms to target

others with mutual product and service needs, and become potential partners in collaborative alliances within industry clusters.

As only 30 percent of best practice 'leader' firms currently participate in business alliances, policy initiatives to encourage/assist their involvement could act as a powerful incentive to others, and therefore, form a sound building block for the development of extended industry clusters in the electronics industry across the Northern Adelaide Region.

Activating Strategic Industry Intelligence: Building Clusters and Strengthening Regional Innovation Systems

The industry intelligence gather above is forming the basis for activating industry clusters - a perfect illustration of the fundamental principle underpinning Playford's industry policy architecture - work with what you have.

Of the electronics companies interviewed, around one third are in the process of developing formal protocols to activate new export market opportunities, as a result of our regional cluster initiatives.

The process was jointly facilitated through the Electronics Industry Association (EIA) through a series of targeted networking workshops.

Resources were then marshalled to bring those companies with a financial commitment to collaboration together. Spurring them to action were the loss of some key contracts in the region. Individually these companies lacked the capacity and capability to bid for those new contracts. Clustering they believe would generate new market and resource sharing opportunities.

The EIA estimates that once these clustering initiatives are developed, they may generate between \$28 million and \$57 million in additional revenue for these networked companies.

With the local industry experiencing 9 percent growth per annum (EIA, 2000), favourable market conditions exist to cluster these companies to grow market opportunities and much needed new jobs and investment.

These new projects will also reinforce the recent success of the Business Vision 2010 Industry Cluster Program, which is helping to grow regional capacity and capability. Around \$80 million worth of new export initiatives have been created through Defence Cluster activities led by companies such as Hue Technologies and Celsius Tech, producing leading edge multi processing systems. (See Rod Brown's report above).

Together these projects contribute to the development of Northern Adelaide's regional innovation system.

Running parallel to the electronics and manufacturing cluster project is an inter-regional food cluster initiative. This project is aimed at increasing value added opportunities in the northern region of South Australia (northern Adelaide, Adelaide Hills, Barossa, Clare Valley and the Riverland).

The project has adopted a whole of government approach to maximise cluster initiatives. These are aimed at realising new investment and export opportunities, and reducing transaction costs through improved supply chain management strategies in the region's agi-food and horticultural industries.

Clustering initiatives are being formalised for companies in the food processing, packaging and distribution sectors. Some of these companies have been represented in trade missions to Asia.

At a local level, the Virginia Horticultural Centre (a public/private sector initiative jointly funded by the South Australian government and the City of Playford) has provided the social infrastructure and grass roots support necessary to progress elements of this regional food cluster agenda.

Clustering opportunities in the Barossa for the gourmet/wine/tourism related sectors are also in progress.

In addition, company interviews revealed that road infrastructure constraints were impeding regional investment opportunities.

Outcomes over the past year include six local councils working together for the first time to prioritise road infrastructure investment which

can directly contribute to regional economic development.

(Reports on the food cluster project are available by contacting Rodin Genoff at the City of Playford).

8

8 Concluding Remarks

Northern and western Adelaide is one of Australia's major manufacturing regions and can be characterised as the engine room of the South Australian economy.

Unfashionable as it is in some quarters to talk of manufacturing and the dynamics of growth, South Australia's future economic success is largely dependent on manufacturing moving up the international competitiveness and productivity ladder. And with the growth of that state's manufacturing exports out-performing the rest of Australia, it is well positioned to build on its successes and increasingly outward orientation.

At the local level, the gathering of complex industry intelligence has given the City Of Playford a "real time" understanding of its companies innovative and best practice capacities. It has also enabled the City to learn the supply chain dynamics of key companies driving the regional innovation system.

Whilst it is popular to talk of knowledge based industries (unlike manufacturing!), the City of Playford at a local government level is developing a sophisticated understanding of its industrial and knowledge fabric.

This is unique in Australia.

Gathering this industry intelligence has provided a concrete and cost effective basis from which to develop practical cluster initiatives aimed at building the region's competitive advantages and creating new jobs.

At a time when politicians and consultants are beating well worn paths to Silicon Valley in search of the perfect industrial blue-print, Playford has looked to itself for the answers.

Who said local government doesn't have a role to play?

Figure 1 : Best Practice Capacities and Capabilities

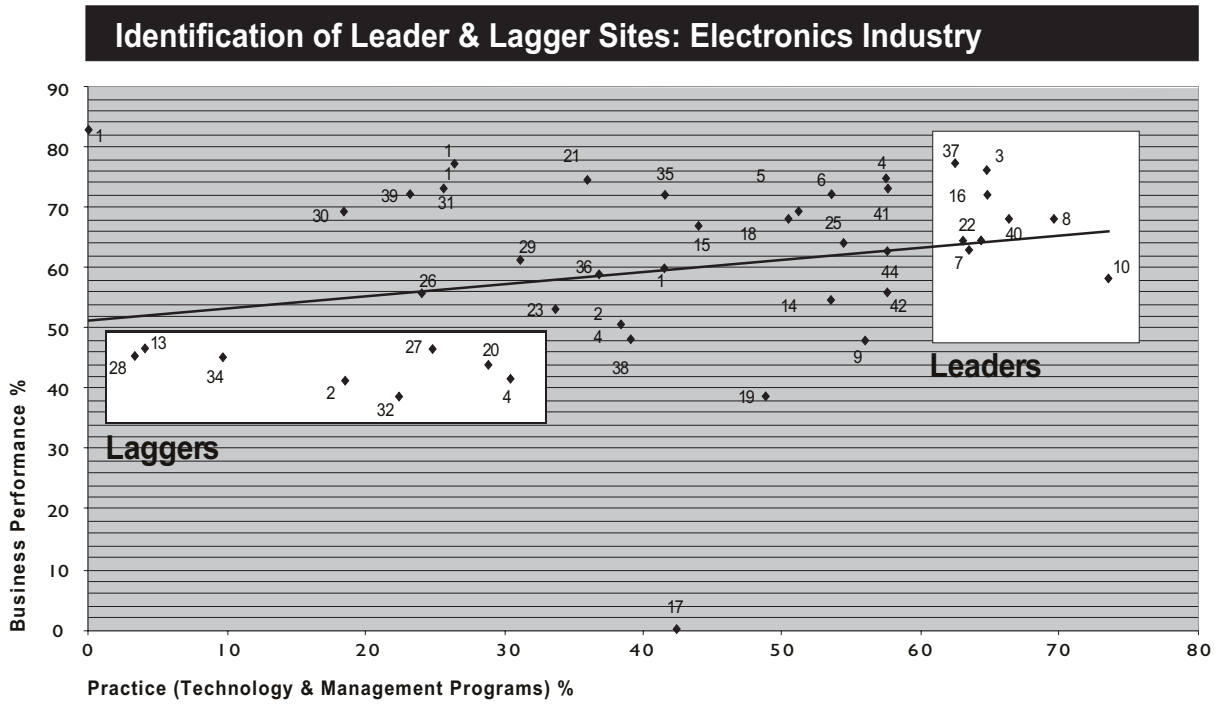
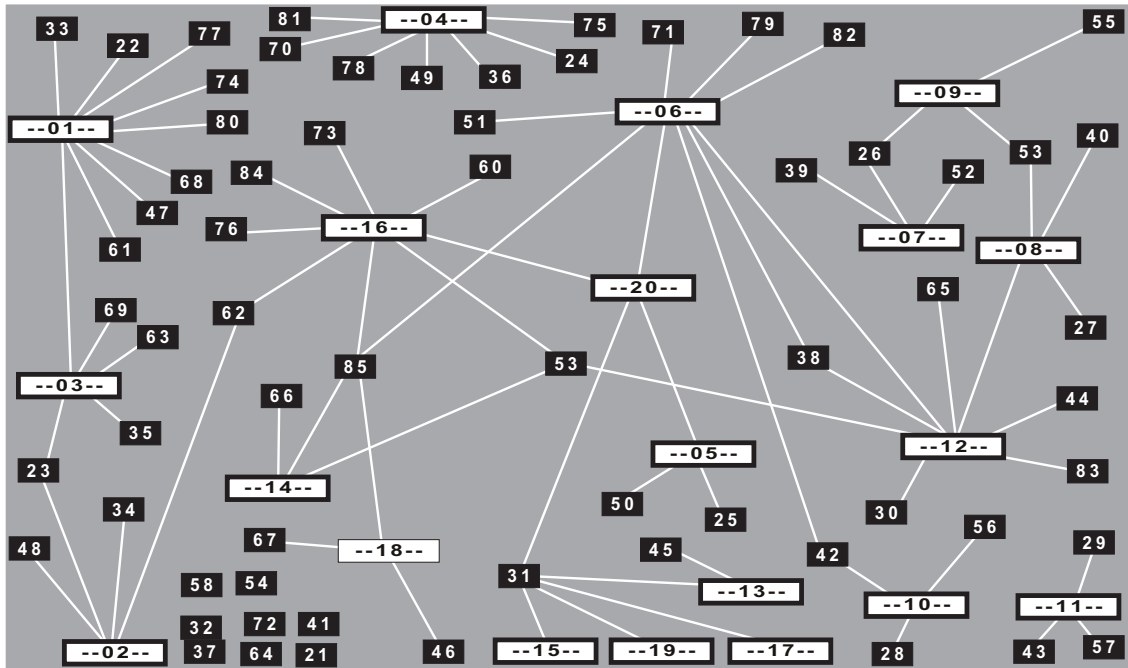


Figure 2 : Supply Chain Procurement Intensity of the Region's Top 20 Firms



Appendix One: Looking at the Wrong Picture: Government Data Weaknesses

Significant gaps and difficulties can surface when trying to use government data to uncover regional clustering activity. Here are just a few examples:

The Unit of Analysis, Firm Vs Industry

Traditional industrial development strategies (for example, business recruitment) tend to use the individual firm as their unit of analysis. But development policies that focus on modernisation and enhanced competitiveness demand data that allow analysis of a specific industry. Currently the only way to approximate this kind of information from government data is to aggregate firms within an industry.

Static Vs Dynamic Data

Even if you do aggregate, an additional problem appears: Most data are like "snapshots" of one time, static conditions rather than "moving pictures" that illustrate the dynamic flows over time that are typical in an active industry cluster. To understand an industry, data are needed about the formal and informal activities that generate business transactions and diffuse technology, knowledge and innovation. Companies in a dynamic industry engage in vertical relationships with one another - called value chains or commodity chains - to yield final products.

Although value-added relationships can be estimated using models based on the national aggregate of purchases and sales recorded by business, these models are based only on gross estimates which, at the regional level may diverge significantly from reality.

Sic Limits

Data that is organised by the Standard Industry Classification (SIC) codes of industries focuses on firms that produce that same end products. It does not capture industry groupings that are based on the use of common technologies, especially specialised expertise or skills, or ties to a scarce resource.

(The same can be said for Australia's ANZIC industry classification system).

Industry Changes and Predictive Ability

Because large corporations are increasingly decentralising and outsourcing production, it is changing their make-versus-buy decisions and consequently purchases and sales so rapidly that official statistics cannot keep pace. Thus these data may lose their value for predicting.

Source: Stuart Rosenfeld (1995) *Industrial Strength Strategies*.

Need for Real Time Data

It is only through undertaking research at the coal face that it is possible to mine for the qualitative industry intelligence that is required for cluster development.

For instance, Rosenfeld gives us an example of "high impact sector analysis", developed by the Michigan Industrial Technology Institute. The model "uses consumer-suppliers relationships as its organising framework...[and applies] national survey data for current and planned uses of technology" to estimate industry competitiveness. However as Rosenfeld points out, "the value of ITI's rigorous methodology is diminished by the weakness of the available data".

On the other hand, the framework developed by Genoff and Sheather employs similar principles, but is based on extensive face to face interviews to develop a regional supply chain competitiveness index based on investment in technology and knowhow. Data is in real time and codes strengths and weaknesses.

Source: Rodin Genoff and Lou de Leeuw, (October 2000)

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Des Masters in the role as cluster facilitator in the electronics sector has won over hearts and minds.

Thanks also to James Coulter of River Strategy & Design for his great support, and yet again delivering on tight deadlines.

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Clusters, Innovation & Investment reports on the latest developments and thinking on industry clustering approaches from around the world.

This book is essential reading for policymakers, industry practitioners, businesses and research agencies. Topics include:

- The importance of clusters to Australia
- 'Scotland the Brave' – the Scottish approach
- The Competitiveness Institute conference in Glasgow – the key issues according to world experts
- The 'Linking Clusters' initiative
- Overview of Australia-New Zealand clusters

Business to business e-commerce is transforming global supply chains and changing the nature of locational investment decisions.

Rod Brown's case studies show how regions adopting cluster strategies can prosper, thrive and act as magnets for global investment. But most all, cluster strategies build regional innovation systems, and provide the foundations for participation in the New Economy.

Clusters, Innovation & Investment also contains reports by The Centre of Governance in Canada, the Foundation for SME Development at Durham University, and the City of Playford in Adelaide, South Australia, which Rod Brown says "is leading local government cluster initiatives in Australia."

Author Rod Brown is one of Australia's leading cluster exponents. He has worked at executive level of government and the OECD. Rod Brown is currently working around Australia on major cluster projects. He is Executive Director of the newly formed Clusters Asia Pacific Inc.



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