



Innovation Lab Australia

INTENSE INNOVATION & EXPERIENTIAL ENVIRONMENTS

Innovation Lab Australia as an ICT Cluster

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Clusters and Innovation Theory

Cluster theory and practice in recent years has reached a new level of interest as a means to enhance a state's national system of innovation. Michael E. Porter's *The Competitive Advantage of Nations* (Free Press, 1990) gave wide attention to industry clusters as a way of drawing together a range of related industries, research and development (R&D) capabilities, training and information and market flows critical to building competitive advantage for the firm in national and global markets.

The terms 'local productive systems', 'industry districts', 'enterprise agglomerations' and 'inter-firm networks' all capture some of the central characteristics of the cluster, the geographical proximity of the firms similar forms of enterprise. In the early 1980s the OECD and its Local Economic and Employment Development program identified the 'third sector' operating between the large private enterprises and government. They were seen as possessing a creative, innovative dynamic through the aggregation of skills and entrepreneurial talent in small enterprises, both in traditional industries or new technology areas, generating extraordinary economic energy.

Clusters, as innovation settings, possess the physical proximity to support intimacy of communication, permit social and enterprise networks to flourish through collaboration and competition enhanced by access to knowledge and market flows. In settings where small and medium enterprises (SME) are disadvantaged by their size, proximity facilitates knowledge flows, critically tacit knowledge in the transfer of a range of benefits. They are compensating factors enhancing the ability of SMEs to build products in innovative ways and into markets both local and global. It is a setting that enhances linkages between knowledge production (universities and research organisations), enabling participants, intermediaries (government agencies, commercialisation agents) and enterprises both horizontally and vertically along the supply/buy value chain. Networked association of all three components of the cluster are important to its emergence, energy and viability. Locale and proximity give the cluster a geographical setting. Local specificity and niche capability make possible both local and global competitiveness.

Historically the interest in clusters has been shaped on the one hand by the need to advance local or regional social and economic development and on the other by the perception that small enterprises, and density of interaction among them, give firms flexibility, technology diffusion, and market

competitiveness. Governments have set policies to enhance these processes and expand wealth generation within them. Much of this policy initiative has turned on how existing knowledge infrastructures might be expanded by enriching knowledge linkages where the informal, tacit knowledge in the transfer of information is deepened through geographic proximity and the creation of centres of excellence. Overtime, new industry policy architecture moved away from direct government intervention to initiatives built around collaborative alliances between enterprises and private and public organizations.

Clusters are definably one of the several strategies now long employed in a state's national innovation system along with others, from science and technology (S&T) parks, business and incubator centres, and networks through to micro programs such as tax based incentives. All but the latter focus on the building of spatial concentration of enterprises and forms of networks. Where networking strategies have been widely promoted from time to time, they should be distinguished from clusters. The OECD usefully sets out the difference:

Networks can provide firms with access to specialised service at lower costs, while *clusters attract needed specialised services to a region.*

Networks have restricted membership, while *clusters have an open 'membership'.*

Networks are based on contractual agreements. This contrasts with clusters, which *are often based on shared social values that encourage reciprocity.*

Networks make it easier for firms to engage in complex production, while *clusters generate demand for more firms with similar and related capabilities.*

Networks are based on co-operation, while *clusters often involve both co-operation and competition.*¹

¹ Alistair Nolan, 'Synopsis, Panel 4 – Beyond Maquiladoras: U.S./Mexico Cluster Strategies', *Strategic Responses to Integration Pressures: Lessons from Around the World*. Local Economic and Employment

The idea of community is here captured in the notion 'shared social values', comparability of industry type and linkages both vertically and horizontally, so characteristic of a cluster.

Clusters Policy in Australia

Both Federal and State governments have explored a wide range of innovative policy initiatives. Federal programs have been implemented across the States and Territories. States have developed their own programs, often striking out in different directions.² One of the most fruitful programs at the Federal level has been the Cooperative Research Centre (CRC) policy that draws universities and other public research organisations together with industry leading through to licensing of intellectual property and from time to time successful spin-off companies. Where the CRCs have not led directly to the commercialisation of IP they have been very successful in aggregating R&D skills required by associated industries and training many others through postgraduate programs. Between 1994 and 1998 the Commonwealth government initiated a firm centred innovation strategy known as the Australian Business Network Programme where some 400 networks were created involving 1200 enterprises.³

A further experiment was the establishment of a 'technopole' in 1992, the Multifunction Polis (MFP). Whereas with networks and CRCs met a perceived need to aggregate R&D capabilities in a distributed fashion, across the several cities and

Development Programme (LEED), OECD Territorial Development Service, 2001.

² The recent study published at the end of March 2002 by the Institute of Engineers, Australia, deplores the want of coordination as impeding Australia's capacity to build competitive industries. *Research and Development: Which Direction? Discussion paper: Setting R&D Priorities for Australia's future*. March 2002.

³ Enright, M. J., and Ffowes-Williams, I., 'Local Partnership, Clusters and SME Globalisation in the World Congress on Local Clusters', Workshop 2, *Local Economic and Employment Development Programme* (LEED), OECD Territorial Development Service, 2001.

states, the MFP may be seen as creating an 'intense innovation environment'. This was a national initiative developed with and at the suggestion of the Japanese government in the mid 1980s at the height of Japan's economic expansion and the Australian government's search for new ways of diversifying its economy by adding both value to the traditional sectors and building advantage in the new expanding information and biological/pharmaceutical based industries. Whereas the Japanese model of an MFP was conceived as an intensely managed, socially engineered community engaged with cutting edge technologies, the Australian Federal government preferred to regard it as but a 'hub' in a system of national networks.

In the end MFP was located in Adelaide adjacent to South Australian government's Technology Park north of the CBD. By the time the Federal funding ceased in 1996 the MFP had matured as Mawson Lakes Technology Park that now embraces both large and small enterprises, R&D and incubator facilities, the IT&T campus University of South Australia, and the Signal Processing Research Institute and an high quality residential area.

Although funded largely by the Federal Government, the MFP became a SA management problem. As it faltered the clusters program emerged from within it. This initiative matured in 1995. It could be said to have come out of an MFP that was in search of building an innovative community, one as suggested above as a characteristic of clusters, a 'shared social values that encourage reciprocity'. Whereas the original MFP concept was built upon the notion of fully integrated community in an intense innovation environment, the cluster strategy embraced a structure directed at enriching firm-centred networks by linking them vertically in the supply chain and horizontally to a social setting with enhanced access to knowledge and market information flows and resources.

Clusters Development in South Australia

South Australia has been energetic in its efforts to devise ways of enhancing its economy: the Playford industrialisation period of the 1950-60s; the first

two S&T Parks in Australia in 1982; engagement in the competition for the MFP in the late 1980s, and among others clusters in the first half of the 1990s about the time the Federal Government was introducing its Business Network Programme.

A clusters strategy was first proposed in 1992 by consultants to the South Australia government, Arthur D. Little. They were advanced as a means of moving the beyond the technopole-technology park mode of innovation. They identified four areas for cluster development: wine industry with its many parts; automotive especially in assembly, steel, components, electronics and engineering services; advanced engineering especially in precision engineering components, sensors, medical and scientific instruments; and research and development services. They tentatively added the food industry stating that it would have to become more focused to build the collective capacity for the collaborative organisation required in a cluster.⁴

The carriage of the policy initiative and implementation of the program was removed from the MFP, initially to the Department of Industry and Trade, and then to an entity partly funded by industry and partly by government known as South Australian Business Vision 2010 (SABV2010). Defence and Multimedia clusters begun in the MFP were carried over into the new organisation; the wine industry was by then a well established bottom up industry cluster that continued to deepen its links to R&D sector, attract overseas investment, embrace the world's best technology and increasingly expand the export of its outstanding product.

The industry driven clusters program of the SABV2010 has always had a measure of government funding. Yet, its philosophy was derived from the American consultants Collaborative Economics Inc. that had helped build Joint Venture Silicon Valley Network.⁵ Their view

⁴ Arthur D. Little, *New Directions for South Australia's Economy, final report of the Economic Development Strategy Study*, vols.1-3, Adelaide, 1992.

⁵ Collaborative Economics and MFP Australia (1997), *An Economic Community for the 21st Century: The Cluster Based Economic Development Project in Adelaide*,

of clusters turned on a wider perception than the mere aggregation of the enterprises. It was shaped very much as a more holistic view of social dimension of the cluster, informed as they were by notions of business leadership, municipal governance and a total community strategy and limited direct government funding. It was a philosophy set in a very American environment where business leaders and municipal and state governments collaborate in ways that set it apart from Australian traditions of strong government direction in the innovation process.

Within the SAVB2010 program, nine clusters were begun of which five have survived, two withdrew from the program to be constituted on a different basis (among them Multimedia) and two others are about to be stated. For instance, the defence cluster became known as Defence Teaming Cluster Inc. while multimedia won funding under a Federal Government program to create six Cooperative Multimedia Centres across Australia. Known as Ngapartji and located in the heart of the City, it has been exceptionally successful survivor. The SAVB2010 program reviewed in 2001 where the clusters movement had had good industry engagement but where the viability of the program was threatened by the high level of voluntarism with its costs to those enterprises from which it came and the failure to secure the clear vertical links to the tertiary R&D sector.⁶

Although both the MFP and Arthur D. Little Report identified biotech and IT&T industries as important areas for development they were not taken up within the SAVB2010 program. Only in late 1990s did both become the focus of local State government policy initiatives.

The Emergence of a South Australian ICT Cluster

In a recent comment on clusters Porter remarked that the most successful are those that build upon

Collaborative Economics and MFP Australia, Adelaide.

⁶ R. Blandy, *Industry Clusters Program: A Review*, SAVB2010, 2001.

long standing industries, 'traditional' industries.⁷ Adelaide has been such a centre, where the ICT industry was initially developed to support the Defence Science and Technology Organisation (DSTO) and space activities at Woomera. DSTO, the Commonwealth government's defence research laboratory (known before 1974 as the Weapons Research Establishment) the University of Adelaide and the South Australian Institute of Technology (now the University of South Australia) provided R&D support, feeding electronic engineering students into the Organisation and the related industries. The result has been the gradual building over time of a concentration of ICT capabilities, a unique centre spanning a broad sweep of communications and information technology in Australia.

From about the mid 80s the existing university departments were augmented by the development of increasingly important information technology/computer science disciplines and the creation of areas of special ICT interest, at the University of South Australia the Institute for Telecommunications Research (ITR); and at Adelaide University the Teletraffic Research Centre (TRC) and the Centre for High Performance Integrated Technologies and Systems (ChiPTec) and in the 90's the Centre for Telecommunications Information Networking (CTIN).⁸ To these were added participation in Cooperative Research Centres: all three universities in the CRC for Sensor Signal and Information Processing (CSSIP); the University of South Australia in the Distributed Systems Technology Centre (DSTC) and CRC Satellite Systems; and Adelaide University in the Smart Internet Technology CRC (SITCRC). A key participant in many of these CRCs is the Defence Science and Technology Organisation.

⁷ David James, 'How to kick global goals', *Business Review Weekly*, 28 Mar.-3 Apr. 2002.

⁸ Mention must be made of those among the first movers: Professor Mike Miller at the University of South Australia; the late Professor Bill Henderson and Professor Bob Bogner in Adelaide University. A dedicated chair of telecommunications was established in 1993 is held by Professor R. Coutts who founded CTIN.

Following the Arthur D Little Report in 1992, the new Liberal Government embraced the findings of a study chaired by Professor Craig Mudge then at Flinders University drawing on his experience of Xerox Park in the USA. This led to the IT2000 policy. Much controversy was to surround the policy development as it centred on bringing international ICT companies into South Australia and outsourcing the government's IT requirements to the multinational company, EDS. Motorola established its Software Centre at Technology Park in 1994. Attracted by these initiatives, and the Ngapartji Multimedia Centre, Microsoft set up one of its major international data centres in the State eventually forming an Innovation Centre in 2001.

In spite of these developments, there was insufficient engagement with the University sector except as a source of graduates and these were limited. In 1997 South Australia government engaged Professor John Hughes (University of Technology, Sydney) to review the ICT education and research coverage among the three universities. Based on its recommendations, the State Government and the universities jointly funded five new ICT chairs across the three universities.⁹ A further initiative was the formation by the universities of the South Australian Consortium for Information Technology and Telecommunications (SACITT) under the aegis of the government's Information Economy Policy Office. By means of this vehicle the universities began to more thoroughly engage with large and small ICT enterprises in the State.

Indeed a study conducted on behalf of the three universities in 2000 identified several issues for the industry in South Australia: the lack of fit between the needs of SMEs for high quality ICT engineers, the need for larger industries as a steady stream of well trained IT graduates, and the apparent lack of understanding in universities of industry's R&D

requirements.¹⁰ These issues were to inform the SACITT strategy in the following years, the momentum working towards an ICT cluster.

These cluster components deepened in 2001 with the establishment in Adelaide of a Federally funded wireless communications technology platform, m.Net Corporation.¹¹ It links all South Australian R&D centres and industry, both local SMEs and multinational companies, in a unique test-bed facility for testing and evaluating wireless Internet applications and devices. The physical domain is located along Adelaide's City centre area of North Terrace, a densely packed space of three tertiary institutions (universities of Adelaide, South Australia and TAFE City Institute), R&D medical institutions, a hospital, convention centre, parliament, hotels and the central business district. It constitutes a unique real-world facility to assess the effectiveness of mobile applications and devices serving the many virtual communities of this City setting.

Another important component for the development of the ICT sector in South Australia has been the need for greater commercialisation skills and venture capital. With the outsourcing of the Government's IT services to EDS, the Playford Centre (now Playford Capital) was established by the State Government to help new ICT start-up companies. Training in the commercialisation of science and technology was further advanced in a collaborative program between Adelaide University and the University of Texas, Austin, Adelaide's sister city as of 1999. This education component was incorporated into the newly formed National Institute for Commercialisation based in Brisbane in 2001.

Overall the momentum generated by these collaborative settings, the extension of the horizontal and vertical links between industry, government and public R&D sector laid the basis for the emerging ICT cluster. It has all the classical elements of a cluster, one built upon a long standing

⁹ It is of note that the final recommendations included recommendations on communications networks, hence the use of the term information and communications technology (ICT) and not merely IT.

¹⁰ SA Centre for Economic Studies, *Final Report, Outcomes from the SACITT, Growth, Innovation and Collaboration Forum*. Adelaide, 2000.

¹¹ See www.mnetcorporation.com.

'traditional' industry, an R&D density of in excess of 1,000 researchers of which some 900 are actively engaged in a diverse range of ICT related research and development programs at DSTO and at least another one hundred across the three universities. To this crossed linked R&D establishment are embedded industry relations in the supply/buy value chain to large ICT industries, multinational companies such as Motorola, Tenix, BAE Systems, medium size enterprises as with Codan Pty Ltd, and smaller companies employing less than a 100 persons such as Ratbag, a games simulation developer. The DSTO sits in the middle not only as a user but also a supplier with linkages spanning both the supply and demand side of the cluster equation with unique linkages around the world.

Innovation Lab Australia as an ICT Cluster

The shaping of the national innovation system in Australia has a long history of policy initiatives, by both federal and state governments. The past fifteen years has seen the central strategy located in distributed linked centres across highly urbanised but dispersed population centres. The Cooperative Research Centres program instituted in 1991 carries the burden of this strategy. Through the mid 1990s Australia Business Network Programme extended the strategy by another means and with a different focus.

The Federal government's proposal for a Centre of Excellence in ICT marks a departure in this long held national innovation system policy.¹² The Guidelines calls for 300 researchers in one location, a 'green field' setting. A 'critical mass' is implied as a more effective means of developing ICT products and processes, of resolving the difficult issue of conducting high quality ICT research, capturing its value and realising it in the process of product commercialisation.

¹² *Information and Communications Technology Centre of Excellence: Application Guidelines. An initiative of Backing Australia's Ability: An Innovation Action Plan for the future.* NOIE, 2002.

It is a sharp break in policy, a move away from a distributed innovation system to one best characterised as an 'intense innovation environment' where a large number of researchers will be located in one ICT centre.

In Adelaide, the steady forging of an ICT cluster has now taken the form of an incorporated structure known as *Innovation Lab Australia* (ILA). The formation of the ILA has been crystallised by the competition for the ICT Centre of Excellence. It has galvanised the elements of the South Australian ICT sector, a community of extraordinary density, not merely one of a 1000 ICT researchers but also one where information flows across this community in information and communications technology are unique to Australia and where there exists international linkages to the world's leading defence research laboratories in the USA, European Union, Canada and the United Kingdom and through these to leading universities in all these countries and other parts of the global chain of technology.

The synergy of this ICT cluster is being richly extended with the introduction of an imaginative DSTO program to upgrade skills and qualifications of its research staff. Entitled the Continuing Education Initiative will extend this staff training program across the 2,000 research in its several divisions. Within two years in Adelaide some 150 of these researchers will be engaged in postgraduate degrees across the three South Australian universities linking supervisors, students and researchers across *Innovation Lab Australia* in ways that enrich the Adelaide ICT cluster. It is an exceptional program enriching the institutional linkages across the three universities and DSTO and enhancing the R&D capacity of this ICT cluster of researchers to the benefit of industry across Australia.

The Adelaide ICT cluster is profoundly 'local' in the sense of the cluster model; it is uniquely 'national' with the presence of Australia's Federal Government defence laboratory; and it is exquisitely 'global' in the way both industry and the R&D institutions are linked into international knowledge flows and markets. Nowhere in Australia has an ICT cluster acquired such density of numbers and international linkages and in true cluster fashion

taking the flat network linkages to vertical trajectories by integrating buyer/supplier entities up the value chain.

Central to the value of this Adelaide based ICT cluster is its place in the national ICT innovation system. The state of information and communications technology at the beginning of the 21st Century is one demanding complex scientific and engineering skills in a setting of rapid product turnover. It is a world in which the pervasiveness of computer based task-specific applications and devices require a 'real-world' laboratory setting to assess the value of high quality research and continuous product iteration.

It is in this environment the Adelaide ICT cluster - *Innovation Lab Australia* - is of national significance. It is a composite of several experimental laboratory components in diverse social settings, City life, Home, Defence, New Media, Education and Health Services, and Business and Industry. It is in such settings that task specific applications and devices may be developed, tested on ILA's technology platforms in an experiential setting, to meet the need for continuous product development in a highly competitive global market. It is the setting in which the value of high quality research may be captured, tested, evaluated and taken to commercialisation.

The central and uniquely informing characteristic of *Innovation Lab Australia* ICT cluster is the 'unnatural' competitive advantage represented by the defence laboratory, the DSTO, the associated industries, the related education, training and R&D facilities and its global networks. It should not be forgotten that when the photocopier technology was invented in Adelaide it was sold off to what we now know as Xerox. What is less well known is the company that grew out from that technology break through in Adelaide, Research Laboratories Australia. It is a private company that churns out intellectual property on digital printing but only into overseas markets, largely the USA and Japan. It is a quality high-tech enterprise, profoundly local and essentially global.

Adelaide is an ICT cluster best understood as a 'lab' – *Innovation Lab Australia* – one uniquely placed in

its local density and global linkages to add value to Australia's national pool of Information and Communication Technologies.