# 25

# Building Regional Research Capacity: The Northern Research Futures Collaborative Research Network

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## Introduction

Australia's Collaborative Research Networks (CRNs) are a modest program (A$81.1 million for 15 projects each over three to five years) of publicly funded research, development and extension (RD&E) designed to support relatively youthful universities with rapidly developing research capacity (Department of Education and Training, 2015). For socio-historical reasons, many youthful Australian universities are located in Australian regional settings (including 60 per cent of CRN-eligible universities). This chapter features the Northern Research Futures CRN (NRF-CRN) to show how the CRN program has supported RD&E capacity building in regional settings.

We propose that the CRN program fortuitously positioned Charles Darwin University as a well-qualified and well-prepared provider of RD&E capabilities that can support the re-invigorated government agenda to attend to the development of Australia's north. The chapter argues that these capabilities have matured as the result of 1) an application of well-established policy drivers for public funding of RD&E that has been 2) applied to

university-based RD&E and 3) aimed towards the needs of regional socioeconomic development of Australia's north through 4) social science using a diverse menu of methods, team formation and rich networking.

Public funding of research—how much and to what ends—emerged as a preoccupation of policymakers and research communities some half a century ago owing to the confluence of 1) clear opportunities to promote the protection and/or welfare of people and communities through the application of de-militarised scientific and project management methods forged in war and 2) advances in public financial systems that generated budgets and released funds for research and related activities (Bush, 1945; Snow, 1962). Since that time, many studies have explored the links between RD&E and prosperity in firms, industries, regions and nations (Aghion & Howitt, 2008; Geisler, 2000). Although the linkages are many and complex, the evidence for their potency is compelling. Accordingly, many national and supra-national governments now establish aspirational targets for the proportion of gross domestic product that is allocated to research and development, targets for the public and private funding components of this proportion and, in many cases, priorities for selecting fields and modalities of research focus. Public funding of research in relation to *regional research capacity* is often viewed as a particularly important part of this policy arena.

In his foreword to the Productivity Commission's (2007) report *Public support for science and innovation* (the PC report), Chairman Gary Banks observed that the benefits arising from public funding of science and innovation[1] are 'not just the gains that end up in gross domestic product or other statistical measures of economic performance, but the social and environmental benefits as well' (p. v). The report itself presents one of the most comprehensive accounts of the public policy considerations that come into play when the Australian Government is designing (and refreshing) the institutions and programs tasked with delivering benefits from public funding of research to the Australian community.

1 The term 'research, development and extension' (RD&E) is used in this chapter to describe the cluster of activities implied by the phrase 'science and innovation' used in the PC report. The term RD&E is not code for the narrow notion of discovery of new knowledge in the natural sciences or for the creation of private economic advantage. It is intended that the term RD&E refers to the systematic creation of generalisable knowledge of any kind and the gamut of processes that enable that knowledge to be used. For example, *Ancient history* is RD&E because it involves research, as is *I'm having a rainbow for dinner* because it represents an extension of nutrition research.

The recent *White paper on developing Northern Australia* (Australian Government, 2015) sustained these considerations, emphasising, for example, that the role of government is to create successful business environments, not successful businesses. This policy objective will be pursued through the implementation of the White Paper as a range of activities including 'the basic research necessary for business to identify opportunities in the north' (p. 2). The White Paper concludes that the case for further public investment in RD&E in the north arises, for example, because private agricultural businesses typically underinvest in RD&E because the benefits tend not to be exclusively captured by the investor. Similar investor behaviour also justifies government-funded RD&E that can increase the competitiveness and productivity of industry in the north by supporting collaboration between specific industry and research organisations to improve commercialisation outcomes and returns. Not all of this public investment must be made in the region, but few if any of the intended policy outcomes of the white paper could be achieved by a strategy that fails to provide for public investment in RD&E specifically conducted in and for the focal regions (Walker et al., 2012). So, the government is committed to subsidising industry RD&E?

Compelling reasons for providing public money to fund certain categories of RD&E do not automatically establish the optimal means of undertaking that RD&E. Instead, they raise consequential questions for innovation policy such as 'Into what kinds of institutions is the public investment in RD&E best made?' Despite the intense attention that has been applied to policy issues relating to innovation systems in Australia and elsewhere, options for answering such questions remain controversial and incomplete. Indeed, few if any stakeholders anywhere in the world express satisfaction with the architecture and operation of any specific national or regional innovation system, leading to a perennial, heroic and never-ending quest for change or improvement akin to the Quixotic search of the holy grail or a cult of cargo (Hughes, 2008).

Symptomatic of this peculiar situation is the great number of fundamental concepts and issues in innovation policy that remain poorly understood or controversial despite a notable level of careful, scholarly attention. One of these is the point made by Derek John de Solla Price (1984) more than 35 years ago concerning the importance of advances in what

he called instrumentalities[2] for stimulating and enabling in parallel both radical theoretical advances in fundamental science and radical innovations in practical application. Through case studies and historical analysis, Price showed how public funding provided to discover and apply new instrumentalities will provide extraordinary returns on RD&E investments compared with other kinds of programs. We shall also explain how instrumentalities for research in the social sciences often rely on novel ways to organise research teams, including teams working in regional settings, using NRF-CRN as an exemplar.

A second area of innovation policy that seems persistently out of focus—at least in Australia—is the role of people and their social behaviour, contrasted with the roles of technologies or services or structural/functional considerations. Despite many sharp questions being raised about its empirical validity (Blaug, 1976)—but see also Quiggin (1999)—human capital theory remains an oft-quoted but rarely examined cornerstone of innovation policies (e.g. Hodgson, 2014). By contrast, Allott (2006) explained how a more people-centric approach can bring those who perform publicly funded RD&E together with those who use the results. When blended with the recognition of the value of institutional perspectives on regional development (Amin, 1999), a people-centric view offers rich policy options for spaces of innovation (Healy & Morgan, 2012).

This chapter explores the formation and usefulness of university-based regional RD&E capacity within the public policy context for publicly funding of RD&E that has been shaped by the PC report and the White Paper. The chapter starts by summarising some of the rationales for public funding of RD&E and the Productivity Commission's findings regarding benefits and impediments. This approach exhibits what may be taken to be the important components and linkages of a well-functioning RD&E and innovation system, including measures to develop RD&E capability within the regions themselves. The chapter then turns to consider the importance of novel research instrumentalities and people-centric approaches to RD&E, particularly in the context of the delivery of RD&E

2 Price argued that advances in instrumentation and experimental techniques—instrumentalities—in physical, biological and social sciences are potent sources of discovery in both pure and applied settings, so that policy should pay attention to financing progress in instrumentalities. It is apparent from his writings that Price would have regarded NRF-CRN as an instrumentality of the social sciences (Price, 1963, 1984).

for remote regions such as Australia's north. It is then explained how the NRF-CRN sustains specific components and linkages in the context of the challenges and opportunities for Northern Australia development.

## Rationales for Public Funding of Research

The PC report identified two strong contenders for a reasoned approach to public funding of RD&E. First, is the need for a government to fund the RD&E required by that government itself as it discharges its functions. There are abundant examples of government requirements for RD&E including such diverse fields as defence technology and the formation of public opinion—and the Australian Government spends approximately 20 per cent (A$1.8 billion in 2014) of its entire expenditure on RD&E for its own needs. Within the context of this chapter, there are many government RD&E requirements that are consequential to the policy intent of the White Paper. They include, for example, RD&E to explore and promulgate better ways to use and plan infrastructure, improved information about land title and use, comprehensive water resource assessment, development of business-friendly policies, engagement with international development in the region and formation of capable and sustainable local institutions.

As the PC report noted, the major public policy questions regarding RD&E required by government arise in relation to procurement issues such as quality and track record, institutional location and organisation of RD&E providers. The questions include whether the RD&E should be outsourced (domestically or internationally) or conducted in house, whether outsourced RD&E should be conducted by the public or the private sector, whether it is better procured by commission or by competition and so forth. We return to some of these questions below.

The second credible rationale for public funding of RD&E relates to the existence of knowledge spillovers that at the margin reduce the incentive for private investment and necessitating public intervention if the research is to be undertaken. The effect is particularly evident in relation to basic research, where the PC report concludes that private agents simply do not have the right incentives to develop an optimal system for undertaking basic research. Whenever—and it occurs frequently—private interests avoid certain kinds of important RD&E because they cannot capture the full benefits of their investment, governments are

asked or led to call on alternative institutional forms for conducting that RD&E. The publicly funded research university[3] is such an institutional form. Research universities have been almost universally sponsored by national governments (Crow & Tucker, 2001) to achieve two different but usefully aligned purposes: 1) juxtaposition of creative researchers in many disciplines in settings that favour the cumulative generation and dissemination of many kinds of knowledge, together with 2) responsibility for tertiary educational processes, professional networks and a system of higher qualifications.

As explained in the PC report, when RD&E is publicly funded in institutions such as universities, the challenge for the government as investor switches from the private focus on fully capturing the benefits of the RD&E to the public benefits derived by ensuring the highest possible levels of spillover. Optimal spillover requires ancillary mechanisms such as procedures for weeding out mediocre research (the PC report estimated that mediocre research entails an economic loss of around A$1.30 for each A$1 invested), sound RD&E governance to ensure that public funding for RD&E is used efficiently and effectively (e.g. that creative researchers have access to the equipment and facilities that their work requires) and efficient knowledge diffusion systems including those directed at business. As this chapter illustrates, the CRN program is an effective and efficient way to promote spillover from publicly funded RD&E.

The PC report identified other rationales for public funding of RD&E that go beyond the cost–benefit perspectives that underlie the two contenders listed above. There are, for example, three separate intangible grounds on which public funding of RD&E might be justified: 1) as a cultural statement about the kind of society we have created, 2) to increase national prestige, and 3) to meet moral obligations. These values are hard to relate to the question of the desirable quantum of public funding, but nevertheless they do have validity as rationales for providing some public funding of RD&E, provided that they reflect the public's preferences, not just those of the funder or funded.

Public intervention to vary the risk profile of private investment is sometimes presented as a rationale for public funding of private RD&E. For example, it is often argued that capital investment that is related to

3 While a research university may be publicly or privately owned, for-profit universities are quite rare and normally do not conduct RD&E.

private RD&E is so difficult to obtain that attractive business opportunities are being missed. Barriers to such investment might arise, for example, from unfavourable taxation of RD&E risk (cf. capital investment in property), or from the specialist nature of knowledge required to assess the risk of investment in RD&E, or from excessive focus on near-term shareholder value at the expense of future business growth. While there are elements of special pleading, neoliberal techniques for self-serving (Peck & Tickell, 2002) and perhaps the occasional naive dismissal of potent and beneficial market mechanisms for pricing and funding business risk, it seems clear that these and similar issues are all relevant considerations in the design of a national innovation system. The White Paper specifically identifies a large number of publicly funded programs with RD&E elements of relevance to the development of Northern Australia, including the reduction of investment uncertainty (Australian Government, 2015, pp. 152–170).

The PC report mentioned an alternative view of public funding of RD&E that arises from theories of innovation economics based on analogies with biological evolution. The PC report observed that public policies derived from an evolutionary perspective will emphasise experimentation, variety, competitive approaches and continual change. They will relish complexity as a measure of healthiness. As the PC report correctly concluded, complexity itself can hardly be a compelling public policy end in itself—once this is recognised, the differences between the goals of evolutionary and those of conventional economic perspectives tend to evaporate. This conclusion is consistent with the influential and relevant work of Boschma and Frenken (2006) on evolutionary economic geography, conducted around the same time as the PC report was being prepared and offering valuable alternative perspectives on many of the issues raised in this chapter.

## Benefits from RD&E

It has been appreciated for more than 70 years that economy-wide productivity improvement is linked with advances in RD&E, although the specific mechanisms of the linkages are elusive. The PC report set out careful criticisms of much previous work on the specific contribution of RD&E to productivity in Australia and presented a set of general models that have been designed to avoid many of these pitfalls. Considered as

a set spanning the likely range of contributions to productivity, the models reveal just how difficult it is to establish quantitative descriptions of the econometrics of the contemporary Australian innovation system (Shanks & Zheng, 2006). Nevertheless, the econometric models do suggest that there is a positive productivity return for public funding of RD&E and a positive contribution to growth in GDP.[4] Cost–benefit studies based on specific case studies or RD&E portfolios also reveal positive returns.

The PC report considered benefits produced by public funding of RD&E that extend beyond those found in the market economy. For example, RD&E relating to environmental matters may produce benefits to the environment (or to people who are active in the environment) as well as benefits in the market economy. Examples include RD&E on salinity, pesticide use, bio-security, energy and water resource management, bushfires, Australian coasts and the urban fringes. Readers will recognise both the importance of this RD&E and the high levels of uncertainty that surround attempts to estimate the economic and environmental value of RD&E in these areas. However, it is important to recognise that this uncertainty has two edges. While it makes it hard to give precision to, for example, a cost–benefit analysis, the overt uncertainty also helps to support the estimation of the risk-related value of actions that are designed to cope with uncertainty, such as investing to be prepared (e.g. building a cyclone shelter) and deliberately delaying a costly but uncertain decision about long-lived infrastructure (such as constructing a dam).

## Public Funding of RD&E for Regional Development

Amin (1999) presented a contemporary overview of approaches to the broad issue of regional economic development, contrasting the Keynesian legacy focused on redistribution, welfare and state incentives with neoliberal faith in markets, deregulation and support for entrepreneurialism. Characterising the implications as choice between 'dependent development or no development' (p. 365), Amin (1999) developed an alternative institutionalist perspective that would aim to build clusters of inter-related businesses, promote a learning culture,

4 It is important to acknowledge that the PC report concluded that it is impossible to give accurate estimates of the beneficial effects of RD&E stimulated by public funding (Shanks & Zheng, 2006).

broaden local institutions and mobilise the social economy. The 'learning culture' component of Amin's alternative perspective bring us closer to issues of public funding of RD&E in regions, a topic explored by Healy and Morgan (2012) who reverberate with Amin in concluding that:

> After more than a decade and a half of research it does seem that geographical proximity (and so territorial space) remains important to learning (and to the exploitation of the resultant knowledge). The evidence suggests that it is within the territorial space that knowledge (from near and far) is combined most effectively, but only if efficient inter-organizational relations are constructed. Therefore, the question for policy-makers is what happens if those relations are not present either internally for the spread of knowledge or externally for the influx of knowledge? It is clear that a Learning Region needs to be more than the sum of its parts, but how are the parts best brought together and combined? In the context of LFRs [Less Favoured Regions] in particular, there is clearly a role here for the public sector to act as a more robust facilitator. One of the key questions for future research is whether the state, and the wider public sector, has the competence and the confidence to play such a demanding role. (p. 1051)

An earlier exploration of controversies surrounding education and regional development by Neave (1979) framed these issues and opportunities in similar terms, drawing on the Okun-Richardson typography of regional development: Low-Stagnant, Low-Growing, High-Stagnant and High-Growing. Northern Australia is, by this typography, clearly a High-Growing region, albeit coextensive with prominent and ubiquitous Indigenous people and communities that defy categorisation in these terms, thereby revealing the poverty of conventional policy perspectives. Neave's (1979) study suggested that in High-Growing regions there is likely to be many fruitful opportunities for linking universities and industry, a thirst for non-formal and second-chance education to upskill existing community members to avoid being overrun by inwards migration and a need for patience as the region's university develops over a considerable amount of time. Unusually for academic literature on this topic, Neave (1979) also situated in his study a cultural perspective of regions, noting the importance of the role of a university in cultural mobilisation orientated both to maintenance and to operating as an instrument of adaption. Neave's (1979) study was published some 40 years ago, yet his findings remain essentially unchanged and at the forefront of the current role and development plans of Charles Darwin University, which is the sole

university in the 'High-Growing' area of Northern Australia. An important conclusion emphasised by Neave (1979) is that a regional university is an instrument of consolidation 'amplifying and broadening trends which emerge from initiatives taken from other sectors in the economic and social system' (p. 266). To ask more of a university might be essentially pointless, but to expect anything less might be to sell a university short.

## Linear Models for Innovation and the Importance of Instrumentalities

The idea that commercially or socially beneficial technologies are created from discoveries made initially through basic research (i.e. research conducted to make discoveries as academic knowledge projected onto a featureless 'blue sky') was cultivated by Vannevar Bush and his colleagues in the context of the postwar economic recovery of the United States (US) and the battle to form the US National Science Foundation (Bush, 1945). Although there are important truths in the model (Balconi et al., 2010), it is not the way that most beneficial technologies have been created, nor is it a fertile source of the innovations in services that have done so much to produce commercial and social value over the past century. Yet our experience is that deliberate human action and enquiry clearly does play an important role in RD&E—alongside sleepwalking (Koestler & Butterfield, 1968), serendipity (Roberts, 1989), luck (Smith, 2012) and the co-evolved capacities of humans to improve on cultural artefacts (Richerson & Boyd, 2008). If the linear model of innovation based on scientific discoveries is not usually in operation, it becomes an important issue to determine the mechanisms whereby deliberate human activity in RD&E does lead to benefits.

Price (1984) proposed that one answer may be found in a reading of the history of science and technology that tells us both science and technology advance through the discovery and application of new instrumentalities.[5] Science, Price (1984) suggested, appears superficially to be driven for utilitarian gains, but in practice is an internally shaped activity where problems, as they are solved, are assembled in a kind of knowledge jigsaw puzzle, re-orientated through paradigm shifts on those occasions when

5 Price included the instrumentalities of social science in this proposal, listing the national census, opinion polls and personal tests as examples.

its scientist-creators get into serious difficulties. Conversely, technology is not the descendent of science, but rather the fruits of revolutionary changes wrought from the wellspring of human inventiveness, tested and shaped in markets. Both fundamental science and technology develop from a foundation comprising the 'the discovery of new techniques for doing something or producing some new effect, then perfecting and extending the technique and using it on everything in sight' (p. 12). These new techniques consist of instruments such as telescopes, effects such as voltaic electricity, processes such as recombinant DNA, new raw material for social analysis derived from polls and personal tests, and a suite of mathematical methods—together comprising what Price (1984) calls instrumentalities. The term is useful as a way to refer to activities extending well beyond the ideas of 'methods' as used, for example, in the social sciences.

Insofar as instrumentalities are a dominant source for innovation, Price (1984) argued that their development and application should become a public policy priority over the other expenses of RD&E. Price (1984) noted a number of implications of this insight that could usefully inform contemporary public policy for RD&E. First is the need to disaggregate and treat differently research and development. He argued:

> Development[6] should be regarded as part of the expense of production, an overhead on innovative industries rather than an investment, and it should be taxed and funded on that basis, leaving policy to be dictated by the market and by government procurement … anything that can be done to shift government funding away from D and into R will automatically cause more innovation and less production of the thing already innovated. (p. 19)

Even more controversially, Price (1984) went on to argue for a partial retreat to conditions wherein 'academics and physicians earn their keep by teaching and giving health service and require(ing) them to do research in order to have something to teach and deliver' (p. 19). This would cut the umbilical cord linking institutional welfare to public funding for researcher salary costs, potentially increasing the relative amount of resources made available for apparatus, technicians and hardware, thereby accelerating progress in science and in technology.

6 'Development' here refers to the 'D' in RD&E.

Finally, and importantly for this account of the NRF-CRC, Price (1984, p. 19) pointed out the importance of doing whatever we can to promote 'interactions between all places where a craft of experimental science is practiced', be they universities, government laboratories or industry. It is highly desirable that all of these sectors have the opportunity to access an abundance of new instruments, materials, effects and methods in case new instrumentalities will yield on the one side novel scientific advances and on the other side unforeseen technological innovation.

The institutional design of the NRF-CRN addresses the challenges and opportunities revealed in Price's (1984) study. For example, the original concept of CRNs included the idea of 'hub-and-spoke' arrangements,[7] whereby a research-intensive university would collaborate with a developing university to facilitate researchers' access to advanced facilities and experienced technicians. Social science researchers in the NRF-CRN collaborate with colleagues at The Australian National University and James Cook University to access advanced social science instrumentalities including research methods and data, providing to them in return in situ tests and applications that reflexively improve methods and models. In another example, the NRF-CRN delivers a range of knowledge-transfer programs ('extension') to government and north Australian communities, helping to ensure that the new instrumentalities of social science (such as new ways of approaching the design of institutional governance) become available to those who might be able to exploit them in innovative ways.

## People-Centric Innovation

Just as Price (1984) identified instrumentalities as an overlooked but important feature of sound innovation policy, so Allott (2006) identified people as an overlooked but central component of public policy designed to create wealth from RD&E conducted in universities. Allott's (2006) point is not that public funding of university RD&E is misplaced, but rather that when the purpose of the funding is technology transfer (broadly defined) grounded on a linear model of innovation, the funding

7 'Hub-and-spoke alliances will ensure that all researchers get access to the best colleagues and the best infrastructure. They will ensure that all research students get access to the best supervision and the best learning aids' (Senator Kim Carr speaking at Charles Darwin University, 9 November 2009, retrieved from web.archive.org/web/20160402185435/http://archive.industry.gov.au/minister archive2011/carr/Speeches/Pages/CHARLESDARWINCHANCELLERY.html).

is targeted in the wrong place. He advocated knowledge transfer that is not idea centric but people centric. This, Allott (2006) stated, has two aspects: 1) contact with the researchers in universities who can answer the questions being asked, and 2) university graduates meeting the potential employers who have the jobs they want.

At first sight, an emphasis on people seems like a hollow motherhood statement. The sharp edge of a people-centric approach to public policy becomes clearer when Allott (2006) highlights the role of PhDs from his standpoint—namely, looking things up when they are needed, thereby accessing 100 per cent of the world's publicly available knowledge in relevant domains, rather than inventing things after long and unpredictable work. To PhD candidates and universities alike, this position would generally represent a major shift in the perceived place of highly skilled knowledge workers in an advanced economy. It is, of course, consistent with the observation by Neave (1979) mentioned above, that the dominant contribution of regional universities is to broaden and amplify trends emerging from other sectors.

While Allott's (2006) perspective is that of an 'industrial Visitor' to Cambridge University, scholars more centrally involved in studying the question of people-centric learning and innovation policy express similar ideas. For example, in a carefully constructed and highly regarded theoretical overview, Asheim, Coenen and Vang (2007) pointed to the need for innovation scholars to address a people-centric view of innovation and creativity, untangling conflated ideas of face-to-face and buzz as modes of personal interaction, of interindustry differences and the consequent exaggeration of cities as the sites of creativity and innovation. According to this analysis, buzz is the concoction of rumours, recommendation, folk lore and information, transmissible electronically or directly and, therefore, both local and global. It is the mode of knowledge transfer that is particularly important for symbolic goods, such as film, theatre and publishing where time-limited projects tend to dominate. Face-to-face interaction, on the other hand, is important for activities resting on an analytic knowledge base (e.g. in biotech and nanotech) that can benefit from direct access to expert researchers working at the forefront of knowledge generation. It is often important also for industries that rely on a synthetic knowledge base (e.g. plant engineering and production systems) resting on access and transmission of tacit know-how and diverse skills. Asheim et al. (2007) argued that if these ideas were better understood,

policymakers should be in a position to implement customised support into different regions and sectors, assisting the competitiveness of regions in a globalising world.

As revealed in other chapters of this book, the NRF-CRN has adopted a wide range of people-centric approaches to knowledge transfer, including the appointment of Indigenous leaders as visiting fellows, frequent face-to-face briefings that take place in various geographical settings, fostering 'buzz' in social media and the development of social science approaches that engage researchers directly in community-led and industry-led activities.

## Discussion

One of the most important and difficult challenges for governments in relation to the public policy for funding research universities is to strike a sound balance between concentration and selectivity.[8] In the US system, this challenge is addressed by a number of programs including the long-running Experimental Program to Stimulate Competitive Research (EPSCoR), founded in 1979. EPSCoR provides funding to research universities in US states that are traditionally underfunded through federal RD&E programs (Feller, 2000; Institute of Medicine, 2013). In the United Kingdom (UK), the discovery through peer-review processes that research excellence is widespread (Adams & Gurney, 2010, 2014) prompted expressions of concern by leaders of universities large with research portfolios. This lead to a funding settlement that protected these universities while recognising dispersed excellence. The CRN program in Australia shares some of the policy objectives of the US EPSCoR program, and faces some of the UK's challenges created when powerful research universities mobilise to protect their funding base against relatively small proposals to distribute it more broadly.

The White Paper and other studies (e.g. Allison & Eversole, 2008) reveal just how important it is for Australia that public funding for RD&E conducted within regional universities be an embedded component of Australia's research and innovation system. The CRN program is such a program, and evaluations of its implementation (e.g. ACIL Allen

8 Concentration is the policy of building research scale in selected institutions, while selectivity is the policy of supporting research excellence wherever it arises (see Adams & Gurney, 2010).

Consulting, 2015) provide an opportunity to improve the design and delivery of such programs. Some of the principal alignments between public policy drivers and the NRF-CRN design features are shown in Table 25.1, illustrating how straightforward it can be to deliver on national priorities through a funding program like the CRN.

**Table 25.1: Alignment of public policy drivers and NRF-CRN design features.**

| Area of public policy relevance | NRF-CRN design features |
|---|---|
| Public funding for RD&E to provide for the requirements of government. | Capability to deploy research teams with distributed disciplinary expertise to address government RD&E needs in an integrated and situated manner (e.g. demography and its implications for business and communities). |
| Public funding for RD&E when private interests cannot capture the full return; findings to be widely disseminated. | Baseline studies of emerging problems in northern development, including better designs for liveability; improved approaches to negotiation of land use; improved approaches to shared governance. |
| Public funding for regional RD&E situated in the specific region of interest. | Field work and stakeholder networks with an enduring footprint in the region, attached to conduits connecting to the leading research groups in Australia and overseas. |
| Instrumentalities enabling both fundamental research and applied research. | Access to a diverse range of qualitative and quantitative research methods; innovative approaches to research organisation and leadership. |
| People-centric innovation policy with attention to regional issues. | Higher degree research students working in team-based approaches to community and societal issues and problems. |

There is a compelling case for a continuing program of public RD&E funding by the Australian Government for institutional arrangements similar to the CRNs. The NRF-CRN or a descendent of it provides an exemplary vehicle to undertake, absorb and diffuse the RD&E required to shape, inform and sustain critically important agendas in the development of Northern Australia.

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