

The Structures, Purpose and Funding of Academic Research Networks

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Introduction

The Canadian Innovation Systems Research Network (ISRN) has been a highly successful approach to fostering a small branch of social sciences research (the economics of innovation and technological change) and managing a large research project on technological clustering in Canada. The ISRN was created as a network of networks with nodes based in Vancouver, Calgary, Toronto, Montreal and New Brunswick.

In the light of this success, the purpose of this paper is to examine the structure and function of networks of academic research in relevant fields (management, economics etc) in a number of other countries with advanced systems for funding and overseeing university research. The systems chosen for examination were:

- Australia;
- Europe (The European Commission Framework programmes and the UK);
- Nordics (particularly joint Nordic activities); and
- The USA

At the end of the paper the concluding section analyses the issues and themes that emerge from this analysis of academic research networks.

Although it is not a primary objective of this paper to examine the ISRN and the related policy framework for funding networks in Canada (that has been done more comprehensively elsewhere), it is worthwhile briefly sketching the processes that led to the establishment of the ISRN, its structure and its purpose.

Holbrook and Wolfe (2005: 111) tell us that the ISRN was initiated through a call for proposals in 1998 from the Social Sciences and Humanities Research Council.

In 1998, the SSHRC issued a call for proposals from groups of researchers across the country interested in forming sub-networks of a national network on innovation systems research. The primary objective was to improve understanding of the innovation process in the context of the Canadian regional systems of innovation. The original call for proposals defined the objectives of the program as:

- encouraging the creation of links and the exchange of ideas and information among the academic community, private-sector firms and associations, and Government policy makers, leading to a better understanding of the nature of innovation in Canada;
 - developing agendas for research on the relationship among innovation, the knowledge-based economy, and regional economic clusters;
 - fostering a multidisciplinary approach to the research that includes fields such as business,
 - economics, urban planning, public administration, and science and technology management;
 - encouraging the development of graduate students with the interests and skills necessary for contributing to future research in this area and/or practicing as managers of science-based innovation; and
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- improving innovation systems and strengthening Canadian competitiveness by influencing public policy and corporate strategy.

The structure for the ISRN follows naturally from the call for proposals. Holbrook and Wolfe observe:

The Innovation Systems Research Network (ISRN) is a collaborative Canadian initiative to undertake and disseminate research results concerning the diverse nature of regional and local innovation systems across the country (2005: 111).

The network included ‘members in political science and public administration, administrative studies, communications, evolutionary and institutional economics, engineering, economic geography and industrial relations’ (2005: 111)

The *regional* nature of the ‘organisation’ facilitated and supported the research agenda of the network, which itself was focused on *regional* (cluster) development issues.

This matching of research design and research project form was in 1998 well in advance of the research system in the first case study presented here.

Australia

As perhaps the least understood research system of those chosen to be reviewed, and due to its unusual characteristics, some space is devoted here to discuss the evolution of the Australian system.

The Australia research system background

In the early 1990s the Federal Government established the Cooperative Research Centres programme. The goal of this programme was to build coalitions of research teams around important themes, projects and problems. The Government contributes a small amount of money towards the administration of the centre for a period of usually seven years. The money for research must come from industry, government labs and universities. Approximately every two years the Government holds a new selection round but the number of centres remains relatively constant around 72. A few centres have been very successful at achieving renewals but many do not.

These centres have been very successful¹ and in many cases are networked organisations with labs and offices across Australia.

Alongside this programme the Australian Research Council has funded research centres of excellence.

- Centres of Excellence (block grants)
 - ARC Centre of Excellence in Innovative Science for Sustainable Management of Coral Reef Biodiversity
 - ARC Centre of Excellence in Structural and Functional Microbial Genomics

¹ See www.crc.gov.au The CRC program has been reviewed on a number of occasions, see website for documents.

- ARC Centre of Excellence in Design in Light Metals
- ARC Centre of Excellence in Cultural and Media Industries
- ARC Centre of Excellence in Antimatter-Matter Studies
- *etc*

For the most part of the 1990s, Australia's system, apart from the CRCs, was not too different to that which exists elsewhere. However, it has been continually altered through 2000s.

National research priorities

One of these changes has been the implementation of national research priorities, which all research applications for public funds must now address.

'Setting priorities provides a vision of where research can contribute to Australia's future prosperity and well being, and will help to align our nation's research effort in these key areas. National research priorities will enhance the quality and impact of our research effort by building critical mass in these areas and by promoting collaboration between research organisations and with industry. Australia's national research priorities were announced by the Prime Minister in late 2002 and were enhanced and refined in 2003 to take greater account of the contributions of the social sciences and humanities research' (DEST website 2005²).

The priorities and sub-priorities, as outlined by the Department of Education, Science and Training (2003) are:

- An environmentally sustainable Australia
 - 1. Water – a critical resource
 - 2. Transforming existing industries
 - 3. Overcoming soil loss, salinity and acidity
 - 4. Reducing and capturing emissions in transport and energy generation
 - 5. Sustainable use of Australia's biodiversity
 - 6. Developing deep earth resources
 - 7. Responding to climate change and variability
- Promoting and maintaining good health
 - 1. A healthy start to life
 - 2. Ageing well, ageing productively
 - 3. Preventive healthcare
 - 4. Strengthening Australia's social and economic fabric

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http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/key_issues/national_research_priorities/default.htm viewed 6 January 2006.

- Frontier technologies for building and transforming Australian industries
 - 1. Breakthrough science
 - 2. Frontier technologies (examples include nanotechnology, biotechnology, ICT, photonics, genomics / phenomics, and complex systems).
 - 3. Advanced materials
 - 4. Smart information use
 - 5. Promoting an innovation culture and economy
- Safeguarding Australia
 - 1. Critical infrastructure
 - 2. Understanding our region and the world
 - 3. Protecting Australia from invasive diseases and pests
 - 4. Protecting Australia from terrorism and crime
 - 5. Transformational defence technologies

Research concentration as a priority

Alongside the development of priorities there is a growing push within the Australian system to concentrate research activity. This encouragement, although not formalised, is nevertheless real, backed by statements in policy documents.

- many universities are using some of their discretionary funds to support a select group of University Research Centres;
- research grant holders are often encouraged to join a research centre;
- postgraduate students will often need to be associated with a research centre; and
- the funding from the Australian Government to universities for successful PhD completions is often channelled back to research centres.

Networks

Over time there has been a drive to make CRCs more self sustaining and to move away from public interest oriented research³. This has gradually opened up a gap in the research system. Some areas of research are not yet (nor ever will be) well enough established to bid for CRC status.

After a dialogue with the Australian research community, in 2004 the Australian Research Council⁴ called for research proposals for *Research Network* funding. The selection round was not circumscribed to any particular research field, as the list in Table 1 shows. This is an important departure from other network programmes funded around the world. Other such funding opportunities are often for pre-chosen research topics.

³ CRC applications must nevertheless show how they are relevant to the national research priorities.

⁴ www.arc.gov.au

In this context the selection criteria for the networks was nothing exceptional and reflects the standard peer reviewed assessment protocols for research grants..

- (i) Network strengths
 - Breadth of engagement and standing of participants in the Network
 - Breadth and standing of relevant national and international participation
 - Capacity to raise the profile of the Network's research portfolio globally
 - Coherence and cooperation
 - Strength and extent of collaboration and co-ordination within the Network
 - Cross-cutting & innovation
 - Potential for the Network to foster genuinely broad, cross-disciplinary, innovative research
 - Plans for providing support for new partnerships and linkages
 - (ii) Research strengths and opportunities
 - The research programs encompassed by the Network
 - Excellence of current and prospective research programs conducted by Network Participants
 - Opportunities to add value to Australian research programs encompassed by the Network
 - Participant track record, relative to opportunity
 - Track record of the Network Convenor and Network Participants in research and research student supervision, where appropriate
 - The Network Convenor's track record as a research co-ordinator, relative to opportunities
 - Arrangements to encourage researchers who have less than 15 years postdoctoral experience to build research leadership and management skills within the Network
 - (iii) National benefit
 - National Research Priorities
 - Capacity of the Network to be catalysed by National Research Priorities
 - Contribution to the Australian economy, environment, society and culture
 - Communication and Outreach
 - The nature and extent of the Network's strategic approach to communication and outreach
 - (iv) Funding and governance
 - Adequacy of the Budget plan
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- The impact of Network Funding in adding value to existing investments in research

The result of this selection round was the selection of 24 networks for funding. As Table 1 reveals these cover a wide variety of research topics.

Table 1: Research Networks recommended for funding

ARC Research Network	Administering Organisation	Total Funding 2004-2009
The Economic Design Network: Practical Policy Tools for Industry, Infrastructure, Services and the Environment	The University of Melbourne	\$1,500,000
Financial Integrity Research Network	University of Technology, Sydney	\$1,750,000
Enabling Human Communication: Tough problems in human communication with bold but informed solutions drawing on sound, speech, and language research capabilities.	University of Western Sydney	\$2,000,000
Complex Open Systems Network (COSNet)	The Australian National University	\$1,500,000
Asia-Pacific Futures Network	The Australian National University	\$1,500,000
ARC/NHMRC Fluorescence Applications in Biotechnology and Life Sciences	Macquarie University	\$2,000,000
Discovering the past and present to shape the future: networking environmental sciences for understanding and managing Australian biodiversity	The University of Adelaide	\$1,500,000
Australian Nanotechnology Network	The Australian National University	\$1,900,000
ARC/NHMRC Research Network in Ageing Well	The University of Sydney	\$2,500,000
Molecular and Materials Structure Network	The University of Sydney	\$1,500,000
Research Network for a Secure Australia (RNSA)	The University of Melbourne	\$1,950,000
ARC Research Network in Enterprise Information Infrastructure (EII)	The University of Queensland	\$1,600,000
ARC Research Network on Intelligent Sensors, Sensor Networks and Information Processing	The University of Melbourne	\$2,250,000
The ARC Earth System Science Network	Macquarie University	\$1,950,000
Australian Communications Research Network	University of South Australia	\$1,500,000
ARC/NHMRC Research Network in Genes and Environment in Development (NGED)	The University of Adelaide	\$1,500,000
The Governance Research Network (GovNet)	Griffith University	\$1,500,000
ARC Research Network for Early European Research	The University of Western Australia	\$1,600,000
ARC/NHMRC Network for Parasitology	University of Technology, Sydney	\$1,500,000
ARACY/ARC/NHRMC Research Network: Future Generation	The University of Western Australia	\$1,750,000
ARC Research Network in Spatially Integrated Social Science	The University of Queensland	\$1,500,000

ARC Research Network	Administering Organisation	Total Funding 2004-2009
The Cultural Research Network	The University of Queensland	\$1,750,000
Australia-New Zealand Research Network for Vegetation Function	Macquarie University	\$2,500,000
Australian Research Network for Advanced Materials	The Australian National University	\$1,500,000

Source: ARC 2004: 6.

Europe

The proliferation of networks as a form of organising academic research is evident from the Centre for Research on Innovation and Competition (1999) based at the University of Manchester, which indicated it was involved in 33 networks.

One significant funding source for academic networks is the European Commission through its Framework programmes, which specifically promote trans-European research networks.

European Framework programme

The European Commission *Framework programmes* prioritise social as well as applied, industrial and other scientific research. Most of the research that concerns us here must be conducted in pan European teams (short lived networks 3 yrs). These are project oriented funds, usually involving specific individuals. Centres can be involved in multiple projects.

The economics of innovation and technological change (EITC) field has been successful with a number of *Framework* networks. These projects have included the following networks:

- Technology, Economic Integration and Social Cohesion⁵
- SI4S: Services in innovation, innovation in services - Services in European Innovation Systems⁶
- RISE: RTOs in the Service Economy- Knowledge infrastructures, Innovation Intermediaries and Institutional Change⁷
- ESSY: Sectoral systems of innovation⁸
- DIME: (ongoing) Dynamics of Institutions and Markets in Europe⁹
- PILOT: (ongoing) Policy and Innovation in Low Tech (Pilot)¹⁰

⁵http://improving-ser.sti.jrc.it/default/show.gx?Object.object_id=TSER----0000000000005AC&_app.page=show-TSR.html

⁶<http://www.step.no/old/Projectarea/si4s/index.htm>

⁷<http://centrim.mis.brighton.ac.uk/research/rise.shtml>

⁸http://www.cespri.unibocconi.it/index.php?id_doc=2671

⁹<http://www.dime-eu.org/>

These framework funded networks are designed to foster cohesion across Europe and research capacity. It also helps fund the research centres.

The economics of innovation and technological change has also been successfully operating, within Europe, a special programme for PhD candidate each year. The ETIC¹¹ is an excellent environment for PhD students to keep up to date with the leading edge research.

Nordics

Whilst, a number of Nordic countries are a part of the European Union, they have also been cooperating through a number of their own mechanisms for many years. NordForsk (established 1 January 2005), is the latest institutional structure to coordinate research collaboration in the region.

NordForsk is an independent organisation under the Nordic Council of Ministers [Norden] responsible for cooperation in research and research training in the Nordic and Baltic countries¹² and North-West Russia. In 2006, we support these activities with approximately 70 million NOK (Nordforsk¹³ webpage viewed 17 January 2006)

Nordic research co-operation involves Nordic research institutions, fixed-term research programmes, Nordic Centres of Excellence (NCoE), grant schemes and the co-ordination and planning of major infrastructure investments. www.norden.org.

Amongst the array of funded programmes, Nordforsk supports the Nordic Network in Economics. Its role is to:

- promote co-operation in doctoral training in economics in the Nordic countries and Estonia;
- aim to increase the quality and diversity of research and research training via co-operation among the participating countries;
- actively promote the mobility of and co-operation between Nordic and Estonian doctoral students and scholars;
- provide travel grants to doctoral courses and workshops in other participating countries; and
- organise a summer school on a current research topic, each year in a different participating country.

A different example of Nordic networking comes from Denmark. It might be a surprise to some, but the Danish Research Unit for Industrial Dynamics, also well know as DRUID is not a centre but was designed from the beginning to operate as network across a number of higher education institutions (e.g. Aalborg University and Copenhagen Business School). In the start-up years building this model of a multi-location research group was difficult:

¹⁰ <http://www.pilot-project.org/>

¹¹ As an example see http://cournot2.u-strasbg.fr/users/etic/ETIC_programme_oct_2003.html . Australia has also run an annual conference for PhDs, the Science and Technology and Economic Progress programme since 1991, <http://www.dsl.uow.edu.au/events/step05/> .

¹² Denmark, Finland, Iceland, Norway, Sweden, Estonia, Latvia and Lithuania.

¹³ <http://www.nordforsk.org/index.cfm?&lid=3>

Not surprisingly, it has proved complicated to create co-operation and interaction between research groups coming from three different universities and five different departments each with its own specific context, tradition as well as technical and administrative systems. (DRUID 1996:2).

The UK (ESRC)

In contrast to the Australian system of an open peer reviewed system for applications for research networks, the development¹⁴ of a networks programme by the ESRC in the UK has been more tactical. The ESRC has approached researchers in selected fields to head up and manage research networks on selected topics. These researchers then constructed the network to address a particular theme of interest to the ESRC.

Part of the decision making in this process is the pre-development of informal networks. In making a bid for Priority Network funding, researchers themselves must have first formed a network of up to ten linked projects and selected their own co-ordinator to manage this network.

- Development and Persistence of Human Capability and Resilience in its Social and Geographical Context
- Gender Equality Network
- NEXUS (complex [social] systems research (incl innovation and urban issues)
- Pathways into and Out of Crime: Risk, Social Context and Responses (SCARR).

The first of these Networks completed its grant term in late 2005 and was (in early 2006) currently 'being evaluated'¹⁵.

The USA

The research system in the USA is unlike many others, particularly those of the UK, Canada and Australia. In those latter countries there is an emphasis on having a university system with common standards and are typically primarily dependent on national public funding.

A few of the key features of the US systems appear to be:

- Universities compete like corporations, emphasising their brand image and what differentiates them from other universities;
- A major driver of the competition is that a major source of funds for universities in the USA is through the philanthropy of companies and the wealth of the alumni (and their personal donations);
- Although the National Science Foundation is an important source of funding, other funding targeting specific technology issues is available through the Department of Defence, Department of Energy and the Department of Transport.

¹⁴ Based on conversations with Dr Jane McCarthy.

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<http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/research/networks/NEXSUS.aspx?ComponentId=12730&SourcePageId=12803&data=A3nrATbDpVoKQI13G3yKnB33%2bFYvByDduaEkY3bd15tAO%2fqzWy%2bZb4DuhhYC7lpn12YbugTbuuMNJu71DCT7hLRM5ajkHorQC5F8k1H2QBMbgcFFXgovC2nXua pnNAXh&xu=&isAwardHolder=&isProfiled=&AwardHolderID=&Sector=> Viewed 23 January 2006.

In this context there are few formal programs that promote networking across universities in the social sciences. However, networking is nevertheless an important dimension of academic life and so they form at the edges.

Research networks¹⁶

- West Coast Research Symposium on Technology Entrepreneurship;
 - Funded by Centre for Innovation & Entrepreneurship¹⁷ @ the University of Washington Seattle and Stanford University's Management Sciences within Engineering¹⁸.
 - The symposium promotes networking between academics and doctoral students on the US and Canadian west coast but not necessarily west coast research.
- CCC (doctoral consortium);
- MIT's Technology management & policy¹⁹ doctoral consortia; and possibly most importantly
- Specific *divisions* or research committees of large conferences e.g. Academy of Management are an important way to stay connected to colleagues and research topics.

It is therefore interesting that of the known, more formalised networks, two are directly developed for PhD students and for one other PhDs are important contributors. The CCC Consortium, for example, has been developed by a number of universities²⁰.

The Consortium On Competitiveness And Cooperation (CCC) is a conference where doctoral students present their research and receive guidance and commentary from faculty associated with Aalborg University, UC Berkeley, Boston University, Carnegie Mellon, Columbia, Dartmouth, Duke, Emory, Harvard, Illinois, MIT, Michigan, NYU, Northwestern, Stanford, University Louis Pasteur Strasbourg, University of Sussex (SPRU), University of Toronto, Washington University, Wharton, EPFL and other schools.

Faculty and student interests typically center on questions of organization and economic theory, technology management and firm strategy, and the co-evolution of industrial structure, organizational structure, and innovation. Past presentations have discussed firm capabilities, management of innovation, competition and cooperation among firms, technological change and variation within industries, diffusion of knowledge, firm survival and failure, and the broader institutional structures and policies that influence firm behavior.

Conclusions on the issues and themes

A number of differences in the operations of research systems emerged from this brief study. However, a few key similarities also emerged. From the assessment of the funding, structure and purpose of the academic networks that have been assessed for the current paper, three key themes seem to dominate.

¹⁶ A number of useful insights for this section were provided by Dr Elicia Maine.

¹⁷ <http://bschool.washington.edu/cie/>

¹⁸ <http://stvp.stanford.edu/>

¹⁹ <http://tppserver.mit.edu/index.php3?idnum=1>

²⁰ <http://csi.epfl.ch/page59001.html>

- Critical mass
 - It seems obvious to suggest that one of the important dimensions of networking is to be able to bring together adequate expertise on a given research question.
 - Critical mass seems to have been particularly pertinent to Australia and Canada with relatively small populations and large geographic areas, although it was also an important characteristic of the Nordic structures.
- Research training
 - An unexpected outcome of this project was the emergence of the importance of networks to research training.
 - It appears that there is a perception in most jurisdictions that PhD candidates cannot be left isolated in their own faculties or universities but require an environment where they can learn from PhD candidates and alongside the leading researchers in their field.
 - This theme cut across all countries, including the United States which typically did not have mainstream funding structures for networks.
- Regional issues
 - For Australia, Canada, Europe and the Nordics a key element of the guiding principles in developing networks is the need for regional inclusiveness, to ensure as far as possible researchers in the periphery have an opportunity to participate in a larger milieu.
 - Often, the projects selected will have embedded within them a research problem that is itself regionally constructed (The ISRN clusters study).

It appears that in developing the ISRN's²¹ next project on city regions, these three dimensions of networking have been carefully incorporated into the activity design.

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²¹ <http://www.utoronto.ca/isrn/>
