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Triple Helix Models of Innovation: Addressing Ecosystem Challenges in the Era of Crises  
Regional Dimensions of Triple Helix? Clusters, Cities and Geographic Boundaries'

Smart Specialisation as an Engagement Framework for Triple Helix Interactions.

John H Howard\*

Todd Williams\*\*

Associate Professor Renu Agarwal\*\*\*

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## Abstract

The Triple Helix (TH) framework is a well-established theoretical concept and a basis for portraying patterns of industry-science-government interactions. The TH framework provides a useful depiction and *description* of what might take place in what are commonly described as 'regional innovation ecosystems'. There is a presumption that interactions will evolve around the convergence of missions concerning creation and utilisation of knowledge, regional networks, government regulation and venture finance, and decisions of multinational corporations and international organisations.

However, like the regional innovation systems model itself, the TH model offers little in the way of practical guidance about *how* interactions can be nurtured and developed, *what* and *where* new public and private innovation investments should be made, the most appropriate way to go about building and strengthening *engagement* between institutions to achieve innovation outcomes, and most significantly, the *governance* and *intermediary* arrangements appropriate to guide planning, budgeting and resource allocation at a regional level. This paper addresses the extent to which Smart Specialisation framework can address those investment, engagement and governance issues.

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\* Managing Director Howard Partners Pty Ltd, Adjunct Professor University of Technology Sydney and Institute for Governance and Policy Analysis, University of Canberra.

\*\* CEO, Regional Development Australia Hunter, Newcastle, Australia.

\*\*\* Associate Professor, Operations and Supply Chain Management, University of Technology Sydney Business School

## Overview

The EU has promoted *Regional Innovation Smart Specialisation (RIS3)* as a concept and agenda for science, technology, and innovation (STI) policy in regional economies. It has been developed across the EU and is a condition for 2020 Cohesion funding (Foray, Goddard, Beldarrain, Landabaso, McCann, Morgan, Nauwelaers, & Ortega-Argiles, 2012; McCann & Ortega-Argiles, 2014).

RIS3 is promoted as providing an integrated, place based, and transformation policy framework (OECD, 2013) that aims to:

1. Concentrate public resources on innovation and development priorities, challenges and needs
2. Outline measures to stimulate private research, technology and innovation investment
3. Build on a region's capabilities, competencies, comparative advantages and potential for excellence in a global perspective
4. Foster stakeholder engagement and encourage governance innovation and experimentation
5. Be evidence-based and include sound monitoring and evaluation systems.

The way in which RIS3 can address the implementation aspects of TH frameworks, and particularly build engagement and provide for effective governance, have the potential to make a major contribution to operationalising the TH concept.

In this Paper the way in which Regional Development Australia (Hunter), one of 55 Regional Development Australia (RDA) Committees<sup>1</sup>, has addressed TH implementation in a framework of smart specialisation.

## The Triple Helix context in the Hunter Region, Australia

The Hunter region in the State of New South Wales covers an area of 29,000 sq. km and has a population of 640,000. The regional centre, Newcastle, is 160 kms from Sydney with a travel time of two hours by road, and three and a half hours by train. A high speed rail service has been on the political agenda for many years. There is a regional airport that links Sydney, Melbourne, Brisbane, and regional centres.

The Hunter has a traditional industrial base, constituted primarily by mining (22.3% of the Gross Regional Product of \$A38.46 billion), manufacturing (11.7%), health care and social assistance (7.7%), finance and insurance services (6.5%) and construction (6.0%). It is one of Australia's largest regional economies. It is also well known for the production and processing of fine wines which are exported globally.

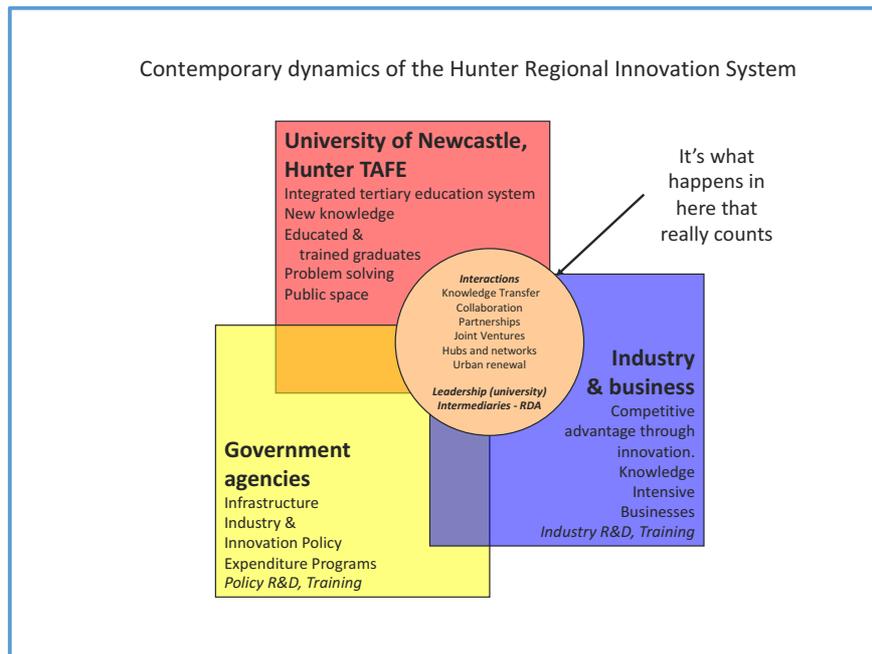
With the end of steel making in the Hunter, and an uncertain future for coal mining, a need has been recognised to transition to an economy where high-tech industries grow and knowledge based services industries become the predominant drivers of the economy. This has involved, and will continue to involve strengthening relationships between research organisations, industry and government.

A Triple Helix (TH) framework for the Hunter Region is represented in Figure 1

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<sup>1</sup> <https://rda.gov.au/about/what-we-do.aspx>

Figure 1: Triple Helix Interactions in the Hunter Region



In a TH context, the framework typically identifies three broad institutional categories: research and education; industry and business; and government agencies. The role of the research and education sector is identified in terms of the broad roles of the University of Newcastle, that extends well beyond research and teaching into an engagement role of providing 'public space' for regional development and community discourse (Gibbons, 2003; Lester, 2003) and the Hunter Institute of Technical and Further Education which has a very close engagement with industry.

The University of Newcastle is one of Australia's leading research universities, and has a very strong STEM and Medical research profile, and in 2012 it was recognised by *Research Excellence Australia* (ERA) as having internationally recognised strengths (category 5) in a number of industry relevant research fields including Statistics, Condensed matter physics, Macromolecular, materials, Physical geography and geoscience, Biochemistry, Civil, electrical, electronic and resources engineering, Extractive metallurgy and Cardiovascular medicine and haematology.

The role of business is identified in terms of its market orientation covering competition and commitment to innovation. There are several business associations and networking organisations in the Hunter pursuing economic development and innovation opportunities for their members. For example, the Hunter Region Office of the Australian Industry Group hosts a *Manufacturing Cluster*, Hunter Business Chamber hosts a *Founders Forum*, and the Hunter *Business Centre* is not-for-profit Business Enterprise hub supporting micro, small and medium businesses. *HunterNet* is an engineering and manufacturing peak body of over 200 members with a focus on collaboration, innovation, and training services.

A *Hunter Defence* network works alongside industry and government to build defence related capacity in the Hunter region. Global prime contractors, including BAE Systems, Thales, Boeing, Lockheed Martin, Northrop Grumman, Raytheon, Forgas, and Varley are located in the Hunter. There are also many defence capable SMEs, technically capable people and supporting organisations. These businesses create strong demand for STEM qualified employees. Hunter RDA manages a programme to lift STEM participation in schools.

There are three tiers of government and numerous separately constituted government agencies present in the region including Departments of Industry, Agriculture, Planning, and Environment, and 10 Local Government Authorities. There are currently over 130 Commonwealth and State programme support and assistance measures available to stimulate private research, technology, entrepreneurial, and innovation investment in the region, although their impact and effectiveness is difficult to ascertain.

The TH framework represented in Figure 1 foreshadows an important role for intermediaries to develop and articulate a strategic approach to TH interactions and relationships that will contribute to the achievement of innovation and regional economic development goals and outcomes. These goals are generally expressed in terms of growth, employment, incomes, as well as goals of social inclusion. The nature and extent of the interactions between institutional spheres in driving innovation and economic outcomes is a fundamental consideration concerning the performance of regional innovation systems.

The Hunter is a microcosm of complexity in TH relationships, reflected in the multitude of roles, responsibilities and accountabilities that exist between and within the institutional dimensions. It is reflected spectacularly in the multitude of planning and resource allocation documents prepared by government and semi government agencies in the region, few of which bear any relationship to the other.

## **Government roles in regional economic development**

Australia does not have a system of regional governance. Responsibility for economic development is principally a matter for State/Territory Governments, whilst the Commonwealth Government has a major role in science, technology and innovation (STI) policy. The Commonwealth has struggled with regional economic development policy with emphasis waxing and waning depending on whether it is a Labor or Conservative Government in office.

In the absence of regional governance, responsibility and accountability for regional economic development in the Hunter, like other parts of Australia, is highly distributed, with multiple Commonwealth and State government agencies and authorities having plans, strategies and commitments that impact on regional resource allocation, growth and employment. These include, for example:

- The *Economic Profile*, prepared for the Economic Development Strategy for Regional NSW (NSW Trade and Investment, 2015).
- The *Draft Hunter Regional Plan*, prepared by the Department of Planning and Environment, that provides the land use framework for economic development, (NSW Planning and Environment, 2015a) and the *Draft Plan for Growing Hunter City* (NSW Planning and Environment, 2015b)
- The *Hunter Economic Infrastructure Plan*, prepared by Infrastructure-NSW and RDA Hunter to remove mining-input pinch points, streamline the export supply chain and address issues in mining-impacted communities. (I-NSW, RDA HUNTER, 2013)
- The *Hunter Strategic Infrastructure Plan*, prepared by the Hunter Development Corporation, that aims to provide the strategic infrastructure framework to inform future urban growth of the Hunter Metropolitan Area (Hunter Development Corporation, 2013)
- *Hunter Regional Growth Plan 2016-2019: Economic Development Strategy for the Hunter*, the latest whole-of-region plan produced by RDA Hunter (RDA HUNTER, 2016)

- The *Local Land Services Strategic Plan, 2016-21*, prepared by NSW Land Services, that focuses on assisting primary producers to improve practices for social, economic and environmental outcomes (NSW Local Land Services, 2016)
- The *Hunter Regional Transport Plan*, prepared by Transport NSW, which covers road, rail and public transport investments (Transport for NSW, 2014)
- The *Hunter New England Local Health District Strategic Plan* (NSW Health, 2014).
- The *Port of Newcastle*, a privately owned corporation, aims to ‘promote and support the prosperity of the Hunter Region and New South Wales in a sustainable manner’. The Port is currently developing a 90-hectare site for port related activities for a range of cargo handling infrastructure and for the promotion of trade.
- *Newcastle Airport*, a corporation owned by two of the LGAs, has developed a Master Plan that includes commitments to ‘economic prosperity and job creation’ and ‘ecologically sustainable development’.
- The Department of Primary Industries publishes an *Upper Hunter Agricultural profile* that identifies important agricultural resources, critical features of region’s leading agricultural industries, their potential development and related land use planning issues (NSW Department of Primary Industries, 2013)

Most of the 10 Local Government Authorities (LGAs) in the Hunter region have prepared their own economic development strategies (Cessnock City Council, 2014; Lake Macquarie Council, 2013; Newcastle City Council, 2016; Port Stephens Council, 2007; Singleton Council & Strategic Economic Solutions, 2015).

There is a formal grouping of the 10 LGAs into an association of regional councils, *Hunter Councils*, which collaborates in the areas of biodiversity conservation, climate change, environmental compliance (under the Hunter and Central Coast Regional Environmental Management Strategy), staff training, procurement, records storage, consultancy and legal services.

Whilst this planning infrastructure has a strong focus on economic development, it tends to ignore, or by-pass, commitment to research and innovation. In terms of the TH framework, it focusses on business and government, representing a two dimensional framework of interactions.

### **Extending the role of innovation in regional planning frameworks**

Due to the institutional setting, regional economic development has tended to take an investment and infrastructure approach to regional planning. It has a strong focus on industry development and job creation. This is also inherent in the Commonwealth Government’s mandate for Regional Development Australia (RDA) Committees.

The system of RDA Committees was established by the Commonwealth and State Governments in 1998 to act as ‘the regional development voice of their communities’. Committees are expected to:

- consult and engage with communities
- promote and participate in regional programs and initiatives
- provide information and advice on their region to all levels of government

- support informed regional planning<sup>2</sup>.

RDAs also work with stakeholders to support the development of proposals for government and private sector funding for regional purposes.

RDA Committee members are appointed by Government on the basis of a formal application and assessment process. Members can include people with knowledge, skills and experience in local government, tertiary education, business, professional services, and NGOs. Committees are not, therefore, representative organisations. However, their charters reflect, in some measure, the network governance model envisaged in the RIS3 Guide (Foray et al., 2012).

Each RDA Committee is expected to develop a *Regional Plan* which outlines priorities for the region and guides them in strengthening their communities. The level of commitment to planning in each RDA varies across regions, as does the commitment to innovation and broad economic outcomes. But with multiple stakeholders, the networked governance framework creates a major challenge for efficient and effective planning and resource allocation decision making.

RDAs have a responsibility for setting priorities, screening, and supporting applications from their communities under the *Regional Development Australia Fund*, set up in 2011 to “support the infrastructure needs and economic growth of Australia's regions”<sup>3</sup>. Under the most recent funding round, 42 grants of between \$500,000 and \$15 million were approved for projects covering the construction of new and/or upgrading of existing sporting, cultural, arts and community facilities as well as airports and roads. Support for university infrastructure projects is not within scope of the Fund.

It is clear that within the framework of multiple organisation and funding responsibilities, economic development in Australia has a very strong regional focus, particularly in delivery of infrastructure and local job creation. By contrast, knowledge based innovation, by its very nature, tends to have an international orientation, involving the adoption, application, and utilisation of knowledge in global contexts. This is inherent in the RIS3 approach embedded in the European 2020 Cohesion strategy.

RIS3 represents a significant departure from traditional approaches to regional economic development planning. It offers a strategic approach to *regional innovation system* planning, and in doing so, it has the additional advantage of taking a *place based* approach to innovation.

The Hunter RDA committee identified the potential in the EU RIS3 approach and has taken the RDA mandate a step further with commitment to innovation as a key element in regional economic development planning. In 2015 the Hunter RDA Committee committed to the development of a Smart Specialisation Strategy for the Region. The aim of the Strategy was to be a catalyst for new activities to strengthen the economic development of the region by:

- Informing policy to ensure effective and efficient spending of research and innovation funds.
- Identifying regional priorities based on current strengths and comparative advantages that support high value-add activities and offer the best chances for strengthening competitiveness.

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<sup>2</sup> <https://rda.gov.au/about/>. More recent formulations of purpose emphasise the role of RDAs in RDAs promoting awareness of, and access to, Australian Government programmes – see <https://rda.gov.au/review/terms-of-reference.aspx>.

<sup>3</sup> <http://regional.gov.au/regional/programs/rdaf.aspx>

- Recommending potential areas for future comparative advantages, entrepreneurship and growth.
- Encouraging partnerships (locally and beyond the Hunter) in governance, project delivery, monitoring and evaluation.
- Supporting productive research and innovation activities for smart, sustainable and inclusive growth of the region.

The Strategy was launched in March 2016 by the Prime Minister of Australia at an event in Parliament House, Canberra (RDA Hunter, 2016). It was prepared on the basis of RDA Hunter's strong knowledge base of innovation and entrepreneurial capability in the region (RDA Hunter, 2014, 2015a, 2015b, 2015c), prior research (Deloitte Access Economics, 2013), extensive consultation with businesses and research organisations, and access to the RDA's well-developed networks across business and government. Academic staff from the University of Technology Sydney assisted in framing the strategy.

The key recommendations of the Hunter RIS3 are listed below.

<b>Hunter RDA RIS3 Strategic Actions</b>	
Develop inclusive leadership	
1.	Hunter RDA to facilitate the formation of the <i>Hunter Innovation Network</i> as the vehicle for linking businesses and entrepreneurs to services, facilities, and stakeholders to accelerate their innovation and growth, thereby maximising wealth creation in the Hunter Region.
2.	Hunter RDA to invite education institutions, industry associations, businesses, and individuals in the Hunter to nominate members to the Board of the Network
3.	Hunter RDA to seek \$A1m in annual funding from the Commonwealth and State Governments to facilitate the operation of the Network
Encourage entrepreneurship	
4.	Encourage schools, TAFE and Universities to offer education and training in entrepreneurship as part of their broader course offerings.
5.	Establish a profile of courses and programs in entrepreneurship available to students and business leaders in the Hunter region
Develop the skills for innovation	
6.	Facilitate a partnership between Business and Business Organisations, the University, Hunter TAFE, private RTOs, Schools, and the Community, to develop an integrated skills development programme that meets the requirements of businesses.
7.	Engage with education and training organisations outside the region who are in a position to bring high level skills development and training to the region
Support university-business research collaboration	
8.	Assist businesses identify research projects that might be suitable as a basis for collaboration with the University of Newcastle and other universities with connections to the Hunter
9.	Work with the university and TAFE careers offices to identify a broad range of work based learning opportunities for undergraduate and post graduate students
Build the Hunter Innovation Initiatives Fund	
10.	Scope and develop the framework for a Hunter Regional Initiatives Investment Fund
11.	Engage key stakeholders, including financial institutions, business organisations, and the State and Commonwealth Government in the development of the Fund
Further, the Hunter Innovation Network will work with Hunter RDA to:	
<ul style="list-style-type: none"> <li>• Coordinate Commonwealth, State and Local policies and regional programmes</li> <li>• Communicate the Strategy</li> </ul>	
Strategic actions for the Hunter Innovation Network in these categories are:	
12.	Hunter RDA continue to advocate a collaborative approach to policy and programme development across Commonwealth, State and Local Governments with a view to achieving greater consistency, coherence, efficiency and effectiveness in government services delivery
13.	Assist Hunter RDA to develop a comprehensive and integrated marketing and communication plan to promote awareness and engage commitment to the Smart Specialisation Strategy

Smart Specialisation is now an integral part of RDA Hunter's ongoing work to grow the Hunter's international competitiveness through innovation. It has provided a solid basis for the development and implementation of an innovation strategy for the region. However, while the Strategy has been received favourably within the region, nationally and

internationally, Hunter RDA does not have a mandate for implementation and delivery of the Strategy. This calls for complementary roles and governance arrangements in strategy development and implementation.

## Complementary roles for smart specialisation in the Hunter region

The RIS3 approach is of course one, albeit important, dimension of innovation system strategic planning. It presents what is essentially a structural and functional perspective to strategic positioning, focussed on an articulation of the opportunities, and potential risks, associated with a region's multifaceted engagement with the global innovation system (the network of transnational value chains that drive trade patterns and shape the global dispersion of innovative activities: who does what, in competition or collaboration with whom - and how well).

It is prudent to balance this structural and functional emphasis with a *dynamic efficiency* dimension – the ways in which an innovation system provides risk-taking entrepreneurs with the necessary capability to learn and adapt in the face of inevitable uncertainties and unexpected events. As very different types of planning architecture and objectives are involved in each area of emphasis, it is vital that to address this distinction and its implications for the strategic planning process. The approach to the development of RIS3 by Hunter RDA has the potential to capture this dynamic efficiency dimension through interactions and relationships with other actors in the innovation system.

In parallel with the development of the Hunter RIS3, the University of Newcastle had prepared the *NeW Futures Strategic Plan 2016-2025*, which aims to deliver economic impact through commercialisation of new knowledge and job creation as a result of contributions to business improvement, entrepreneurship, the creation of start-ups and new businesses, and the supply of industry ready graduates (University of Newcastle, 2016b).

<p style="text-align: center;"><b>University of Newcastle NeW Futures Strategic Plan - Driving Global and Regional Impact</b></p> <p>We work with partners across the world to build equitable prosperity, social cohesion and healthy communities. We engage with business, industry and government to deliver innovation and impact. We exploit new knowledge to create start-ups, new businesses and new jobs across our regions.</p> <p><b>Goals</b></p> <ol style="list-style-type: none"> <li>1. We will be recognised as a lead university for research engagement and for staff mobility between UON and business, industry, government and community organisations.</li> <li>2. UON will deliver economic impact through commercialisation of new knowledge and job creation as a result of contributions to business improvement, entrepreneurship, the creation of start-ups and new businesses, and the supply of industry ready graduates.</li> </ol> <p><b>Lead strategies</b></p> <ol style="list-style-type: none"> <li>1. <i>Delivering impact:</i> We will establish at least five UON Global Impact Clusters to address global challenges built on the base of our research concentrations and working across discipline and national boundaries. These GICs will ensure excellence and discovery, drive innovation, business development, commercialisation and impact.</li> <li>2. <i>The UON Innovation Hub:</i> UON staff and students will engage in creative, social and technological innovation and entrepreneurship and be supported to work with partners to create start-ups and new businesses across our regions.</li> <li>3. <i>UON Business and Industry Connect:</i> We will work with industry and business partners to support Associate, Fellow and Professorial appointments who will provide expertise from business and industry and we will support our academics to gain experience working in industry and business. Our Business and Industry Connect strategy will be supported by physical and digital strategies including the integration and collocation of industry and business with academic partners.</li> <li>4. <i>The UON Engaged PhD:</i> Our doctoral training programme will include supervisors from academia, business and industry and will broaden graduate knowledge, skills and attributes; improve the employability of doctoral graduates and facilitate the translation and commercialisation of research outcomes. We will establish a number of Industry Doctoral Training Centres with partner organisations to build capacity in areas of national and global relevance and impact.</li> </ol> <p><b>Key measures of success 2020</b></p> <p>UON will have a measurable increased economic, cultural and social impact in our region built on new jobs created as a result of new knowledge, innovation and commercial outcomes leading to business improvement, the creation of start-ups and attraction of new businesses to our regions.</p> <p>We will be in the top 5 universities in Australia for engagement with, and support from, industry, business, international partners and the community</p> <p>UNIVERSITY OF NEWCASTLE (2016) NeW Futures Strategic Plan 2016-2025. University of Newcastle, Newcastle.  <a href="https://www.newcastle.edu.au/_data/assets/pdf_file/0005/225680/2015-1050-NeW-Futures-A4Program_06_Print_WEB.pdf">https://www.newcastle.edu.au/_data/assets/pdf_file/0005/225680/2015-1050-NeW-Futures-A4Program_06_Print_WEB.pdf</a></p>
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The Hunter TAFE also has a *Strategic Plan* (Hunter TAFE, 2014) with a strong focus on skills development and training, particularly in technologies relevant to innovation. The *Strategic Plan* will be superseded with the reorganisation of TAFE NSW currently underway.

In July 2016 the University of Newcastle announced that it had received \$A1m from the NSW Government to support the development of an *Integrated Innovation Network* across the Hunter region. The funding is 'to help the University create an enabling environment where researchers, start-ups and SMEs can undertake multi-disciplinary collaboration and produce the next generation of entrepreneurs' (University of Newcastle, 2016a).

The new funding will be directed towards the development of four innovation hubs and finance *innovation vouchers* to leverage *Newcastle Innovation*<sup>4</sup> in developing relationships with the local start-up and seed investor community to 'create partner-led projects to complement the innovation spaces'. This initiative represents another example of government funding for regional innovation in Australia being channelled through a local university.

The University of Newcastle initiative would appear to be consistent with the evolution of industry-university engagement approaches in Europe. A EU report on the role of universities and research organisations as drivers of smart specialisation (European Commission, 2014) points out that policymakers at the regional level that seek to engage universities and research organisations in RIS3 processes should consider, amongst matters:

Invest jointly with HEIs and ROs in programmes that support RIS3 strategies and bring wider benefits to regional businesses and community. Such measures may include: Translational research facilities aligned with the needs and opportunities of the region for example addressing the needs of the ageing population with the help of telemedicine and social innovations which can create new opportunities for enterprise; One-stop advisory services for SMEs that pool together the expertise of all HEIs and ROs in the region; Professional development programmes; People-based mobility between HE and industry that transfer knowledge and innovation to SMEs and other organisations (such as Knowledge Transfer Partnerships in England), and Graduate retention and talent attraction policies that are aligned with the regional priorities (European Commission, 2014).

It is of interest that many of these initiatives are currently being implemented at the University of Newcastle.

Notwithstanding the objectives of strong university engagement with business, a number of obstacles to close university involvement in regional partnerships have been identified. In particular, universities need the freedom to pursue regional goals taking into account their financial, managerial, and administrative capacity and academic objectives. Coupling with global, regional and local dimensions simultaneously has been identified as a challenge for many universities and academics (European Universities Association, 2014). Linking regional economic development with global innovation is both a challenge and an opportunity.

A situation has therefore emerged where there is an innovation oriented strategic plan prepared by the Hunter Region's lead university, a series of infrastructure and business development plans developed by multiple government and semi government agencies, and a broad regional innovation and economic development strategy developed by the Hunter RDA - that parallels in many important respects the strategy prepared by the University. These

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<sup>4</sup> Newcastle Innovation, the technology transfer arm of the University, was established to connect researchers, industry and investors to facilitate the creation of new products and services. The University also supports an early stage venture investment fund, Slingshot, a corporate accelerator programme that brings start-ups and corporates together to build and grow companies. It also supports Jumpstart, a mentor-driven programme designed to assist entrepreneurs in the tech space who want to develop a start-up or scale-up with the assistance of an innovative partner and, most important, a big customer base. The programme offers potential to access to \$A30,000 in seed funding, a structured 12-week programme, mentors, and workspace at hubs.

strategies, in turn, are closely aligned with the National Industry Growth Centre strategies (Department of Industry and Science, 2015).

The Hunter RDA RIS3 outcome reflects a high level of continuing engagement with industry and government, and capacity to facilitate relationships between business, particularly small business, multiple government agencies, and the University. Hunter RDA has also used its identity as a regional organisation and its knowledge of the RIS3 platform to build relationships with regional organisations in Europe, building on the relationship it has established with the EU Centre in Australia and the Joint Research Centre in Seville.

Whilst the Hunter RDA has extended its role into innovation strategy, it does not have a charter or resources for strategy implementation. Resources must come from business, government, or the university. The essence of RIS3 is to achieve some coordination in resource planning and allocation. Through the RIS3 development process, the RDA has become an important innovation intermediary in drawing attention to priorities among innovation system actors, building on its connections with business, government and the research sector.

### **The role of intermediaries in innovation systems and the TH framework**

The TH framework outline in Figure 1 above envisages a key role for intermediaries in connecting research, industry, and government institutions to deliver innovation outcomes.

An innovation intermediary has been defined as an organisation or body that acts as an agent or broker in any aspect of the innovation process between two or more parties (Howells, 2006). They can play a key role in the ‘market for knowledge’ in relation to the transfer and translation of knowledge and technologies from creators to users in a business (commercial) context. They also have a key role in developing longer term collaborations and partnerships. In this sense knowledge creators include universities, other research organisations, and other businesses.

Intermediaries address a number of gaps in the innovation system. In a study commissioned by the Australian Government these gaps were categorised as follows (Howard, 2007):

- *Information gaps*—gaps encountered by firms in identifying relevant, useful and applicable techniques for product and service development.
- *Access gaps*—difficulties encountered by firms in accessing technologies and knowledge which they know to exist but are unsure about how to go about acquiring it.
- *Transfer gaps*—negotiation of licence and consultancy/contract agreements, as well as project management. may be beyond the capability of businesses, particularly small to medium businesses.
- *Translation gaps*—developing and transforming knowledge embedded in a technology into a form and format that can be used in product, service and/or business development.

The study also identified a range of ‘institutional gaps’ that are addressed by intermediaries, including: gaps in university technology transfer capability; researcher orientation in industry-academic collaborations; and, limited funding for research organisation—SME collaborations. The study demonstrated that intermediaries had been particularly valuable in addressing these institutional gaps.

The study also highlighted the importance of the personal/professional contribution of intermediary services and intermediary staff to building capability for business-research interactions. In particular, intermediaries need to have excellent communication skills and be exceptionally well networked across industry and the research sector, as well as possessing

reputation, integrity, and credibility with business, research organisations, and government program managers.

Practice and experience suggests that intermediary arrangements can be transactional or strategic. That is, arrangements can be put in place for one-off dealings to access or merchandise a particular piece of technology or research project or to establish longer term relationships to engage business and research organisations in addressing new science, technology, and innovation opportunities (Howard, 2009, 2011, 2015).

Intermediaries must also understand and acknowledge the way in which universities, research organisations, and businesses work, and differences between institutional formats—in terms of mission, structure, systems, and processes, and the way they measure achievement and rewards success (Howard, 2007).

Whereas intermediaries such as Research and Technology Organisations, formed by industry/trade associations, have become a feature of the British and European regional innovation systems, and have been closely involved in the establishment and operation of an ‘interface’ between research organisations and business (Howells, 2006; Howells, Georghiou, Evans, & Hinder, 1998), this has not occurred to the same extent in Australia.

Few industry and professional associations in Australia have taken a proactive role in the national innovation system, preferring instead to take on a lobbying role in relation to innovation policy and funding, and focus more on industrial relations agendas. At the regional level associations, may become proactive, although this depends on the strategies of regional boards and capabilities of a CEO<sup>5</sup>. There is potential for the RDA model to fill a gap in this regional intermediary capability and Hunter RDA provides a case example of what can be achieved.

There are also very few intermediary organisations that address the full range of relationships between research, industry, and government. Most focus on the two dimension interactions between research organisations and industry. Government programs that support innovation vouchers and subsidies for researchers in business, have a strong transactional underpinning. In Australia the RDA has emerged as a potential *institution for engagement* that embraces all three dimensions of the TH framework.

### **Hunter RDA and an intermediary in the regional innovation system**

Given the parallel interests of the University of Newcastle and the Hunter RDA in smart specialisation, and the commitments that the University has in hand, there is potential for the University to take a role in the refinement, implementation and delivery of RIS3 strategies. RDA Hunter would retain a strong and important role in the development of RIS3 through its broad connections with business, the broad range of government agencies, and Commonwealth and State Ministers.

In developing the RIS3 strategy Hunter RDA demonstrated an excellent understanding among stakeholders of the region’s capabilities, competencies, comparative advantages and potential for excellence in a global perspective. These had been highlighted by prior work of the RDA through its Scorecard projects and lead roles in implementing an industry led Science,

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<sup>5</sup> In the Hunter, AiGroup has taken on a very proactive role in the Hunter regional innovation system – see <https://www.aigroup.com.au/contact/hunter/>

Technology, Engineering and Mathematics (STEM) focused skills and workforce development program.

In a study for the Commonwealth Department of Industry, Science and Tourism, involving a review of a pilot of innovation services (Howard, 2007) the following categories of intermediary role was identified:

- That of a *consultant*—covering assistance through providing information and advice in the recognition, acquisition and utilisation of relevant intellectual property or knowledge and technology capability.
- That of a *broker*—covering ‘brokering a transaction between two or more parties’.
- That of a *mediator*—being an independent ‘third party’ who assists two organisations form a mutually beneficial collaboration.
- That of a *resource provider*—being an agent who secures access to *funding* as well as other material support for the innovation outcomes of such collaborations.

The study drew on earlier work on intermediaries in innovation systems (Howard, 2004a, 2004b; Howells, 2006; Johnston & Howard, 2003).

Each role has different characteristics in terms of knowledge and skills, responsibilities and accountabilities, rules of professional and ethical conduct, incentives, rewards, and remuneration. These roles are provided by people separately, in specialist organisations, or in combination. The nature and business characteristics of intermediary roles is summarised in Figure 2.

**Figure 2: Nature and characteristics of intermediary business models**

Intermediary role	Nature of role	Nature of the Business Model	Nature of the ‘value proposition’
<b>Consultant</b>	Expert professional advice based on the knowledge, skill and experience of the consultant In an Innovation context, advice might relate to due diligence, strategic marketing and IP management and technology acquisition	A professional services firm model—providing and selling knowledge-based <i>capabilities</i> . These are reflected in a person’s or a firm’s reputation and track record, their integrity and their credibility in providing solutions for business and government A highly contested market with freedom of entry—often a lot of effort goes into marketing capabilities. Consultants are typically paid on a fee for service basis, calculated by salary cost, recovery of direct and indirect costs, and a profit margin	Creates value through provision of advice that may not have been available or difficult to obtain. Value is reflected in the solution that is provided—which is the total cost of the service Buyers often have difficulty in identifying and capturing value. Implementation is often more difficult and costly SMEs are reluctant to pay full cost of consulting services – might not be able to afford them, or cannot see the value, or both
<b>Broker</b>	Agent acting for a creator and/or acquirer of sought after knowledge and/or technology. Interprets business needs and ‘translates’ available capabilities to meet that need Brokers can also perform an integration role bringing multiple parties together into a collaboration ‘deal’. Roles may involve assistance in negotiating contracts, purchases, or sales	An agency model—people acting for either buyers or sellers of knowledge (rarely both) on the basis of their capacity to meet needs through their networks and ability to initiate and negotiate deals (Acting for both gives rise to conflicts of interest—a reason why brokers are often regulated) An example would be a technology broker, acting on behalf of a client, who identifies/seek out a technology and works towards creating a deal Supplements the role of electronic knowledge exchanges Brokers are typically paid a commission on the value of a transaction or a success fee. They may also be paid on a retainer basis. Government grants may also be paid	Creates value to parties through a deal being negotiated, or a transaction being completed Commissions reflect payment for the track record of the broker, a premium for risk (if the deal fails) as well as the overall cost of doing business Value is reflected in perceptions about the benefits and returns to the party paying the commission in relation to potential longer term returns

Intermediary role	Nature of role	Nature of the Business Model	Nature of the 'value proposition'
<b>Mediator</b>	Introduction, engagement and representation services A go-between who acts as a link between parties Assists in forming collaborations between two or more parties Facilitator in a knowledge network	A network or association model—where people become members and in turn gain access to other people, knowledge and technologies they would not otherwise encounter Members may also have opportunity to meet and communicate in areas of shared and common interest Industry and professional associations perform important mediation roles. Some have specifically tasked mediators There may be one or more mediators In some 'clubs', membership may not be widely known—except to the mediator Mediator organisations are financed by subscription and/or membership fees Governments may provide support/assistance for SMEs to join	Creates value by people getting to know each other—which may not have occurred Value is in the opportunity and potential to collaborate—which is reflected in the perception about what members are getting from their membership fee Free membership can cause free-rider problems Value is also placed on the high level of trust established between and among members. Confidences are respected and preserved
<b>Resource provider</b>	Provision of resources, such as funds to secure market research, management strategy advice, facilities, and access to knowledge in the form of IP or contract research services	Grants based model—people and organisations make applications from funding programs in accordance with assessment and selection criteria For public programs, grants are usually awarded on a competitive basis Public accountability and probity requires separation of responsibilities between people recommending the grant and people authorizing payment	Grants provide ability to acquire new capability (knowledge, people, assets), and offset costs, to achieve innovation outcomes

Source: HOWARD PARTNERS (2007) The Role of Intermediaries in Support of Innovation. Department of Industry, Tourism and Resources, Canberra.

Intermediary roles can become compromised where remuneration incentives and value capture favours one side of the relationship more than another. This has tended to occur when commercially oriented intermediaries seek to capture value through provision of additional fee for service consultancy. Similarly, research grant writers, working on a commission basis, may capture up to 10 per cent of the value of project funding.

In the preparation of the Hunter RIS3, and in its ongoing work programme, RDA Hunter has demonstrated excellent capability in each of the roles of consultant, broker, mediator, and resource provider (accessing and allocating resources from government and industry). By involving a wide cross section of stakeholders, and funded largely by Government, it has been able to assure independence and objectivity.

In the context of contemporary interest in regional innovation systems, Hunter RDA is developing a vitally important role as an *intermediary organisation*, with a clear mission and purpose relating to both regional innovation and economic development. The RDA has adopted a highly inclusive approach in bringing key actors in the innovation system together in an overarching strategic framework provided by the RIS3 approach.

The RDA is not seen to be pushing any specific political agendas. It has credibility with business, the research and teaching sector and government. Moreover, the approach allows for some separation between contributions to strategy development and responsibilities for strategy implementation in regional innovation and economic development – an approach adopted widely in corporate and public management.

## Future directions for Regional Development Australia Committees

The Australian system of RDA Committees is currently under review. The purpose of the review is:

To examine the effectiveness of the RDA programme in delivering the Australian Government's regional agenda and make recommendations regarding its future scope, structure and delivery model, in light of developments in the Australian Government's regional agenda<sup>6</sup>.

As indicated earlier in this Paper, a feature of Australian regional economic development is the existence of a complex landscape of Commonwealth, State and Local Government agencies with roles and responsibilities for the planning, organisation and delivery of infrastructure and services at a regional level. Australia does not have a system of regional governance and there is, at the moment, little coordination of effort across those organisations.

The RIS3 framework provides a context for regional innovation strategy formulation across this complex backdrop of largely autonomous public and private organisations. This complexity in organisational roles and responsibilities has a potential for *innovation systems failure* where resource allocation and implementation decisions taken in one organisation may conflict with decisions taken in others.

As an intermediary organisation the RDA has the potential to ameliorate these potential system failures. RDA Hunter has a well-developed capacity and capability for continuing representation and advocacy for the region to navigate through the complex public administration arrangements that exist at the regional level.

Commonwealth and State Government agencies also administer a broad range of grant programs for purposes associated with regional innovation. In the Hunter, there are over 130 such programs. In an ideal world, grant applications should point out extent to which proposed actions are consistent with RIS3 research, development, and innovation priorities.

In Europe, Regional Development Agencies (RDAs) provide the following advantages in the development of Smart Specialisation Strategies.<sup>7</sup> These advantages reflect the way in which Hunter RDA has discharged its mission in an economic development and regional innovation system context. In particular, RDAs can be:

- A relevant institutional arrangement to avoid political lobbying
- Close enough to the Commonwealth and State agencies, but not only focused on administrative processes
- Focussed on both innovation and economic development
- Taking account of the place base dimension in innovation systems
- Providing for innovation leadership from the Board
- Holding the 'know how' to explain statistics and access to key policy documents and reports
- Flexible and responsive to regional institutional settings
- Holders of appropriate level of legitimacy to explain the changes issued from the smart specialisation platform
- Advocates to keep RIS3 approach alive

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<sup>6</sup> <https://rda.gov.au/review/terms-of-reference.aspx>

<sup>7</sup> [http://www.regionalstudies.org/uploads/ARIIT-Saublens-EURADA\\_Key\\_role\\_of\\_RDAs\\_SMARTER-Conference-VF.pdf](http://www.regionalstudies.org/uploads/ARIIT-Saublens-EURADA_Key_role_of_RDAs_SMARTER-Conference-VF.pdf)

A wider role of RDAs in regional innovation system governance was advocated in a report prepared for the Senate Economics Committee inquiry into Australia's Innovation System (Green & Howard, 2015). The report noted:

. . . a number of RDA regions have developed or are in the process of developing Regional Smart Specialisation Strategies (RS3). Other regions should be encouraged to go down this track. Smart strategies are oriented towards 'clustering' around key enabling technologies – for example, digital technologies and digital content, biotechnology, nanotechnology, micro/nanoelectronics, robotics, artificial intelligence, and advanced materials in industries that have been identified as offering potential for growth.

In an Australian context an RDA can operate as both a 'top down' instrument for public policy implementation, and a 'bottom-up' instrument for on-the-ground contacts that generates input for the public policy. They have an important role in partnership with universities in developing the innovation dimension of regional economic development strategy through Regional Innovation Smart Specialisation.

## **Conclusion**

This paper has endeavoured to provide some insight into the way in which interactions between the three main elements of the Triple Helix model of university-industry-government interactions operate and can be facilitated using the framework of the Regional Innovation Smart Specialisation Strategy, using as a case example, the Hunter region of NSW, Australia which has recently completed a RIS3 project.

The paper also draws attention to the role of RIS3 in extending traditional regional economic development approaches into regional innovation system strategies that can support Australia's current innovation and growth agenda. In addition, the paper points to the potential of Regional Development Australia (RDA) Committees to perform an intermediary role in the development of collaboration arrangements in Triple Helix contexts.

The paper has not explored parallel arrangements relating to UK Local Enterprise Partnerships (Great Britain. Department for Business Innovation and Skills, 2013) and the recently initiated Science and Innovation Audits that aim to build relationships between universities and business (Great Britain. Department for Business, 2016).

Further research will draw on knowledge generated by reviews of coordination and governance arrangements in Europe and the UK and particularly the relationship between national and regional innovation systems (Simmonds, Montes, Sharp, Rentel, & Wain, 2014).

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