Christchurch Health Research Institute
Indicative Business Case

CERA / Health Precinct Advisory Council

April 2016

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Executive summary

The Christchurch Health Research Institute

This Indicative Business Case outlines the rationale and options for a proposed Health Research Institute (HRI) within Christchurch's Te Papa Hauora / Health Precinct (the Precinct). A separate programme business case has been prepared for the Precinct. The HRI will be a core part of, and integral to the Health Precinct and, to a degree, to delivery of the programme benefits of the Health Precinct. As such, this indicative business case for the HRI should be read alongside the Precinct programme business case.

The HRI is at an earlier stage of development than the Precinct. The role of the HRI and its core functions have been evolving There has not to date been a detailed and common understanding among its stakeholders of what the HRI might look like, what functions it might carry out and what parties might "own" or invest in it.

The HRI as defined in this is business case is envisaged as an enabler of research in Christchurch. Its role will be to proactively support the Research Partners[1] in their efforts to grow the scale and impact of the world class health research in Christchurch.

The HRI will not undertake research in its own right. Rather, it will undertake a wide a range of initiatives and activities to assist the Research Partners, including:

- Actively engaging with private sector organisations and facilitating their participation and investment in research collaborations in Christchurch.
- Seeking out opportunities for accessing further public sector research funding.
- Finding solutions to impediments or constraints that are preventing or inhibiting research progress and/or collaboration.
- Identifying and delivering ways of reducing the administrative burden on researchers and research projects.
- Providing facilities and forums and coordinating services for prospective and current research partners to discuss and develop ideas and research opportunities.
- Promoting Christchurch research capability and achievements to enhance the sector's and the Research Partners' national and international recognition and profile.
- Providing a facilitation and coordination role to bring together research collaboration partners in their efforts to create a world class precinct.

The overriding rationale for the HRI is to assist the Research Partners bring together the expertise, funding and the other resources they need to efficiently undertake and execute research projects within a collaborative framework. In doing so it will be the "front door" for health research in Christchurch – the point of contact or conduit for third parties, such as private sector businesses, other research organisations and individual researchers, looking to access the deep experience and expertise of the Research Partners and for the Research Partners to seek out other collaborators.

There is opportunity for the HRI to provide strong strategic leadership for Christchurch health research. Also, although the HRI will not undertake research in its own right, its activities could extend to more direct support to research activities such as:

- Forming a specialist advisory committee to provide validation/endorsement of research proposals and research outcomes.
- Providing analytical and statistical capability and capacity.

[1] University of Otago, University of Canterbury, Ara Institute of Canterbury, Canterbury District Health Board.

The HRI concept as defined in this document is not a capital expenditure project that requires a business case to obtain funding. As with the Precinct, the context and audience of this Business Case is different from a traditional Indicative Business Case. The purpose of this document is to take the next step in developing the HRI concept by defining the project's objectives and business needs in more detail, with a focus on:

- Identifying what is required to make a successful HRI.
- Identifying and assessing options for those requirements, within the context of options for the wider Precinct.

Collaborating as a means to critical mass and international recognition

The Research Partners have been collaborating successfully in many significant ways for over 40 years. A major tertiary teaching hospital and a leading medical school have together provided an environment conducive to relatively high levels of co-operation and collaboration.

However, collaboration is typically driven at an individual, rather than organisational level. It is dependent on individual researchers networking, seeking funding, engaging with external sectors and driving projects, with relatively low levels of strategic guidance or discussion on how best to leverage collaboration to achieve shared aspirations.

Enhanced and more strategic, coordinated collaboration could enable the Research Partners to produce even better quality research and increase their critical mass and impact. This could, in turn raise their international profiles and further enhance their credibility as partners for private sector businesses. Partnerships with the private sector not only bring additional research revenue, they will increase the likelihood of research being commercialised and translated into clinical practice – an important goal of health research.

Creating an environment with capabilities that will enable the Research Partners to further enhance the quality of their research will assist the Christchurch tertiary institutions attract more students and top-quality staff. This in turn contributes further to the tertiary education "virtuous circle", with funding following student enrolments, and high calibre staff attracting interest and investment from the private sector. This feeds back in and adds further to the benefits described above.

A long term goal of reducing the burden of health care

CDHB has world leading and innovative models of care, such as its integrated health record system (HealthOne). The HRI and wider Precinct can support CDHB's efforts to continually improve its model of care in terms of health outcomes and efficiency, taking into account the shifting demographics and the burden this will place on the health system in the future.

The HRI can assist capitalise on the very valuable research potential within CDHB and assist in the efforts to improve health outcomes for Canterbury, the South Island and the country more generally.

A boost to the Christchurch rebuild and economy

Christchurch is taking advantage of its unique opportunity to build a new central city that will include clustering of organisations within precincts. The Health Precinct can play a leading role in catalysing the recovery of the central city, both in the development of its infrastructure and when it is operational. It will accommodate a large number of researchers, health sector workers, students and staff.

The employment of these people and the associated activity will bring economic benefits to the city and the region. Importantly, it will help to revitalise the central city and contribute to the benefits of the programme of work to rebuild the central city through:

- Increased participation in central Christchurch as a place to invest, work, live and play
- Increased productivity for central Christchurch, which will contribute to the economic growth and social wellbeing of greater Christchurch and Canterbury.[2]

[2] Draft Christchurch Central Implementation Plan: Programme Business Case

The Precinct will also directly support a number of initiatives outlined in the Christchurch Economic Development Strategy (CEDS) and associated action plan, including:

- Improving productivity through innovation.
- Successful central city design and build.
- Workforce.
- Sector development.
- Connections and business networks.

The HRI, as an important part of the Precinct's research offering, will play an important role in building momentum for the Precinct's development and attracting of organisations to locate or operate there.

Recommendations

The options for the HRI are to a large extent tied to the shape the Precinct takes, particularly in terms of operational delivery structures. Therefore, this business case references the Precinct Programme Business Case heavily and proposes a combined preferred option.

The case for establishment of an HRI in Christchurch is built on the benefits it can deliver the Research Partners in both removing administration burden and in providing facilitation, coordination and business development services and strategic direction that they are not incentivised to deliver as individual entities with their own strategic imperatives.

In the circumstances is considered appropriate to take a "step-wise" approach to implementing the HRI. There is no requirement for the establishment of a large, heavily resourced independent entity at the outset. A sensible approach will be to put in place a small number of high quality people who can start working with the Research Partners to gain their confidence and carefully plan the development of the HRI. It can then grow, in line with the plan and with the development of the Precinct (although the activities of the HRI do not need to be constrained by the speed of Precinct developments). In effect, the HRI will grow as it proves its worth to the Research Partners.

With this is mind, it is recommended that:

- The HRI's scope of activities encompass:
    - Administration
    - Facilitation
    - Business development
    - Strategic direction and guidance

  These activities are defined in Table 7 on page 29.

  Research support services could be incorporated into the HRI's scope in the future, potentially taking over an expended brief from the current combined University/CDHB Research Office.
- The personnel resources needed to deliver the HRI's scope of activities be incorporated within the organisational design for the Health Precinct team. It is estimated that a staff of two to three will be required initially to facilitate and promote collaboration across the Research Partners, establish a business development strategy and function, develop an identity and value proposition for the HRI and provide administrative support to the Research Partners.

  The need for a separate standalone operating structure for the HRI can be assessed over time. If the HRI's functions are expanded to include the research support services and its other activities grow then there might be a case for a separate operating structure in the future.
- The HRI is governed initially by HPAC.
- The HRI personnel resources are housed with the Health Precinct team but there is specific branding of the HRI to give it a strong, standalone identity to external parties.
- The HPAC commences a process to confirm strategic themes and capital requirements for a flagship institute based on the workshops held to date.

Economic benefits of a successful HRI

A successful HRI will enable many of the broader benefits of the Health Precinct to be realised. There will be a two-way relationship between the HRI and the balance of the Health Precinct—a successful HRI will support a successful Health precinct and vice versa.

The HRI is expected to have a business development function and provide reputational benefits, which will assist with generating the Health Precinct's benefits. The HRI is still likely to have an influence over the other aspects of the Precinct benefits, but that relationship is less direct.

The benefits estimated in this business case and in the Health Precinct Programme Business Case are intended to provide an order of magnitude of the potential benefits, assuming a successful Health Precinct and HRI. A simple summing of these benefits needs to be treated with caution as they are inevitably interrelated but the analysis suggests a successful Health Precinct could realistically deliver additional economic benefits in the order of $50 million per annum. Of these benefits, at least a third could be ascribed to the HRI. This proportion could be significantly higher if there is a larger uplift in research commercialisation.

Strategic Case

Overview of the HRI concept

HPAC's Strategic Plan 2015 – 2020 defines a research centre of excellence as "an entity which brings together a network of researchers, students and clinicians (team) with a clear focus on particular areas of research and innovation". This definition leaves open the form of the research centre of excellence and how it should operate in practice.

The HRI, as described in this business case, is the practical interpretation of the research centre of excellence as envisaged by the HPAC strategic plan. With meaningful commitment to the HRI by existing Research Partners it will play a support, coordination and facilitation role to enable the Research Partners to build on and enhance their very considerable existing collaborative research activities. It will undertake business development and promotion activities – a critical success factor for the HRI will be that it is recognised widely as the "front door" for health research in Christchurch. It will be an integral component of, and in due course a flagship for the Christchurch Health Precinct.

The roles envisaged for the HRI in this business case include providing strategic leadership for Christchurch health research and possibly providing direct research support services. They do not include the HRI undertaking research in its own right.

However, this doesn't mean that the HRI cannot evolve, in time, to become a provider of research – a true research institute carrying out research under contract to the Research Partners or in its own right. The case for the extension of the scope of the HRI in the future would need to be developed by the HRI itself and agreed among the Research Partners and HPAC.

Organisational overview

The key partner organisations in the HRI project are:

- **University of Otago (UO):** a leading University and a provider, through its Division of Health Sciences, of biomedical and public health research and professional health workforce programmes (including medicine, dentistry, nursing, oral health, medical laboratory science, radiation therapy, physiotherapy, and pharmacy).
- **University of Canterbury (UC)**: a leading University with a significant portfolio of health research across a range of disciplines. UC incorporates a School of Health Sciences and offers professional education in Audiology, Clinical Psychology, Nursing, Medical Physics and Speech and Language Pathology.
- **Ara Institute of Canterbury (Ara)**[3]: the largest South Island provider of education and workforce training for nursing, midwifery, medical imaging, social work and other nursing and health careers (from Certificate to Masters qualification).
- **Canterbury District Health Board (CDHB)**: the main planner, funder and deliverer of health services in Canterbury. CDHB provides a wide range of health services to the region, including supporting teaching, professional development and research activities.
- **Canterbury Earthquake Recovery Authority (CERA)**: a New Zealand Government Department providing leadership and oversight of the recovery from the earthquakes in 2010 and 2011.
- **Ngāi Tahu / Matapopore**: Matapopore is the Ngāi Tūāhuriri earthquake recovery steering group and has been working closely with the Crown, providing advice on the Christchurch Central Recovery Plan (CCRP). Matapopore became a party by invitation to the Health Precinct Advisory Council (HPAC) in August 2014, agreeing to contribute advice and support to the project in-kind.

A detailed summary of each of these organisations is provided in Appendix A.

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[3] Ara Institute of Canterbury has been formed recently from the merger of Christchurch Polytechnic Institute of Technology and Aoraki Polytechnic.

The **Health Precinct Advisory Council (HPAC)** also has a key role to play in the establishment and subsequent operation of the HRI. The HRI will be an important contributor to the development of Christchurch's Te Papa Hauora / Health Precinct (the Precinct – see below) so the **Health Precinct Advisory Council (HPAC)** will have a major interest in the HRI's successful implementation.

HPAC was established in 2014 by its stakeholder institutions (CDHB, UC, UO, Ara and CERA) to ensure realisation of the vision of the Precinct, recognising that success will require strong leadership, investment in kind and funds, and collaborative effort to achieve long term goals. HPAC comprises an independent Chairman (Dr Ian Town), as well as a senior representative from each of the partner organisations listed above, and an Executive Officer.

One of the six themes in HPAC's Strategic Plan 2015 – 2020 is to enable the development of the HRI. It has established a **Project Working Group** to support this work. The Project Working Group includes members from all interested partner organisations, as well as some individuals from private sector companies. Most members of the Project Working Group have been involved in the development of this business case, either through interviews or participating in workshops.

Context: Te Papa Hauora / Health Precinct

The Te Papa Hauora/Health Precinct ("the Precinct") is one of 17 anchor projects in the CCRP. The CCRP describes the Precinct as:

> *"... an inspirational project in which private research and professional partners, educational and medi-hotel facilities will be within walking distance of the main hospital site. It will also form a world-class facility for learning and teaching in medicine ..."*

The Precinct occupies four blocks between Hagley Avenue, St Asaph Street, Montreal Street and Oxford Terrace. It will accommodate public and private sector organisations that have a focus on medical, nursing and allied health research, health sciences, tertiary and postgraduate education and research, and business innovation.

The Precinct will be an attractive area with public spaces. It is bordered by Ōtākaro/Avon River to the north, with green spaces for cyclists and pedestrians beside the river. There are open public spaces, including a proposed public plaza near the planned outpatients facility, and proposed new north-south streets and lanes promote engagement with the river and connections and collaboration within the Precinct.

Alignment to existing strategies

The HRI has strong alignment with the strategic aims of the Research Partners. This is evidenced not only in strategic documents such as the HPAC Strategic Plan 2015-2020, but also by the commitment all organisations have made to the Precinct by signing the Collaboration Agreement in May 2014 and participating in the resulting HPAC.

The summary of partner organisations in Appendix A also includes a summary of the organisations' strategic objectives and their aspirations for their involvement in the HRI and wider Precinct. There are common themes in these documents that are important to the concept of the HRI. Some of these themes were raised during interviews and workshops held during the development of this business case. In particular:

- A commitment to growing strong and productive relationships among the public sector stakeholders as well as between public and private health organisations operating in Canterbury.
- Collaboration as a means to achieving benefit for individual organisations (for example in collaborative research), as well for the public good (for example, through better and faster translation of research into clinical practice).
- A need to ensure health workforce training is geared to meeting the growing and changing demands on Canterbury's health services.
- A desire to contribute to positive health outcomes for the people of Canterbury in practical ways, such as developing and testing new models of care and innovative workforce development.
- Making a positive contribution to the re-building and re-shaping of Christchurch city, and to the city's and the region's economic growth.

Alignment with broader policy objectives

The HRI concept, with its themes of increasing collaboration, research and innovation and pursuing new private sector partnership opportunities, is aligned with local and central government priorities in a number of sectors, such as the Business Growth Agenda, Tertiary Education Strategy, National Statement of Science Investment. The HRI is also relevant to plans such as the CCRP and the Christchurch Economic Development Strategy through the role it will play within the wider Precinct. The relationships to these strategies are summarised in Appendix C.

The Canterbury landscape

The Health Precinct is one of the 17 anchor projects contained in the Blueprint Plan, which is an integral part of the Christchurch Central Recovery Plan. It is also aligned with the draft Christchurch Central Implementation Plan: Programme Business Case, which includes the Precinct as a Stage 2: Catalysing Investment (2014-2017) project.

The Precinct is expected to contribute to the programme benefits identified in the Christchurch Central Implementation Plan: Programme Business Case. It will also build on the need to redevelop parts of Christchurch hospital, due both to earthquake damage and pre-existing need for additional capacity.

As the HRI will play an important part in the development of the Health Precinct, it will contribute to achieving the objectives for the recovery of the Central city.

New Zealand's health sector

Health services in New Zealand are provided through a network of public and private sector organisations. It is a large and complex system with multiple decision-makers. The health system absorbs more than a fifth of government spending, with core Crown health expenditure of $15.9 billion for 2015/16[4].

As in other developed countries, the New Zealand health system will need to adapt to meet changing population health needs in the medium term. An ageing population is a key challenge for Canterbury, which has the largest total population aged over 75 years in New Zealand. By 2026 one in every five people in Canterbury will be over 65, and the number of people aged over 85 will have doubled.[5] A rising incidence of chronic conditions such as diabetes and obesity nationally[6] is also a major challenge.

These demographic changes will result in changes in the demands on the health system. For example, chronic conditions typically require sustained management over many years, with most of this care occurring outside of hospital. Many patients will suffer more than one chronic condition and will need to be cared for in an integrated way[7].

The health system will need to be rebalanced to meet these future service demands, with a probable increase in focus on primary and community-based care and patient self-management. However, this doesn't mean simply increasing the quantity of primary and community care as it is delivered today.

Future primary health services will not only need to provide excellent care, they will need to be accessible, co-ordinated across organisations, care sectors and regions and make the best use of available technology. Hospital care will continue to be a very large and integral part of the health system but it will also need to adapt to changing demands as New Zealand's health needs change.

This will also have implications for the health workforce. The future health system will require a different mix of skills and a more flexible workforce. In terms of primary sector care, there will be opportunities for nurses and other healthcare workers to carry out a wider range of functions than they do currently. There could be increase in "nurse practitioner" roles or new ways for healthcare workers to co-ordinate their services across the sector.

The projected changes in health service demand add up to a need for innovation in health service delivery models, and changes to the way the health workforce is trained and developed.

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[4] www.beehive.govt.nz/feature/budget-2015, accessed 15 August 2015

[5] 'Our Region' section of CDHB website. Accessed 21 July 2015 at http://www.cdhb.health.nz/About-CDHB/Pages/Our-Region.aspx

[6] Treasury and Ministry of Health Briefings to the Incoming Minister of Health, November 2014.

[7] Treasury Briefing to the Incoming Minister of Health, November 2014.

The tertiary education sector

New Zealand is recognised internationally for its integrated tertiary education system that supports people to study at a variety of levels and in different learning environments. The tertiary education sector is a large part of our economy and communities. In 2013 there were half a million people studying. Over one third of 18- to 24-year olds were in some form of tertiary education, and 127,000 domestic students completed a qualification[8].

However, global competition in the tertiary education sector is likely to grow. Higher education is growing rapidly across the world as governments look for ways to enhance economic growth. Developing countries across Asia, Latin America, and the Middle East are investing heavily to increase graduate numbers. Many western world countries that are grappling with high levels of public debt following the global financial crisis are looking to private investment to supplement or reduce public sector funding of tertiary institutions[9].

This global investment in tertiary education has several key implications for New Zealand[10]:

- Preparing our young people for an increasingly skilled and educated international job market.
- Competition for academic teaching and research talent.
- Competition for international students.

Our tertiary education system will need to make some key changes to address these challenges. The Tertiary Education Strategy 2014-2019 suggests we will need to:

- Build international relationships that contribute to improved competitiveness: TEOs need a stronger connection to the world through academic and research links, cross-border education and business relationships. New Zealand needs to strategically extend these relationships to realise new opportunities, especially in emerging markets.
- Support business and innovation through development of relevant skills and research: TEOs need to develop the skills and knowledge essential for innovation and business growth. New Zealand needs TEOs and industry to work together more closely, to enhance knowledge transfer and the relevance of the skills and knowledge developed.
- Improved outcomes for all: A more prosperous society supports all individuals to achieve their aspirations. New Zealand needs to ensure that more people, including more people from priority groups, have the transferable skills in demand as employment rises, and that will support them in other areas of their lives.
- Continuing to improve the quality and relevance of tertiary education and research: Growing international competition for talent means that New Zealand needs higher quality, more relevant provision from TEOs that offers value for money and improved outcomes for the country.

The first two changes are of particular relevance to the HRI, which is based on the concept of increased collaboration among TEOs, as well as between TEOs and private sector research partners. The HRI is expected to assist in increasing the amount and quality of research generated by the Research Partners, and increasing their international profile and competitiveness, through facilitating collaboration.

The HRI can also generate profile for the Research Partners through business development activities and so assist in attracting international students, including PhD students, to study at UO and UC. This will create financial and strategic benefits for the institutions, particularly in the context of increased global competition for international students.

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[8] Briefing to the Incoming Minister of Tertiary Education, November 2014

[9] Tertiary Education Strategy 2015-2019

[10] Paraphrased from Tertiary Education Strategy 2014-2019

The broader New Zealand research and development sector

This sector has seen increased focus and considerable change in the past five years, with a 54% increase in Government funding (from $628 million in 2007/2008 to $967 million in 2014/15), the integration of the former Ministry of Science and Innovation into the Ministry of Business, Innovation and Employment (MBIE) in 2012, the creation of Callaghan Innovation in 2013 and the establishment of the National Science Challenges in 2013.

Although New Zealand's research and development (R&D) funding has grown substantially in recent years, it is still low by international standards. The 1.28 per cent of GDP that New Zealand spends on science is well below the OECD average of 2.06 per cent. There are many reasons for this relatively low level of science spend. Relatively low investment in the business sector important among these reasons.

Furthermore, as a country we don't necessarily reap the potential benefits of our R&D spend. Although New Zealand is ranked 13th out of 143 countries on the quality of our innovation inputs (such as quality of education, presence of skilled workers, and flexible regulatory environment), we are only ranked at 66th for our ability to convert innovation inputs into innovation outputs (such as patents, new businesses, and high-tech exports).[11]

A number of different pieces of research have investigated the challenges and constraints to improving the effectiveness of New Zealand's R&D ecosystem[12]. Issues identified include:

- Lack of scale and a limited presence of large, internationally-focused companies. This also manifests in low levels of venture capital.
- Low levels of business R&D investment relative to other small OECD countries and low levels of enrolment to study qualifications germane to these companies.
- The quality of research. New Zealand ranks 6th globally in terms of scientific and technical articles relative to GDP, but 26th for the rate at which this research is cited13 (although we note these rankings may be biased because of New Zealand's research being related to unique factors of production).
- Poor targeting of research that constrains its ability to be effectively commercialised.
- High levels of silos and fragmentation leading to a lack of effective collaboration.

HPAC has also identified issues relating to fragmentation in research and development funding. It considers that:

- Uncertainty about funding continuity negatively impacts on career opportunities for those working in research.
- The cost of funding applications and reporting erodes research productivity.
- Incentives to participate within the clinical environment are mixed.
- Clinical innovations are often not taken up nationally.
- Commercialisation of research is challenging.

An important premise of both the Precinct and the HRI is that closer links between health service delivery organisations, TEOs and industry will facilitate collaboration, particularly in research, and that this collaboration will attract greater investment into health R&D, as well as improving the efficacy of that investment. The HRI is also expected to help address the fragmentation issues by enabling institutions to share some research support services (for example, grant applications or commercialisation support).

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[11] By the Global Innovation Index (GII), cited in MBIE's 2014 Briefing to the Incoming Minister of Science and Innovation

[12] See for example, New Zealand Institute, "Standing on the shoulders of science" and the "National Statement of Science Investment"

[13] National Statement of Science Investment

Benefits of research collaboration

The Research Partners have a track record of successful collaboration on health research. This will continue irrespective of whether or not the HRI is established.

Consequently, the focus of this Business Case is on how an HRI can help the Research Partners enhance their collaborative research activities and so enhance their reputations and raise their profiles as leading research institutions in their own right. In this respect the HRI's focus is on adding value to the research activities of the Research Partners.

A successful HRI will help the Research Partners address the challenges they can face in planning and executing their research projects, including:

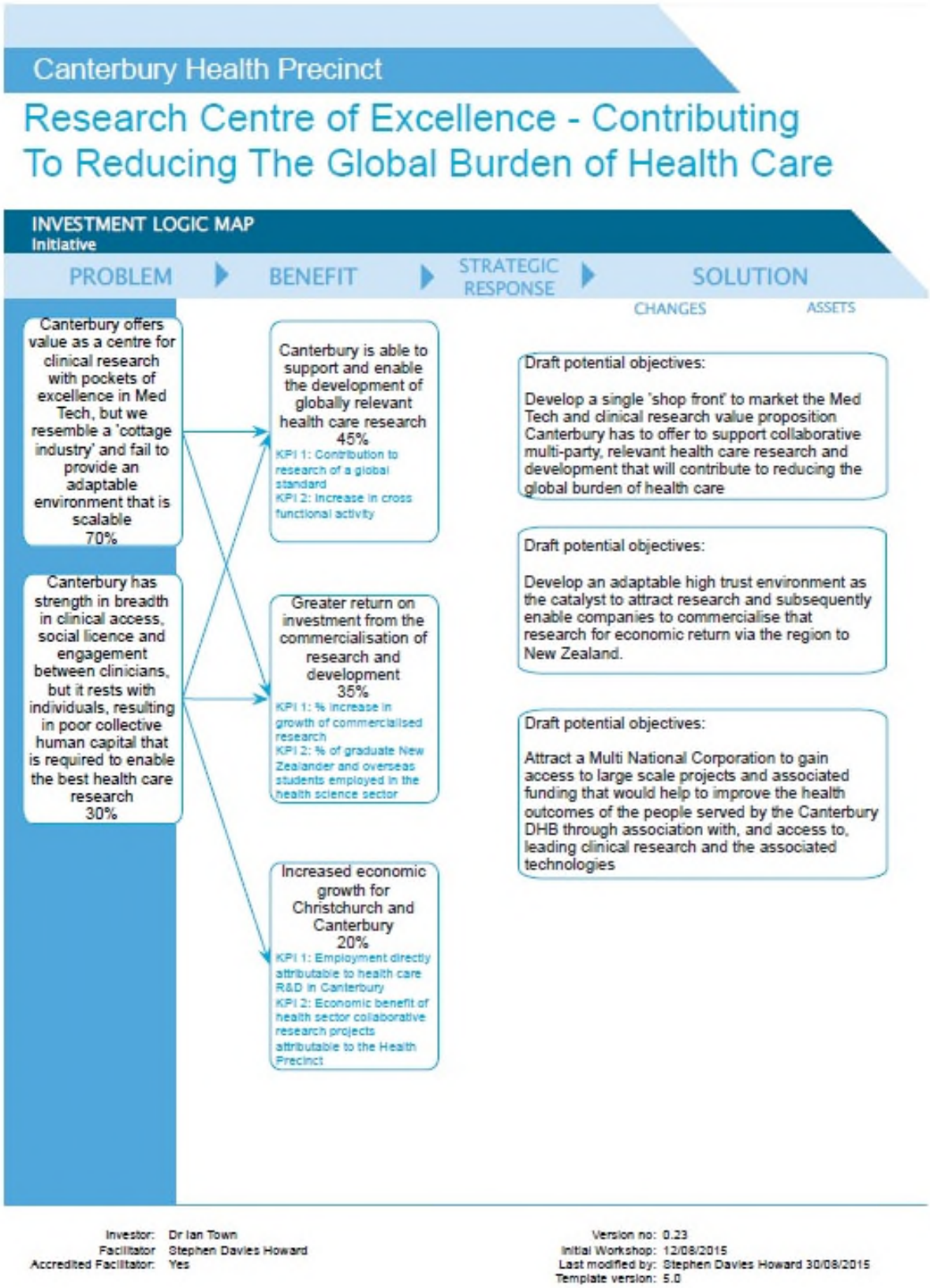
- Fragmentation in research and development, and suspected under-developed research relationships and partnerships between public research institutions and the private sector.
- Institutional barriers and constraints that currently make it challenging to leverage the immensely valuable contributions that CDHB can make to health research.
- Absence of a coordinated and focussed approach to engaging with potential private sector partners, which makes it difficult for the private sectors to identify the appropriate "entry points" into the Christchurch health research community – who do they approach and deal with?
- Increasing, but still low research and development funding that is probably generating relatively low rates of return.
- Increased global competition in the tertiary education sector, impacting on research activities and many other components of the tertiary education system (learning, teaching and export education).
- Changing population health and corresponding changing demands on the health system, requiring innovation in the way the health workforce is trained and how health services are delivered, both in Canterbury and nationally.

The HRI will contribute to the wider Precinct. A successful HRI can be a catalyst for further development in the Precinct through its actions to draw in new researchers, students, private sector partners etc. that increases the level of research and other activities in and around the Precinct. This will have flow-on impacts on the level of economic activity in Christchurch and contribute to the vibrancy and revitalisation of the central city.

Investment objectives

An ILM workshop was held in Christchurch on 11 August 2015 (see Appendix E for participants). The resulting ILM is included on the following page, and has been used as a basis for setting the investment objectives and key service requirements for the HRI.

Figure 1 Investment Logic Map for HRI



Investment objectives, existing arrangements and service needs

Introduction

This section presents:

- What the HRI to is expected to achieve ***(investment objectives).***
- The current state ***(existing arrangements)***.
- The problems or issues in bridging the gap between the current state and desired future state ***(service needs)***.

Investment objectives

The following table summarises the investment objectives for the HRI and the associated measures.

Table 1: HRI investment objectives and measures

Objective	Measures
Create synergies between organisations and enable them to build critical mass	• Investment attracted from new sources (private sector, off-shore) • Global recognition of the HRI as a co-ordinated "shop front" with its own identity and as a flagship for the Precinct.
Increased research and development activity by universities and private sector organisations, and increased commercialisation of that research	• Increased number of internationally significant clinical trials in Christchurch • Increased number of research partnerships between universities (UO and UC) and private sector companies • Increase in published peer reviewed health research and citations from partner organisations • Increase in commercialisation of IP from partner institutions (licencing deals, number of patents, spin-off firms)
More competitive tertiary education organisations	• Increased number of health students / graduates at Ara, UC, UO • Increased number of international health students at Ara, UC, UO • Increased competition for or calibre of candidates for health academic and research positions at Ara, UC, UO • Increase in published peer reviewed health research from UC, UO
Revitalisation of Christchurch CBD and economic uplift for Canterbury	• Number of FTE students and staff located within the Precinct or HRI • Jobs created within the HRI • New private sector investment

The objectives and measures here are built on further in the Benefits section, which sets out expected benefits and an initial draft performance measurement framework for the HRI.

The investment objectives broadly align with HPAC's overarching outcomes, which include the specific expectation that the HRI will contribute to the economic uplift of the region.

While not listed as a specific objective of the programme, it is expected that the HRI, and the wider Precinct, will contribute to improved health outcomes for the Canterbury population over the long term, primarily through faster and better translation of new health research into clinical practice, and improved models of care.

What HRI success will look like

The HRI will be integral to the Precinct's research community, which will produce collaborative and internationally renowned research with practical applications for patient care. The commercialisation of research will be facilitated by good access to a sound innovation ecosystem.

Private sector health-related firms will recognise the HRI as the access point for Christchurch health research experience and capability. The HRI will have an international profile as the point of contact for health professionals, students, academics, researchers and firms looking to tap into or be involved with health research being undertaken by the Research Partners.

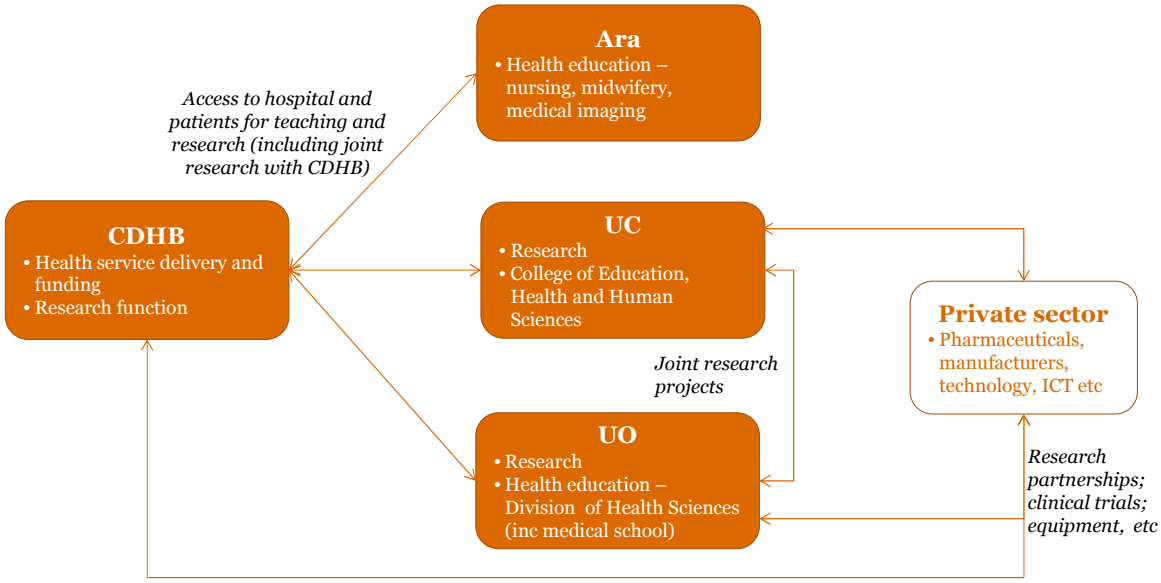
Long term, the HRI will be:

- Widely recognised as a key enabler that assists the Research Partners and their collaborators in their research efforts to contribute to reducing the global burden of health care through new research, innovative models of care and a skilled and adaptable health workforce and research community.
- Critical to the success of the Precinct through its contribution to making the Precinct a premier destination for health professionals, students, academics, researchers and firms, home to a collaborative and connected research community spanning the length of the health value chain and a valuable contributor to the revitalisation of central Christchurch

Existing arrangements

Relationships between the Research Partners are multi-faceted. Figure 2 shows at a high level the current activities and relationships between the Research Partners and between the Research Partners and the private sector.

Figure 2 Overview of existing activities and relationships between partner organisations



Relationships between public sector organisations

There are many existing collaborative relationships between CDHB, UO, UC and Ara. For example, there is a formalised relationship between UO's School of Medicine and CDHB, where the organisations enable each other to carry out their core business. In fact, the existing level of co-operation in Christchurch is considered by some parties to be high relative to other cities (such as Auckland or Wellington), because Christchurch has a single teaching hospital and a leading medical school

There are also research relationships between the two universities (and other New Zealand and international universities), and examples of successful collaborative research projects and networks between them. Included later in this section are case studies on the MARS Spectral Molecular Imaging Project, and the Consortium for Medical Device Technologies.

Practically speaking, there are few barriers to collaborative research, with minimal constraining management or governance requirements. However, this also means collaboration is dependent on individual researchers networking, driving projects, leading collaboration with peers and the private sector, and seeking funding. There appears to be relatively low levels of strategic guidance or discussion of how best to leverage collaboration to achieve shared aspirations. Collaboration between public sector organisations can therefore be seen as somewhat fragmented.

This fragmentation also contributes to inefficiencies in collaborative projects. For example, in clinical trials involving a number of parties, participating organisations each complete their own ethics approval process.

When collaborative research projects lead to commercialisation opportunities, partners may be required to follow their own IP management processes and advice. The ability to share information across partners is in some circumstances limited.

While collaboration between the public sector organisations is certainly possible, and already occurs, there are many opportunities for it to be more cohesive, to operate on a larger scale, and to present this in a more organised and targeted fashion internationally.

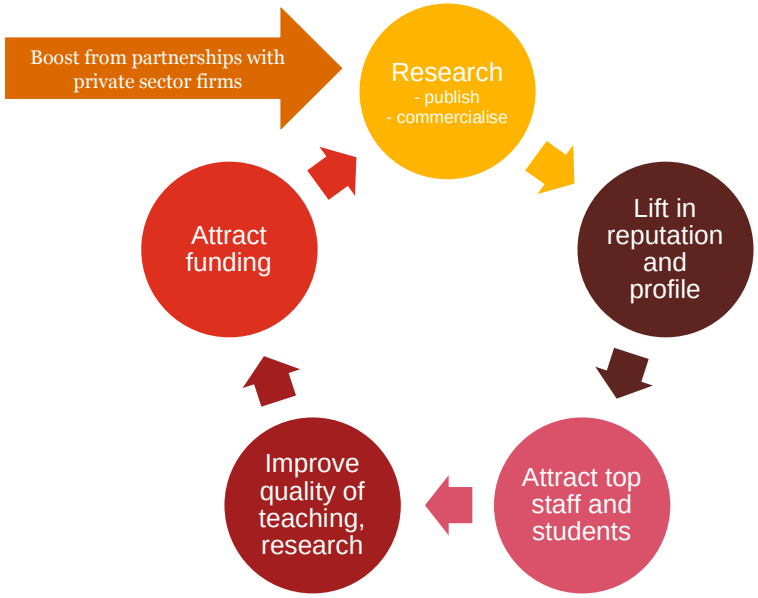
HPAC also represents an important aspect of the relationship between these organisations, although it relates to the development of the Precinct specifically, rather than to organisations' existing business interactions (for example, collaborative research or education activities).

The jointly signed Collaboration Agreement that established HPAC in 2014 notes that the signatory partner organisations wish to lead and help contribute to "a health service delivery, research, education and training ecosystem as a framework for collaboration and shared activities of mutual interest" in the Precinct. In signing the agreement partner organisations also made a financial contribution to the operation of HPAC. This indicates partner organisations see value in fostering greater collaboration in the areas and ways proposed in the Precinct programme, including in the HRI.

Relationships between the public and private sectors

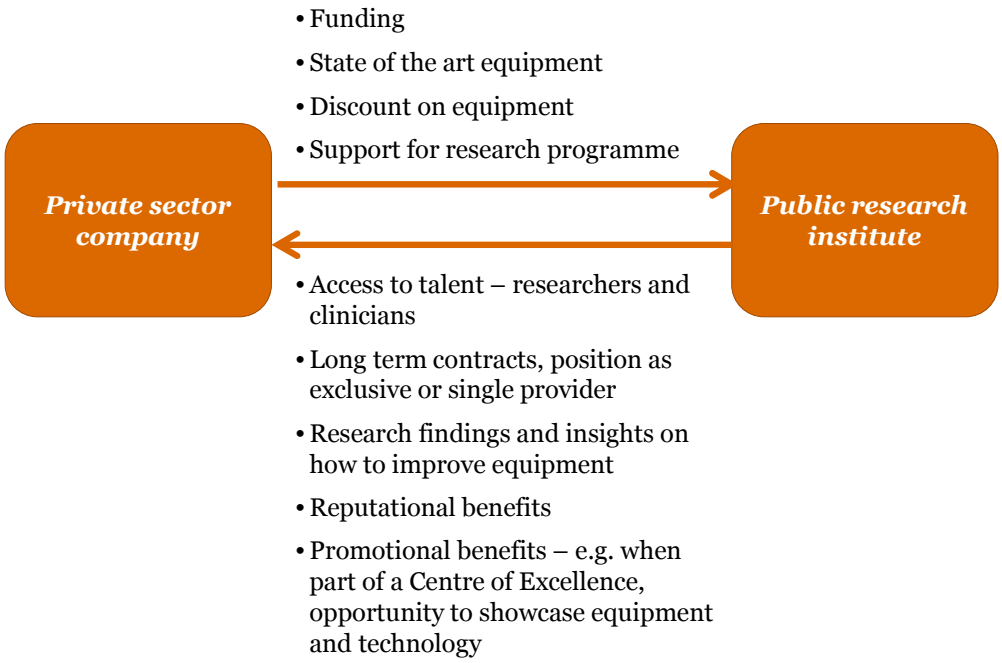
Partnerships between public research institutions and private sector companies are highly sought after and celebrated by researchers, because they boost a "virtuous circle" of tertiary research and education. They may bring new funding (and which has therefore not been re-appropriated from other research projects) and they can provide a clear path towards the commercialisation of ideas generated through research.

Figure 3: "Virtuous circle" of tertiary research and education



The figure below gives a general sense of the contributions and gains for public research institutions and private sector companies in partnerships, using an example of a partnership involving medical research equipment.

Figure 4: Example contributions and gains in public / private research partnership



While there are examples of successful consortia and partnerships across the public and private sectors (see case studies below), these are fairly infrequent. UC, UO, CDHB and Ara have all confirmed a desire for more collaborative partnerships with private sector companies.

When they do occur, relationships between public and private sector organisations present similar challenges and opportunities as those between research institutions. As with university research collaboration, there are few practical or bureaucratic barriers or constraints to partnerships with private sector firms. Partnerships with the private sector also tend to be linked to top individual researchers, rather than organisations; and while individual researchers will drive projects and pursue private sector partners, private sector companies also scout and seek out top talent in areas of commercial interest.

An important consideration for public/private research partnerships is the motivations of the private sector. Private sector companies tend to invest for commercial outcomes, although they may be innovative in the route to those outcomes, and they may have some flexibility in the time frame. While private sector companies will understand the need for outcomes that benefit all partners or stakeholders, they will be drawn to invest in the Precinct or HRI for primarily commercial reasons.

Anecdotal evidence suggests that the minimal strategic oversight of collaboration represents a missed opportunity (on research institutions' part) to strategically target potential markets or funders. The fragmentation described above prevents Canterbury or New Zealand from presenting a unified "shop front" overseas, which some researchers consider would enable the promotion of Christchurch or New Zealand as a destination for excellent clinical trials (for example).

HPAC also consider that the uncertainty in continuity of funding impacts negatively on career pathways for those working in research.

Case studies

Appendix F contains two sets of case studies. The first set are examples of current live collaborative research projects in New Zealand. The second set present the features of three research institutes/precincts in other countries.

Current physical location

The Research Partners currently operate from various parts of Christchurch city:

- **CDHB:** Health services currently provided at Christchurch Hospital (as well as other locations such as Burwood). The corporate and administrative services that are intended to be based in the Precinct from mid-2016 are currently based at Princess Margaret Hospital in Cashmere.
- **UC:** Health Sciences education and research activities are mainly based at UC's campus in Ilam.

- **UO:** Most of UO's Christchurch-based health sciences education and research is already based within the Precinct, primarily in the central campus building (adjacent to Christchurch hospital), with some departments based at Christchurch Hospital, at Christchurch Women's Hospital, or at Terrace House (4 Oxford Terrace) or in various buildings nearby.
- **Ara:** Nursing, midwifery and radiology education is currently based at Ara's facilities in Madras Street.

Impact of the 2010-2011 Canterbury earthquakes

All of the Research Partners are experiencing ongoing disruptions due to earthquake damage to their physical facilities, or to facilities or infrastructure they rely on to deliver their services. New developments in the Precinct, and therefore, plans to co-locate into the HRI, are in part driven by a need to repair or rebuild following earthquake damage. However, the concept of better collaboration and building critical mass pre-dates the earthquakes.

The earthquakes have certainly accelerated the Precinct concept, due to the opportunity presented by the land that became available following the earthquakes, and due to individual organisations' needing to initiate refurbishments or developments, or accelerate existing redevelopment plans. The earthquakes also arguably created an opportunity to broaden the concept for the same reasons.

Conclusion: opportunities for more strategic collaboration

There are strong existing research relationships between Ara, UO, UC and CDHB, and to a lesser extent, with industry stakeholders. However, these are largely ad hoc and often informal. Collaborative projects occur frequently, but these are often driven by relationships at an individual staff member level and can involve high transaction costs[14].

Strong formal and informal relationships already exist between HRI partner organisations. Collaboration does occur under existing arrangements, but it is heavily tied to individuals and individual relationships, with minimal strategic oversight. All partner organisations also collaborate successfully with private sector organisations on research projects, but these collaborations are infrequent and again, tied to individual researchers.

There is physical separation between the organisations, and many of the organisations are still experiencing interruptions to business due to the 2010 and 2011 earthquakes.

Changes in the way research funding is allocated have also started to drive a more strategic approach to research. For example, the National Science Challenges has funding for eleven areas of research considered particularly pressing for New Zealand.

Business needs

The primary focus of this Business Case is to identify options for addressing the needs of the Research Partners. These needs include addressing a number of problems with the current state, including:

- Lack of critical mass and unified 'shop front' for partner organisations to promote their research capability and facilities globally.
- Lack of overarching strategic direction for collaborative research.
- Increasingly competitive tertiary education market (potentially impacting domestic and international enrolments, recruitment and research).
- Low levels of private research and development funding compared to other OECD countries, and a relatively low conversion of innovation inputs to outputs.
- Challenges in gaining timely support and access to resources of CDHB that are critical to a lot of the health research projects in Christchurch.

Importantly, the business needs include using "HRI-like" capacity and capability to leverage the opportunity presented by the development of the Precinct and expected co-location of health research and

[14] Based on comments during workshops and interviews,

education organisations. The HRI can be instrumental in assisting the Research Partners use co-location in the Precinct to further enhance collaboration and synergies for their mutual benefit.

Scope and key service requirements

Role and purpose of the HRI

The role of the HRI will not, in the first instance, be to undertake research in its own right. Rather, its role will be to grow the scale and impact of the world class health research in Christchurch. This will involve it in a wide a range of initiatives and activities including but not limited to:

- Actively engaging with private sector organisations (from multi-national corporations to smaller local businesses) and facilitating their engagement and investment in research collaborations in Christchurch. The nature and extent of private sector contributions to collaborative research projects will vary considerably and could involve combinations of funding, personnel and equipment.
- Seeking out opportunities for accessing further public sector research funding.
- Finding solutions to impediments or constraints that are preventing or inhibiting research progress and/or collaboration.
- Identifying and delivering ways of reducing the administrative burden on researchers and research projects[15]. Fulfilling this role will require the HRI to take a strategic view of its purpose and to proactively coordinate the activities of multiple parties.
- Providing facilities and forums and coordinating services for prospective and current research partners to discuss and develop ideas and research opportunities.
- Promoting Christchurch research capability and achievements to enhance the sector's and the research partners' national and international recognition and profile. This will be a business development function aimed at attracting private sector partners, researchers and research institutes, students etc. to Christchurch generally and to the Health Precinct particularly.
- Providing a facilitation and coordination role to bring together research collaboration partners. This could involve a range of activities such as facilitating introductions, searching for partners with particular attributes, "translating" requirements to ensure effective communication between potential partners.

These activities have coordination, business development and promotion roles. In this regard the HRI can be characterised as the "front door" for health research in Christchurch. Taking this a step further, the HRI will provide strong strategic leadership for Christchurch health research.

Although the HRI will not undertake research in its own right, its activities could extend to more direct support to research activities such as:

- Forming a specialist advisory committee to provide validation/endorsement of research proposals and research outcomes.
- Providing analytical and statistical capability and capacity.

Of particular importance in scoping the possible activities of the HRI is how it will interact with the Research Partners and other key stakeholders. This will determine, in part, the level and type of resources the HRI will require – personnel, systems and tangible assets, including its physical location.

The need for the HRI's various support activities will differ among the research partners. For example, competing demands can make research within the Canterbury District Health Board challenging yet

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[15] This could involve assistance through all phases of a research project's lifecycle, from establishment – for example, assisting with funding applications, ethics approvals – through execution – for example organising clinical trials – to implementation and/or commercialisation – for example assisting with IP protection, finding commercial backers, encouraging/persuading District Health Board's to change clinical procedures etc.

leading clinicians can add very significant value to research projects and enable access to patients. The HRI will be expected to play a very important role in helping projects manoeuvre around the unavoidable institutional processes and barriers that might otherwise slow down their progress.

Essentially, the HRI will assist in bringing together expertise, equipment and funding for research projects. It will be a key point of entry to the Christchurch health research network for private sector and international organisations. It may in the future have its own dedicated physical space or building but this not a prerequisite to its establishment.

The HRI will continue to explore the specific research themes that were agreed at the collaborative workshop held in September 2014 and reconfirmed at the June 2015 workshop. These build on the Christchurch health research network's existing strengths. The themes are:

- Medical imaging;
- Regenerative medicine; and
- Medical informatics.

There has to date been a consciously broad definition of the 'who' and 'what' of the HRI, which provides significant flexibility in what the HRI might look like. The preceding discussion and the key service requirements in Table 2 below are a first step in focussing that discussion by identifying the HRI's service requirements – the elements it needs in order to be successful at minimum, desirable and optional levels.

The key service requirements builds on the required components of the Precinct. As discussed above, an HRI would be at the heart of the research offering of the Precinct, and if successful, it would help organisations gain critical mass and promote their combined expertise and services as a package in order to attract more international and private sector interest than they would be able to as individual organisations.

Options for the HRI, including the requirement for physical space, are examined in the Economic Case section of this business case, although it is noted here that UO's proposed redevelopment of 4 Oxford Terrace would likely provide significant research space within the Precinct.

Table 2: HRI key service requirements

Level	Key service requirements	Current status
Minimum service requirements	• Active management with responsibility for supporting collaboration between organisations, promoting the HRI internationally as the research heart of the Precinct	• Little active management at present
	• Active management to have an independent identity (may be the same as the Precinct as a whole – but a shared identity for the partner organisations separate to individuals)	• Not in place
	• A physical 'shop front' office, and shared social spaces to encourage collaboration	• Not in place
	• Central support for more administrative research activity such as grants applications, ethics approval processes	• Not in place
	• Shared equipment –if Imaging is to be a research theme, this would include CT, MRI and PET scanners. Equipment does not necessarily need to be jointly owned, but agreed access to certain equipment would be required	• Not in place
	• Access to commercialisation infrastructure (e.g. incubators, support for patent development)	• No explicit access or active management of a process to provide support to this infrastructure (which could be provided through Otago Innovation Ltd, Uniservices or the Canterbury Development

	• Access to new funding for research projects, from non-government sources • Access to venture capital for start-ups and spin-offs • Central services representative of, but independent from, partner organisations	Corporation). • Limited to existing mechanisms • No explicit presence, and no active mechanism to connect companies to investment • No structure at present
Desirable service requirements	• Infrastructure to support clinical trials "end to end": • Appropriate animal and clinical research facilities • Ability / resource to hold conferences or events as a HRI	None is in place at this stage (or accommodated through some limited facilities only).
Optional service requirements	• Higher scale / sophistication in physical spaces and equipment	Not in place currently.

It would not be necessary for all minimum service requirements to be in place from the beginning – access to venture capital, for example, could be phased in at a secondary stage. This is explored further in the Options section.

Stakeholders

There are a number of potential stakeholders/partners in the proposed HRI:

Table 3 HRI stakeholders

• UO	• NZ Brain Research Institute
• UC	• Canterbury Medical Research Foundation
• Ara	• Christchurch Clinical Studies Trust
• CDHB	• GE Healthcare
• Pacific Radiology Group	• Other private medtech companies

This list is indicative of potential HRI partners over time; in the initial stage(s), key partners are expected to be UO, UC, Ara and CDHB.

Benefits, risks, constraints and dependencies

HRI Benefits

The key expected benefits from the HRI will be active support and assistance that directly results in:

- Increased research and associated competitive and reputational benefits by and for the Research Partners.
- Growth in the number of health research collaborations between the Research Partners and private sector organisations.
- An increase in the number of staff and students undertaking health research at the Research Partners.

These benefits would likely create jobs and increase the level of health research related purchases from local companies (overheads and office infrastructure, marketing, events and conference services). This increase in economic activity will deliver benefits to Christchurch in particular and also to Canterbury more generally.

The support and assistance provided to the Research Partners by the HRI will allow them to increase and/or speed up research targeted at improving models of care and clinical practice with the aim of, ultimately, improving health outcomes for Canterbury and New Zealand patients. These health outcome impacts will materialise over a long time period and will be difficult to directly attribute to the actions of the HRI.

The following table lists a range of benefits that could result directly and indirectly from the actions of the HRI. The direct benefits are those where the HRI can have a direct influence (but in all instances realisation of the benefits will require positive action by the Research Partners). The indirect benefits, which are the vast majority of the benefits, are those that will be realised by the actions of the Research partners, but the support and assistance of the HRI will be an important determinant of the Research Partners realising the benefits.

Table 4: HRI direct and indirect benefits

Benefit	Direct or indirect	Sector	Stakeholder	Type
Increase in peer-reviewed published research and citations	Indirect	Research	UO, UC	Non-monetary Quantitative
Increased research funding from new sources (private sector, off-shore)	Direct	Research	UO, UC, CDHB	Monetary Direct
New research partnerships resulting from global recognition of Precinct	Direct	Research	UO, UC, CDHB	Non-monetary Quantitative
Increase in commercialisation of IP	Direct	Research	UO, UC, individual researchers	Non-monetary Quantitative
Improved calibre of candidates for staff positions	Indirect	Research Tertiary education	UO, UC, Ara	Non-monetary Qualitative
Increased revenue from increased health students (domestic and international)	Indirect	Tertiary education	Ara, UO, UC	Monetary Direct

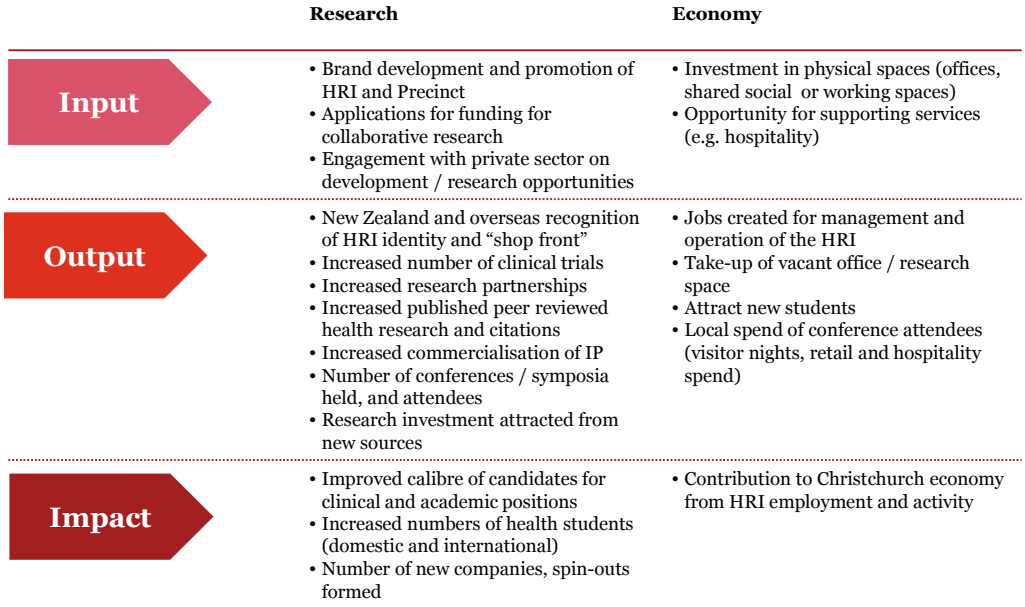
Benefit	Direct or indirect	Sector	Stakeholder	Type
Increased number of clinical trials in Christchurch	Indirect	Research Tertiary education Health	UO, UC, CDHB, Private sector	Non-monetary Quantitative
Improved models of care, particularly primary care	Indirect	Health	CDHB	Non-monetary Qualitative
Improved health outcomes for Canterbury patients	Indirect	Health	CDHB	Non-monetary Qualitative
Economic benefit from HRI employment and activity once operational	Indirect	Christchurch and Canterbury	Christchurch City and wider Canterbury; national economy	

Performance measurement

The mix of benefits set out in the table above, and the way they are able to be attributed to activity within the HRI, means that performance measurement will be best based on a mix of input, output and impact targets. This will enable the capture of direct activity as well as its expected outcomes.

Guidance on an initial high level performance measurement framework for the HRI is presented in Figure 5. This has been designed to align with the investment objectives set out earlier. This framework will need to be developed and targets set as the scope of the HRI is refined and its modus operandi determined.

Figure 5: Initial HRI performance measurement framework



HRI Risks

The risks to the HRI's objectives, and proposed mitigations, are outlined in the table below.

Table 5 Potential risks to successful implementation and operation of the HRI

Risk	Estimated likelihood	Estimated consequence	Proposed mitigation
Not all Research Partners unequivocally support the HRI and its objectives	Medium/high	High	• All Research Partners approve this business case, including the recommendations • All Research Partners agree to a work programme for implementation of the

Risk	Estimated likelihood	Estimated consequence	Proposed mitigation
			HRI, key outcomes of which will include a: – Specification of the functions that the HRI will undertake and the services it will provide – Determination of the HRI's legal form – Detailed design of an ownership model, governance arrangements and an operating model – Detailed design of a funding model, including funding shares – An implementation plan • Memorandum of Understanding to be executed by all Research Partners that commits each to providing unequivocal support for the HRI in accordance with the various foundations plans and documents referred to above. This MoU is to be executed by each Research Partner on the basis of that is has all of the appropriate authorisations/approvals
Organisations are co-located but there is no increase in collaboration	Medium	Medium	• Active management of the HRI • Good design (e.g. including collaborative meeting places) • Financial incentives that encourage collaboration (e.g. research funding that is accessible only to joint/collaborative projects)
Breakdown in relationship between stakeholder organisations	Medium	Medium	• Active management of the HRI • Clear, supported and formalised governance arrangements between stakeholders • Aligned incentives to achieve mutual objectives
Loss of key individuals (e.g. clinical, academic or research staff)	Medium	High	• Attractive remuneration packages as well as additional support for staff • Nurture new appointments with effective on-boarding and support services, particularly for international appointments • Incrementally build talent to reduce risk • Active succession planning
HRI processes or management adds complexity, impedes ease of research or commercialisation	Medium	High	• Ensure active management of HRI is proportional to need • Test models of support with stakeholders and seek feedback for continuous improvement • Review active management at early and then regular intervals
Change in central government priorities or funding models	Low	Medium	• This is a risk to individual organisations under any model (including the status quo); in fact, involvement in the Precinct may lessen individual organisations' exposure.

Risk	Estimated likelihood	Estimated consequence	Proposed mitigation
Organisations' competing interests prevents collaboration	Medium	High	• Clear, supported and formalised governance arrangements between organisations with agreed understandings of responsibilities and scope

HRI Constraints

Key constraints affecting the HRI include:

1 **Funding**: The HRI has to date been discussed in relatively high level terms, with a broad range of options; as such, there has not been a specific cost (or even a range) for organisations to consider in terms of affordability. However, this business case is written with the assumption that any financial costs of an HRI would need to come from within existing baselines of participating organisations. As with the Precinct, direct investment may be available from the private sector, although this is not currently being pursued specifically for the HRI. Funding and affordability is discussed further in the options and financial case sections of this business case.

2 **Physical spaces**: If there are to be physical aspects to the HRI – for example, a 'front door' office or reception, or shared social spaces as noted in key service requirements, these will be constrained by the tenancies available within the Precinct. Furthermore, if there is to be shared equipment as well as an office and/or shared social spaces, there may be a constraint around housing these aspects of the HRI close to one another.

HRI Dependencies

The HRI's primary dependency is on successful delivery of the Precinct as a whole. Although an HRI could in theory exist without being based within a Precinct, in this case it is the Precinct that will bring the partner organisations together physically which provides the opportunity and impetus for an HRI.

As outlined in the Programme Business Case, the Precinct initiative has dependencies of its own – primarily the ongoing redevelopment of Christchurch Hospital and building of the new outpatients facility.

Economic case

Introduction

This section of the Business Case presents the principal options available for the nature and form of the HRI, with a focus on its functions and the services it can deliver for the Research Partners. The options are assessed against a set of critical success factors (CSFs) as well as the investment objectives and potential benefits, costs and risks.

The HRI's dependency on the way the wider Precinct develops is relevant to the consideration of the functions and services of the HRI. Therefore, the HRI options are assessed consistent with the options identification and assessment in the Precinct Programme Business Case.

Critical success factors (CSFs)

The CSFs are the attributes essential to the successful delivery of the HRI. These are listed in Table 6 below.

The five standard CSFs within Treasury's Better Business Cases Guidelines are the first five listed in the table. Two further CSFs have been added that are specific to this Business Case:

- **Clear purpose and enables strong leadership**. A clear purpose was identified by many interviewees and workshop attendees as critical to the success of the HRI and the Precinct and to achieving and retaining buy-in of the Research Partners, as well as attracting interest from the private sector. Strong leadership goes hand in hand with this. While strong leadership relates to how an option is implemented, rather than the option itself, options need to provide a platform for strong leadership if they are to be considered realistic and meriting further investigation.
- **Open and shared access to facilities.** The importance of all organisations being able to access particular facilities (particularly expensive research equipment) on the same basis as the organisation that owns or leases those facilities was highlighted at workshops and interviews. The challenge for the HRI will be to determine the role it can play in managing facilities access.

Table 6: Critical Success Factors

Critical Success Factor	Description and relevance to Precinct
Strategic fit and business needs	How well the option meets the agreed investment objectives, related business needs and service requirements – that is, how well the option supports or incentivises collaboration, enables partner organisations to achieve critical mass and to attract international and/or private sector interest
Potential value for money	How well the option optimises value for money – that is, the scale of the benefits (e.g. how much of an increase in research, commercialisation, attraction of students, etc.) the option is likely to lead to, relative to the investment required
Supplier capacity and capability	The ability of potential suppliers to deliver the required goods or services - for example, ability to procure research equipment or appropriately skilled staff, should the option propose these; and how likely the option is to result in a sustainable arrangement that optimises value for money over the term of the contract
Potential affordability	How well the option can be met from likely available funding – for example, whether the option can be met from within partner organisations' existing funding envelopes, or from an alternative source
Potential achievability	How well the option is likely to be delivered with the current capability and capacity of partner organisations
Clear purpose and enables strong leadership	How clearly the HRI's purpose can be articulated under the option, the extent to which it enables strong leadership, how likely the option is to support good working relationships between partner organisations, and how well the option maintains the independence, autonomy and governance of partner organisations

Critical Success Factor	Description and relevance to Precinct
Open and shared access to facilities	How well the option supports open access among partner organisations to key relevant equipment and facilities (notwithstanding standard fee and availability restrictions)

Options

There are a wide range of functions that the HRI could perform and services it could deliver. The research conducted for this business case has had a considerable bearing on defining these functions and services.

Specifically, the research suggests that a common feature of research centres or precincts is a centralised administration or management resource to co-ordinate activity, support partner organisations and provide a single voice or "shop front" for engaging with external organisations or sectors[16]. This can be characterised as an "active management" capability that can include "soft" infrastructure (such as human resources (people with the requisite skills and experience), marketing and research support services) and "hard" infrastructure (such as physical spaces and equipment).

The range of HRI functions and services are points on a continuum. Three points on that continuum have been identified for analysis purposes:

- Do nothing: There is no HRI and current arrangements for research continue. This a valid option and is included in the options analysis on the basis that it is the base case. The implications of do nothing are:
    - New (governance or management) initiatives form organically, with no formal or organised arrangements between partner organisations. Any initiatives will be driven by need or mutual benefit
    - There will be no specific HRI cost to the Research Partners.
    - There will be limited leveraging of physical proximity of research activities or investment in equipment or support.
    - Collaboration is more likely to be bilateral rather than multilateral.
    - There will be no incentives that will lead to a step-change in collaborative practices.
    - Constraints and barriers that currently slow down research projects or stop them from commencing will not be addressed in a coordinated way that will benefit all Research Partners. This is particularly relevant to the constraints faced in accessing the resources of and support from CDHB that are important if not critical to a large proportion of health research projects typically undertaken in Christchurch.
    - There will be no unique, single identity for Christchurch as a centre of health research excellence.
    - Attracting new investors/private sector partners will be reliant on a step change in promotional and market development activities of individual Research Partners. Feedback from private sector organisations suggests that the absence of a single coordinating body for the Research Partners will be a barrier to attracting greater interest from the private sector.
    - No economic benefit to Canterbury above that of individual developments of partner organisations.
- HRI soft infrastructure: The HRI is established with "active management" capability to service and support the Research Partners health research activities.

[16] This is not to say that individual organisations should not have or should not seek to cultivate their own relationships with organisations and sectors outside the Precinct or HRI; but that there appears to be value in having a recognisable front door to facilitate communication, particularly multilateral communication.

Active management encompasses a suite of potential functions that the HRI could undertake and services it could provide to the Research Partners and other potential stakeholders. For example:

- Co-ordinating collaboration and relationships between the Research Partners.
- Central support and facilitation.
- Providing a single point of contact for engaging with external organisations or sectors.

Table 7 contains a description of the potential suite of functions and services. These range from reactive services, such as providing administrative support, to proactive functions such as business development activities to promote the Research Partners and to attract potential private sector partners.

These functions and services would be undertaken and delivered within parameters agreed by the Research Partners so that they do not interfere with each partner organisation's existing individual autonomy, independence or governance – as required by the CSFs.

Undertaking the functions and delivering the services envisaged for the HRI will require it to have access to or employ people in its own right. The level of resourcing required will vary depending on the HRI activities. The larger the range of activities the greater the resource requirement.

- Research provider: at the opposite end of the spectrum to the do nothing option is the HRI acting as a research provider. Under this option the HRI would undertake and control its own research activities using either its own resources or resources contracted from other parties. This is unlikely to be a fully standalone, independent organisation. It is more likely to be part of or hosted by an existing research organisation.

  Market testing undertaken during the development of this IBC suggests that there is no party among the Research Partners that has the capacity, capability and/or willingness to be the host entity for an HRI at this time. That is not to say that a host will not emerge in the future.

  As there are no realistic hosting options at present, the research provider option has not been evaluated in detail in this business case. However, it may need to be evaluated in the future if a willing and capable host is identified. In this regard the options that are considered in this business case do not preclude the transformation of the HRI to a research provider in the future.

HRI soft infrastructure functions and services

There is a broad range of functions that the HRI could perform and services it could deliver. These are presented in Table 7 as discrete tasks. However, in practice there would not be a clean delineation between some of these tasks.

The way the functions/services are scoped means it would be feasible to design the HRI to undertake any one of the functions as a sole activity (and not undertake any of the other functions). However, the functions are not mutually exclusive; they are complementary. It would be feasible, if not sensible, for the HRI to be designed to undertake a number of the functions. It would have its greatest impact if it were given responsibility for all functions and services listed in Table 7.

Table 7 HRI functions and services

Function/service	Examples of activities
Administration	• Assisting with funding applications and ethics approvals. • Assisting with IP protection processes.
Facilitation	• Seeking out opportunities for accessing public sector research funding • Working with some or all of the Research Partners to find solutions to impediments or constraints that prevent or inhibit research projects from occurring or that slow down the process of implementing and executing projects • Managing access to facilities and equipment
Business development	• Actively engaging with existing and potential research partners, particularly private sector organisations, with the objective of proactively assisting researchers to form collaborative linkages for projects • Promoting the capability and achievements of the Christchurch health research network nationally and internationally. This will have two objectives: – Raise the profile of the Research Partners to enhance their national and

Function/service	Examples of activities
	international reputation as important research providers – Stimulate interest among private sector businesses, researchers, research institutes and students in joining or being part of the Christchurch research network.
Research support services	• Organising resources required for clinical trials. • Managing clinical trials. • Establishing and managing an advisory committee that provides credibility to research proposals and/or projects through an endorsement or validation function. • Employing/contracting data analysis and statistical resources that can be used by researchers. This could include a focus on efficiently accessing information and data maintained by CDHB.
Strategic direction and guidance	• The HRI, in conjunction with the Research Partners, develops a regional strategic plan that provides a framework within which the Research Partners and individual researchers can develop their research proposals. The HRI would provide a leadership role in developing the strategic plan and direction. • The strategic plan would be based on the Research Partners expectations for the longer-term development of health research in Christchurch. Its objective would be to ensure that research is focussed on topics and outcomes that will enhance Christchurch's, and individual institutions' reputation for delivery of high quality, efficient research in selected areas of specialisation relevant to existing and potential stakeholders (other research institutions, private sector partners, research funders). • The HRI could assess research proposals within the strategic plan framework and provide endorsement for projects that support the strategic direction.

Table 8 and Table 9 present an evaluation of the do nothing scenario and the HRI soft infrastructure functions against the investment objectives and the critical success factors. This is presented by describing how and the extent which the options will contribute to achieving the investment objectives and the CSFs.

Table 8 Evaluation against investment objectives

Investment objectives:	Do nothing	Administration	Facilitation	Business development	Research support services	Strategic guidance
Synergies between organisations, build critical mass	Synergies based on individual relationships occurring without any direction or encouragement	No direct significant contribution	Yes – a primary objective of this function is to proactively find solutions to existing impediments and constraints to collaborative research progressing on a timely basis or progressing at all. This function will also help to provide a single point of contact for Christchurch research.	Yes – this function is designed to attract new private sector investment into Christchurch health research. Promotional activities will be built around a single point of focus and contact for private sector organisations wanting to do business with the Christchurch health research sector.	Yes – the research support services provided by the HRI will not only lead to more research but, importantly, will assist in raising the quality and relevance of research.	Yes – strategic guidance will be directed at encouraging research that will be of high quality and relevant to funders and potential research partners.
Increased R&D activity	Partner organisations will continue to invest in research, including UO's proposed investment in 4 Oxford Terrace (whatever shape that may take). Collaboration continues to rely on relationships between organisations.	Some – removing administrative burden may encourage more research and enable faster progression of research	Yes – the objective of this function is to facilitate more and faster research	Yes – successful promotion and business development should lead to more partnering opportunities and more money for research.	Yes – the research support services will include activities that will make research more efficient form both a cost and time perspective. This will enable more research activity.	Some – the strategic guidance is about the quality and nature of the research and research processes. It will not of itself facilitate an increase in the volume of research.
Increased commercialisation of research	Relies on existing structures, word of mouth and individual researchers or research projects finding their own way through the commercialisation	Some – helping with IP protection puts researchers in a better position to negotiate commercialisation arrangements	Some – to the extent that more research leads to more commercialisation opportunities.	Yes – successful promotion and business development should lead to more partnering opportunities and so more direct commercialisation opportunities.	Some – to the extent that more research leads to more commercialisation opportunities.	Yes – having a coherent research strategy supported by the Research Partners will contribute to making Christchurch an internationally competitive centre for health research and so

Investment objectives:	Do nothing	Administration	Facilitation	Business development	Research support services	Strategic guidance
	process					be attractive to private sector and other research partners.
More competitive TEOs	No specific initiatives to build competitiveness of TEOs	Some – the preceding benefits may assist in making Christchurch a more attractive place to carry out research, so attract more students. Also, more research will assist TEOs in raising their research credentials and reputations.	Yes – more research funding and removal of impediments should encourage more students to Christchurch and assist TEOs in raising their research credentials and reputations.	Yes – successful promotion and business development should lead to an increase in private sector funds for research and so increase research activity.	Some – the preceding benefits may assist in making Christchurch a more attractive place to carry out research, so attract more students. Also, more research will assist TEOs in raising their research credentials and reputations.	Yes – a strategy that provides coherence to research activities across all of the Research Partners will assist them in their pursuit of research excellence.
Revitalisation of Christchurch CBD, economic uplift for Canterbury	Some economic uplift from partner organisations relocating services to the Precinct, even if HRI did not proceed.	Some – increased research activity may attract more international students and international research organisations and private sector partners.	Yes – increased research activity may attract more international students and international research organisations and private sector partners.	Yes – successful promotion and business development should lead to more opportunities for TEOs to partner with private sector entities and so enhance their research credentials.	Some – increased research activity may attract more international students and international research organisations and private sector partners.	Indirectly, to the extent that a more coordinated strategic framework ultimately underscores the impacts associated with the other functions.

Table 9 Evaluation against critical success factors

CSFs:	Do nothing	Administration	Facilitation	Business development	Research support services	Strategic guidance
Strategic fit and business needs	No – except to the extent that outcomes occur organically through co-location, this option effectively represents business as usual. It does not respond to the	Yes – focus on business needs but at a relatively low level.	Yes – this function will be designed to assist and support the Research Partners in their collaborative research activities with a goal of raising activity levels.	Yes – raising the national and international profile of the research capacity and capability of the Research Partners among potential new research funders and partners is central to	Yes – the services that the HRI could deliver are designed to enhance the efficiency and effectiveness of collaborative research by Research Partners.	Yes – enables establishment of a clear and coordinated framework to address business needs

CSFs:	Do nothing	Administration	Facilitation	Business development	Research support services	Strategic guidance
	significant strategic challenges outlined in the strategic case, and fails to respond to business needs around for example, establishing a unified 'shop front'.			this function.		
Potential value for money	Yes – no additional costs beyond baselines	Yes – low cost to implement and operate. Will produce time and cost savings for Research Partners through centralisation of administration resources	Yes – low cost to implement and operate. Will produce time and cost savings for Research Partners and enhanced outputs by performing coordination functions that would not occur in a do nothing environment	Yes – promotion and market development will require investment by the Research Partners. Promotion and market development activities are not coordinated across the Research Partners currently. A single focus point for these activities (the HRI) with dedicated resources is expected to generate funding and research opportunities that might not otherwise exist. This will be the payoff for the investment by the Research Partners.	Yes – the resources required to deliver the research support services, mostly people, will be considerably more than the other functions/services. However, the expectation is that it will produce considerable benefits, not only in terms of the efficiency and effectiveness of collaborative research but also of the quality of the research through the HRI being a centre of excellence for data analytics.	Yes – low cost to implement and operate, and will provide directions and common purpose to efforts across other functions
Supplier capacity and capability	Yes	Yes – no significant capacity or capability restrictions.	Yes – though there may be a lack of skills familiar with the specific Christchurch medical research context and broader New Zealand R&D context, this capacity should be able	Mostly – though there may be a lack of skills familiar with the specific Christchurch medical research context, broader market development capacity and capability should be	Difficult to determine. This will require strong data analysis skills. While these should be available they may need to be drawn from other institutions which may be difficult before the	Yes – though broad support from across the research partners will be important.

CSFs:	Do nothing	Administration	Facilitation	Business development	Research support services	Strategic guidance
			to be developed – particularly with the support of strong leadership.	available.	HRI is established.	
Potential affordability	Yes – sits within current base lines	Yes – costs will likely need to be funded by the Research Partners but the impost should not be particularly significant	Will be more costly than the administration function but should not be high cost	The Research Partners will determine the level of investment in promotion and market development. They can make the trade-off between the payoff they desire and the level of investment they are prepared to make	Will require the Research Partners to develop and agree a funding model. This will need to take into account affordability. But to some extent the costs incurred by the HRI will be a substitute for costs that the Research Partners would otherwise incur individually. Moreover, the centralisation and aggregation of these services could provide scale economies. These factors will serve to limit the net increase in costs to be funded by the Research Partners	Yes – costs will likely need to be funded by the Research Partners but the impost should not be particularly significant
Potential achievability	Yes – status quo.	Yes – easy to implement if supported by the Research Partners	Yes – will require people and some physical space but should not be complex to implement.	Implementation will require the Research Partners to agree on a marketing and promotion plan that is designed, at least in part, to deliver marketing messages that don't necessarily distinguish between the Research Partners i.e. it will market Christchurch health	Will require the Research Partners to support the HRI providing research support services, agree on the scope of services and to fund any consequential cost increases. Implementation will be more complex than other functions but nevertheless achievable	Yes – primarily requires the research partners to agree to develop an overarching framework to guide ongoing research, and a clear terms of reference in relation to this.

CSFs:	Do nothing	Administration	Facilitation	Business development	Research support services	Strategic guidance
				research capability and capacity as a whole. If this can be agreed then implementation should not be complicated	with the support of the Research Partners	
Clear purpose and strong leadership	No – relies on individual organisations organically making decisions or conducting operations with a joint interest	Some – this function will not make much contribution to leadership. But it will facilitate good working relationships between the Research Partners and shouldn't threaten their individual independence, autonomy or governance.	Yes – an important outcome of this function will be assisting the Research Partners collaborate among themselves and with third parties. This is an operational outcome, which should be consistent with the outcomes desired by the Research Partners.	Yes – this function is based on the HRI providing leadership to the Research Partners in promoting their joint capabilities to a wider audience then they might reach individually	Yes – this function will give the HRI a mandate to develop services that will provide it with a leadership role.	Yes - provides the partners with a single joint strategic plan to harness and focus research efforts
Open and shared access to facilities	No – partner organisations may choose to provide open access to equipment or facilities on an ad hoc basis, but no formalised agreement for this at a strategic level.	Yes – provides for the coordination of shared access to facilities. Would still require some agreed 'rules' around these arrangements.	Not specifically, though would support shared access by connecting potential research partners. Could also support identification of new facility needs across researchers, which may not make sense individually (i.e. could highlight facility constraints that are holding back joint research efforts).	Not specifically related to shared access, though this could be a point of promotion for the HRI which would be self-reinforcing.	Yes, in relation to the data analysis components of research, but not necessarily for core research equipment and facilities.	A clear strategic framework that guides ongoing research could include contemplation of opportunities for sharing of facilities. It could also be a mechanism for identification and business case development for facilities that align with the Partners' research strategies.

Physical space/location, governance and operating arrangements

There are three practical matters that need to be factored into the consideration of the HRI options:

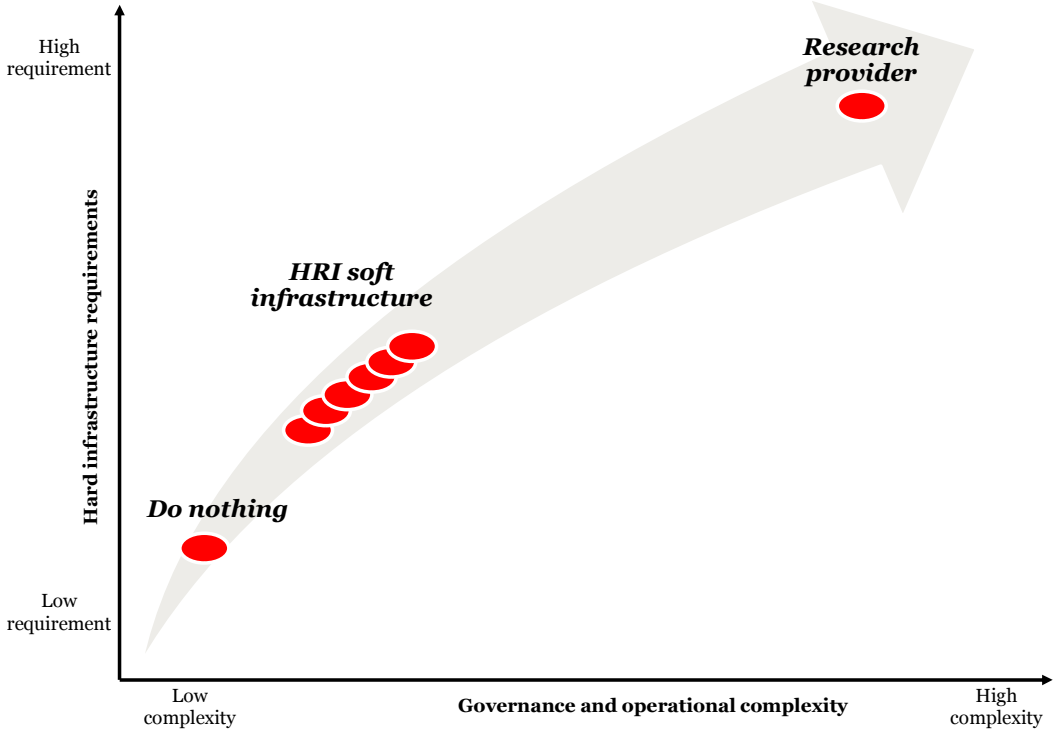
- How the HRI will operate. For example, will it be part of or an adjunct to the Health Precinct Advisory Council support functions? Will it require personnel in its own right? This will be, in part, a function of the scope of the HRI activities
- The requirement for resources to support the HRI. This will include people and physical space. Physical space will be needed to house people required for the HRI and for any spaces to be made available to the Research partners. The resource requirements will be driven in part by the operating model for the HRI.
- The arrangements for governing the activities of the HRI.

These matters have little or no implications under the do nothing option. The research provider option will likely have the most extensive requirement for resources and governance.

The requirements under the HRI soft infrastructure options will vary depending on the scope of functions being undertaken. More particularly, the operating model, resource requirements and governance requirements will be more extensive the greater the number of functions bundled together and undertaken by the HRI.

The following diagram is a representation of the relationship between the options, operating model and governance complexity and the resource requirements.

Figure 6 HRI options, physical space requirements and governance complexity



The focus of the discussion on these matters is on the HRI soft infrastructure.

Operating model

The following table presents options for operating models by function. The operating models are:

- HP: the management and resourcing is undertaken by the Health Precinct Advisory Council Executive Team.
- HP plus: management is provided by the Health Precinct Advisory Council Executive team but with added resource to provide the focus required to enable the HRI to deliver its functions.

- Stand-alone low level administration: standalone resource is provided (i.e. separate to the Health Precinct Advisory Council Executive team). This is a relatively small team with lower level management capability.
- Stand-alone full structure: a stand-alone structure is established with a full management structure and staff complement.
- Senior specialist resource: a low staff number, high skill model.

Two ticks in the table indicates a preferred model. One tick indicates an acceptable model for the option.

Table 10 Operating models

Operating models:	Do nothing	Administration	Facilitation	Business development	Research support services	Strategic guidance
HP	N/A	✓✓				
HP plus	N/A		✓✓	✓		✓
Stand-alone low level administration	N/A		✓			
Stand-alone full structure	N/A			✓✓	✓✓	
Senior specialist resource						✓✓

The operating models are not applicable to the do nothing option as the status quo operating models are assumed to continue.

The facilitation function will require a level of resource over and above that required for the Health Precinct Advisory Council. Whether there is a need for dedicated management capability is less certain.

Business development and research support services will require resources and management capability. The nature of the business development function is such that it may not create a business focus problem if this was included with or as part of the Health Precinct team. However, the research support services have less in common with the functions of the Health Precinct team. It will be appropriate to separate this function from the Health Precinct Advisory Council Executive. It will require focus and specialist resources.

Strategic guidance will not require a significant level of permanent resource. But it will require specialist expertise that understands the research sector (which could be seconded from the Research Partners on a short term basis) and senior management expertise to guide the development of the strategic plan and manage stakeholder relations.

The table doesn't show the requirements if functions are bundled together. The increase in scale of activities that will occur through bundling will quickly increase the level of required resources.

In summary, the administration, facilitation, business development and strategic guidance functions would have features in common with the activities of the Health Precinct team. It would make sense from a cost efficiency perspective to combine these functions within one operating model and with one management structure, at least initially. If it transpires that this combination doesn't allow an appropriate level of focus on and drive of the HRI functions then they could be transitioned to a standalone full structure.

If the scope of the HRI is to include direct provision of a material level of research support services, then it is more likely that a stand-alone full structure will be appropriate from the outset.

Governance models

For the purpose of this analysis, governance also encompasses "entity" status as the two concepts are inextricably linked. Entity status refers to how the operating models will be given effect to in a legal "contracting sense". If the HRI is to have resources and engage with third parties it will need a legal form so that it can enter into contracts.

Table 11 provides options for legal entity form and the associated governance arrangements. Under the first option, one of the Research Partners would be the contracting party for the HRI activities. It would be the employer for HRI staff and contract with third parties for any other resources (e.g. leased office space). Governance could be provided by HPAC itself or a "committee" of the Research Partners.

The second option, an unincorporated joint venture is not a separate legal entity in its own right. It will require one or more of the Research Partners to be enter into contracts on behalf of the joint venture.

The fourth option involves establishing a separate legal entity and governance structure for the HRI. This will involve compliance costs but will enable clean ring-fencing of the HRI's activities. This option will be more appropriate where the HRI is delivering a greater number of functions/services requiring more staff and resources.

The first two options will provide the Research Partners with the ability to jointly control the governance of the HRI through the use of a "committee" as the governance body. There is a complication with these models. As one or Research Partner will be the party to the HRI agreements and contract, it or they will have the final say on matters impacting on its legal position under these contracts notwithstanding the requirements or preferences of the governing body. Consequently these two options are likely to be appropriate only for circumstances where the HRI is undertaking "simple" functions (e.g. administration).

The governance for options 3 and 4 is likely to be less complicated, not least because these are commonly used legal entity forms with governance arrangements that are long established and clearly definable.

Table 11 Governance and legal entity form

	Legal entity form	Governance
1	A Research Partner	HPAC or Research Partners' committee
2	Unincorporated joint venture	HPAC or Research Partners' committee
3	Non-company legal form (partnership, trust etc.)	HPAC or Research Partners' committee
4	Company	Board of directors

The choice of a non-company or company legal form is usually driven by such factors as the need (or not) to ring-fence liability, tax, ownership requirements, distribution preferences and accountability/governance. The Research Partners may place different weightings on the relative importance of these factors.

A fuller analysis of entity structures is included in the Commercial Case.

Physical space

Under the HRI soft infrastructure options there will be a requirement for physical space of some amount. As a minimum this will need to be sufficient to house a relatively small administration function (which could be part of, or housed with, the Health Precinct Advisory Council Executive function). The space requirements could be quite substantial if the HRI undertakes all of the functions in Table 7 and provides collaboration space for the Research Partners, researchers and other stakeholders.

The following table provides a description of physical space options.

Table 12 HRI physical space options

No control of physical spaces (base case)	Under this option, there is no standalone space leased or owned by the HRI. There are no costs or specific effort required of the Research Partners. As arrangements are effectively negotiated on an ad hoc basis, they are of mutual benefit - there are no "forced marriages". This option provides limited leveraging of physical proximity and investment in equipment or support. It provides limited opportunity for synergies, and collaboration is likely to be bilateral rather than multilateral. The option is unlikely to lead to a step change in collaborative practices. The option does not signal anything more than a group of proximate organisations and is therefore likely to have limited appeal to new investors.
HRI office	Under this option, there would be a physical HRI office or, as a minimum, a reception area.

	This option would likely be relatively low cost, although it will require a financial commitment and cost-sharing arrangements from partner organisations. An office will assist with the development and promotion of a unique identity for the HRI, although it is unlikely to help enable collaborative practices to develop. It may also not be a sufficiently significant step to attract private sector interest in the HRI or Precinct.
HRI office and social spaces	As per the previous option, with the addition of shared social spaces such as common rooms, cafeterias and/or kitchenettes managed by the HRI team. The expectation is that shared social spaces are likely to help enable collaborations This will option will cost more than the previous option but is unlikely to present a more attractive proposition to the private sector. Some of these types of spaces are planned within the Health Research and Education Facility and these could be accessed by the HRI subject to mutually acceptable arrangements.
HRI office, social spaces and working spaces	As per the previous option, with the addition of shared working spaces such as offices and even laboratories. Not all shared working spaces are likely to help enable collaboration further – 'hot desking' offices may, but research facilities such as laboratories may not. If partner organisations are already developing research working spaces (such as in the HREF and in Otago Universities development in the Health Precinct), collaborative work is likely to be undertaken in those facilities without them needing to be jointly managed. This will present a greater cost than Option 3, particularly for laboratories. It is unlikely to present a more attractive proposition to the private sector than Option 3.

Recommendations: scope, operating model, governance and location

The case for establishment of an HRI in Christchurch is built on the benefits it can deliver the Research Partners in both reducing the administrative burden in relation to their collaborative research activities and in providing facilitation, coordination and business development services and strategic direction that they are not incentivised to deliver as individual entities with their own strategic imperatives.

In the circumstances is considered appropriate to take a measured, "step-wise" approach to implementing the HRI. There is no requirement for the establishment of large, heavily resourced entity at the outset. A sensible approach will be to put in place a small number of high quality people who can start working with the Research Partners to gain their confidence and carefully plan the development of the HRI. It can then grow, in line with the plan and with the development of the Precinct (although the activities of the HRI do not need to be constrained by the speed of Precinct developments). In effect, the HRI will grow as it proves its worth to the Research Partners.

With this is mind, it is recommended that:

- The HRI's scope of activities encompass:
    - Administration
    - Facilitation
    - Business development
    - Strategic direction and guidance

  These activities are defined in Table 7 on page 29.

  Research support services could be incorporated into the HRI's scope in the future but it would not be critical to do so at the outset.
- The personnel resources needed to deliver the HRI's scope of activities be incorporated within the organisational design for the Health Precinct team. It is estimated that a staff of two to three will be required initially to facilitate and promote collaboration across the Research Partners, establish a business development strategy and function, develop an identity and value proposition for the HRI and provide administrative support to the Research Partners.

The need for a separate standalone operating structure for the HRI can be assessed over time. If the HRI's functions are expanded to include the research support services and its other activities grow then there might be a case for a separate operating structure in the future.

- The HRI is governed initially by HPAC.
- The HRI personnel resources are housed with the Health Precinct team but there is specific branding of the HRI to give it a strong, standalone identity to external parties.

As noted elsewhere, in this document, the scope of the HRI as presented in this document does not include the HRI undertaking research itself. However, this is a matter that should be investigated and it is recommended that the HRI team be given responsibility for examining the case for the evolving the HRI into a full research institute in the future.

Funding and implementation

There matters relating to implementation and funding that will need to be addressed. For example, how quickly the option is implemented. There are also options relating to the funding model, and in particular, the contribution from central government, if any. These are touched on below and explored in further detail in the Financial, Commercial and Management Cases.

Funding options

The Research Partners are assumed to be the default source of funds for the HRI. However, there is also a spectrum of funding options for possible central government support. This includes both direct and indirect central government involvement, if any. At one end of the continuum is the status quo: no specific central government funding or involvement other than:

- The support the government has provided to the Precinct programme to date with CERA, through CCDU. This is not insignificant[17]. Funding and support has been to date focussed on development of the concept and planning for the Precinct – that is, funding has not been provided for actual Precinct infrastructure or activity (e.g. research, equipment or buildings). Funding subsequent to the dissolution of CERA is not certain.
- The support and investment of Research Partners, who are all to a lesser or greater extent related to and receive funding from central government.

No central government involvement means no direct or indirect government funding specifically tagged to the HRI.

At the other end of the continuum is explicit government funding for the HRI. This could be in the form of direct funding for physical space or direct funding of its operating costs, for example funding business development activities focussed on generating private sector involvement in research projects.

In between the ends of the continuum is a range of more indirect or facilitation options. For example, enabling institutions such as Ara to participate by ensuring they are funded to a level necessary to contribute funding to the HRI.

Each 'end' of the continuum has its own pros and cons –explicit government funding for the HRI would likely help cement the joint relationship between the Research Partners. Importantly, it would inject some momentum into the development of the HRI, enhance its profile and raise the private sector's confidence that the HRI is a meaningful counterparty.

However, government investment comes at a financial and opportunity cost. There is also a risk that too much government investment 'crowds out' the market and makes it unlikely that the private sector will also invest. Private sector investment will bring explicit incentives and drivers for achieving commercial, demand driven success that might not be as strong with government financing.

Central government funding did not feature highly in interviews or workshops. While this is potentially due to an assumption that none is available, there was also acceptance that significant government funding

[17] CERA has provided significant resource to activities including establishing the planning framework, acquiring land required to develop public works, legal support services, and amending and improving the transport network. CERA has also (along with Ara and CDHB) contributed to the cost of Master Planning Advice. CCDU has a significant operating expenditure budget for supporting the Precinct programme.

had occurred or is occurring in the Health Precinct, and it a responsibility of the partner organisations to effectively leverage this investment.

Funding models, including government support are outlined in the Financial Case.

Timing of Implementation

Timing considerations include when the HRI should be implemented and what length of commitment is necessary.

While there is no specific imperative around timing, the only constraint to proceeding is likely to be related to agreement to the concept of an HRI and the scope of its activities by HPAC and the Research Partners. While financial affordability considerations will be important in this regard, so will buy-in to the HRI concept.

Notwithstanding these constraints, it is desirable to proceed is quickly as possible. Having an effective HRI will help embed some of the collaborative culture being sought for across the Precinct.

Economic benefits

The HRI acts as an enabler for the benefits of the Christchurch Health Precinct. As a project within the Precinct, the benefits associated with the HRI are a subset of the benefits described in the Christchurch Health Precinct programme business case, and are (generally) not additional to those benefits. The analysis described here, is mostly about attribution of Health Precinct benefits to the HRI. However, as more details of the potential nature and function of the HRI have now been developed, there are some small additional benefits that have been identified which were not captured in the Health Precinct programme business case.

As with the Health Precinct, the nature of the HRI means that generating meaningful and robust measures of economic benefits is challenging. However, the nature of potential economic impacts can be described and the potential scale of the benefits estimated, assuming a successful HRI.

Table 13 below presents potential areas of economic benefit. Table 13 also notes whether the benefit is a new benefit or if the benefit is already captured in the Health Precinct business case. Indicative assessments of the scale of these economic benefits, if achieved, are presented in the text following the table.

Table 13: Potential economic benefits of the Precinct

Benefit	Description	Nature and scope of impact
Administrative function activity	Administrative functions are performed by staff in the HRI.	This is assumed to be displaced activity from other sources (e.g. activity currently undertaken by staff DHBs) therefore this is not an additional benefit.
Administrative function efficiencies	A centralised administrative function for researchers means that an administrative team can specialise in tasks and perform them more efficiently, for example in: • Funding applications • Ethics approval support • Organisation of clinical trials.	Small uplift in labour productivity from specialisation. Not captured within the Health Precinct, but also not material.
More and better quality research time for researchers	Researchers are freed from administrative tasks and will have more time for research. The morale of researchers could improve, as they are no longer burdened with paperwork, which could also reduce the likelihood of errors and enhance the reputation of the research undertaken at the Health Precinct.	Research is better quality and projects proceed as quickly as possible. These benefits are captured within the Heath Precinct benefits.
More research commercialised	A business development team supports greater commercialisation of research. In addition, stronger links with the private	Benefit is captured within the Health Precinct benefits, therefore this is not an

Benefit	Description	Nature and scope of impact
	sector provide information and direction to researchers that enable more effective commercial application of research.	additional benefit.
Infrastructure efficiencies	Centralised research infrastructure enables the ability to share equipment, lab space, teaching space, common area etc. costs across organisations. Convenience related benefits.	Benefit is captured within the Health Precinct benefits, therefore this is not an additional benefit.
Promotion of research and stronger linkages to private sector and funding opportunities	Synergies between organisations, and improved research connections to private sector and to public sector funding bodies.	Benefit is captured within the Health Precinct benefits, therefore this is not an additional benefit.
Training opportunities	The HRI provides opportunities for the students, such as internships and work placements.	Opportunities benefit is captured within the Health Precinct benefits, therefore this is not an additional benefit.
Reputation benefits	The HRI supports the reputation of the Precinct and the likelihood of increased funding for research. The HRI gains accreditation for the management of private records, increasing the likelihood of funding for research.	Benefit is captured within the Health Precinct benefits, therefore this is not an additional benefit.
New economic outputs from complementary research activities	Complementary research activities e.g. data analytics and statistical support also provide a commercial service.	Commercial services are provided by the HRI leading to increased economic output and jobs. This benefit is additional as it was not identified in the Health Precinct analysis.

Table 13 above describes the potential economic benefits of the preferred option. A monetised assessment of the potential economic benefits, along with the underlying assumptions, is described below.

The likelihood of achieving the potential economic outcomes has not been assessed. This would be addressed in a benefits realisation plan. The benefits below represent what could be achieved through the Precinct, should it achieve its goals.

Where economic multipliers are used, they relate to New Zealand-level multipliers, rather than Canterbury specific multipliers, due to data availability. The impacts on direct value-added and direct employment are expected to be reasonably similar.

Administrative function efficiencies

The new administrative function that the HRI will undertake does not generate additional economic output. As identified above, we expect that the administrative functions undertaken by staff at the HRI will be displaced activity which currently occurs elsewhere (e.g. staff at the universities or DHB). However, if the HRI is successful, there is an improvement in labour productivity for the staff who specialise in the administrative tasks.

Labour productivity in administrative services has been lower than the overall measured sector historically in New Zealand. Services sector labour productivity (of which administration and support services is a component) between 1978 and 2011 was 1.4 per cent, compared to 1.9 per cent for the overall measured sector in New Zealand.[18] Assuming that the specialisation at the HRI enables labour productivity to catch up to the average level of labour productivity growth, over the long run this could generate productivity

[18] NZ Productivity Commission (2013) *Productivity by the numbers: The New Zealand Experience*

gains of around $3,000 of additional value added per FTE. This is not considered material in the context of this analysis.

New economic outputs from complementary research activities

If the HRI is successful, commercial services which are complementary to research activities could begin at the HRI. For example, market research, data analytics and statistical consulting services which support health research at the Precinct, could also have a commercial element to businesses in Canterbury and the rest of New Zealand. This is new economic output not included in the benefits of the Health Precinct.

Based on economic output of $83,500 per full-time equivalent in market research and statistical services in

Christchurch in 2014, and a national average enterprise size of 8 FTEs for the sector, the expected contribution to value-added from the complementary research activities is $689,000 per annum if the HRI is successful.

Table 14: Benefits from complementary research activities

Benefit	Direct value added (annual)	New FTEs
Additional economic output from complementary research activities	$689,000	8

PwC analysis

A successful HRI enables many of the broader benefits of the Health Precinct to be realised. There is a two-way relationship between the HRI and the balance of the Health Precinct—a successful HRI will support a successful Health precinct and vice versa. Table 15 below summarises the benefits of the Health Precinct (refer to the Health Precinct Programme Business Case for further details). In Table 15, we have estimated the strength of the one-way relationship, that is, how integral the HRI is to the success of the Health Precinct.

As shown in Table 15, four out of the seven benefits of the Health Precinct are enabled by the HRI. The HRI is expected to have a business development function and provide reputational benefits, which will assist with generating the Health Precinct's benefits. The HRI is still likely to have an influence over the other aspects of benefit, but that relationship is less direct.

The benefits estimated both here and in the Health Precinct Programme Business Case are intended to provide an order of magnitude of the potential benefits, assuming a successful Health Precinct and HRI. While we are hesitant in simply summing these, as they are inevitably interrelated, the analysis suggests a successful Health Precinct could realistically deliver additional economic benefits in the order of $50 million per annum. Of these benefits, at least a third could be ascribed to the HRI. This proportion could be significantly higher if there is a larger uplift in research commercialisation.

Table 15: Summary benefits of the Health Precinct

Benefit	Description of impact	Assumption	Direct value added (annual gain)	HRI influence on realisation of Health Precinct's benefits
Economic activity from new private sector investment	Synergies between organisations, and improved research connections attracts new private sector investment into the Precinct.	Modest investment	$8.4 million per 100 FTEs	Strong
New research funding	Effective research collaborations are more successful at winning research funding. Increased partnering with the private sector attracts research investment.	9.7% increase over baseline Crown investment	$573,000	Strong
More research commercialised	Improved commercialisation support for researchers supports greater commercialisation. In addition, stronger links with the private sector provides information and direction to researchers that enable more effective commercial application of research.	One new small business begins generating export revenue, one small exporting business becomes a medium sized exporting business	$5.6 million	Strong
Expenditure from increased student numbers	The Precinct attracts greater numbers of students both from New Zealand and internationally.	150 new domestic students, 86 international	$1.6 million	Weak
Improved models of care	Innovations in workforce training, closer integration of theory and practical training, and increases in cross-discipline training improves the capability and capacity of the health workforce.	3% productivity uplift for CDHB	$26.2 million	Weak
Infrastructure efficiencies	Ability to share equipment, lab space, teaching space, common area costs across organisations. Convenience benefits.	Agglomeration benefits applied	$1.7 million	Strong
City centre revitalisation	Development of the Precinct leads to increased local activity and supports local businesses and the broader city centre	Not specifically quantified	Small uplift, as largely displaced from elsewhere	Weak

Benefit	Description of impact	Assumption	Direct value added (annual gain)	HRI influence on realisation of Health Precinct's benefits
	redevelopment.			

The Commercial Case Outline

Low-key procurement

An IBC Commercial Case is intended to provide an initial assessment of the commercial viability of the preferred option, in terms of its attractiveness to potential suppliers and its ability to deliver long-term value for money to the organisation. As the HRI does not involve procurement of any large scale asset or capital works, the typical assessment of a procurement strategy is not relevant.

The recommended options for the HRI in the Economic Case involve combining the resource requirement for the HRI with the Health Precinct team. This will require a procurement strategy that addresses the following:

- The basis on which the Research Partners agree to participate in the HRI. This will likely require a form of a Memorandum of Understanding that commits each Research Partner to unequivocally supporting the HRI in accordance with its foundations plans and documents. It would include govern the relationships between the Research Partners and between the Research Partners and the HRI in relation to ownership, governance, funding, resource usage etc.
- A resource plan and recruitment approach. This will include identification of the desired skills mix, including a manager with the ability to drive and champion the HRI, and development of position descriptions.
- Budgets for operating the HRI.
- Office space requirements, in conjunction with the Health Precinct team, including a budget, a preferred site and rental arrangements.
- The approach, across the Precinct, for shared working spaces (e.g. hot-desks) and shared social spaces and procedures/protocols for using these spaces.
- Rules and procedures or agreements for accessing research equipment, to the extent that this is within the HRI's scope to manage.
- Early stage development of a strategic plan for collaborative research with a focus on private sector involvement.

Requirement for a legal entity

The recommended way forward involves hiring or contracting a small team of individuals and transacting with a range of parties for goods and services, for example for premises. As noted in the Economic Case, this will require a legal entity to act as the contracting party to enter into employment agreements, lease agreements etc.

Options for providing a legal entity are:

- One of the partners enters into contracts, agreements etc. on behalf of all of the partners. For example, the host partner will provide the conduit for funding the Health Precinct team (as currently occurs).
- A standalone legal entity is established.

The advantages and disadvantages of one of the partners acting as the contracting party are:

Advantages	Disadvantages
• Lower compliance costs: no need to go through the process of establishing an entity. • Scale benefits: can use the partner's existing systems and processes and so avoid the cost of establishing standalone systems. • Timeliness: will enable a relatively fast start-up.	• Funding agreements: will require the host partner to enter into funding agreements with the other partners to ensure equitable sharing of costs. • Cost allocations: funding arrangements will require a transparent cost allocation method. For example, are services provided by the host partner on a marginal cost basis or will there be

Advantages	Disadvantages
	an allocation of overheads? • Risk: the host partner will take on legal and other risks associated with the HRI. • Governance: how the governance will be exercised will need to be determined (see the Economic Case). There is a risk that non-host partners might perceive that the host partner has undue influence over the operation of the HRI.

The advantages and disadvantages of establishing a new entity are:

Advantages	Disadvantages
• Independence: the entity can be set up to be arms-length from all partners and so not necessarily overly-influenced or controlled by one partner. Financial reporting will not be complicated by internal costs allocations. • Equitable influence and control: will enable a transparent and flexible ownership structure to be established. The partners ownership shares can be structured in whatever way is deemed appropriate. For example equal ownership or ownership in proportion to some measure such as financial contributions. • Flexible: ownership can be structured to accommodate changes in partners. • Transparent governance and accountability: the form of the entity will dictate to some extent the nature of the governance and accountability. However, the governance and accountability structures are likely to be well understood and robust. The form of the entity could be structured in a way to incorporate the HPAC. For example, if the entity was a company then the HPAC could become the board of directors. • Risk: depending on the form of the entity, risks can be ring-fenced and sheltered within the entity	• Higher compliance costs: there will be costs associated with establishing the entity and, depending on its form, with on-going compliance. • Scale dis-benefits: it will be relatively costly for the entity to put in place its own systems and processes. A sensible solution would be for the entity to contract services from the partners and take advantage of the partners' scale. • Timeliness: will require some time for the partners to agree the commercial and legal parameters for their participation in the entity and for the required documentation to be put in place. The latter should be relatively straight forward but the former could be more complicated.

All other things being equal, a stand-alone entity would be the preferred option for housing the combined HRI and Health Precinct team. Although it would be controlled by the Research Partners, it can be established as an independent entity acting in the best interests of the Precinct and the HRI for the benefit of all Research Partners. Importantly, it can have a transparent governance and accountability framework that allows the Research Partners to exercise an agreed level of influence in a structured and transparent manner.

However, the recommendation in the Economic Case is predicated on taking a measured approach to the development of the HRI. In this regard establishing a stand-alone entity may impose unnecessary compliance costs and governance complexity.

An alternative approach would be to establish the HRI/Health Precinct team within one of the partners as a transition measure. An independent entity could be established when the HRI and Precinct gain traction and the activities of the HRI/Health Precinct team ramp up. This will allow the HRI/Health Precinct team time to establish itself and its credibility with the Research Partners and effectively plan for the establishment of a stand-alone entity, if required. The establishment of the stand-alone entity can then be undertaken in a measured and cost effective manner.

The challenge with this approach is determining which of the Research Partners will host the combined HRI/Precinct team. Also, it doesn't obviate the need to prepare the foundation principles for cost share, governance etc. and capturing these in a Memorandum of Understanding.

The Financial Case Outline

The Financial Case outline, involves providing an initial assessment of the overall affordability of the preferred programme option, and identifying possible funding sources and requirements.

The preferred options for the HRI are not likely to require significant additional funding. However, they will involve an increase over current costs, and they are intentionally flexible enough to accommodate growth in investment as the success of the Precinct and the HRI grow. In effect, the preferred options represent initial steps to leverage committed investment.

We have not attempted to develop a detailed budget at this stage, but have indicatively suggested that the preferred option would require **operational funding** of around $500,000 - $750,000 per annum to support:

- Two to three FTEs, including a manager or director with appropriate skills, networks, profile etc. to provide strong leadership and drive.
- Office space to locate this team – effectively the physical "shop front" for the HRI.
- Possible collaboration spaces.
- Marketing and business development.
- Event hosting costs etc.

Costs may be reduced by leveraging existing partner resources/services.

While the partner organisations are large organisations with considerable capital bases, they are not without resource constraints. They have faced major disruptions following the earthquakes, which has necessitated significant capital outlays. They have also faced operational disruptions which have impacted their operational finances.

There are several funding options available (which are not mutually exclusive):

- Increased funding from partners via the HPAC. Currently the HPAC has a budget of $40,000 per annum from each of its partner organisations, along with a $50,000 contribution has been made by CERA, meaning a combined budget of $210,000. This budget has recently been reconfirmed for 2016; however it is unlikely that CERA will be able to make an ongoing commitment. A key element of any increased funding will be to agree a cost sharing mechanism, which may not involve equal shares.
- Development of a membership fee option like that used by Biomedical Research Victoria. Under this model 'founding partners' have particular status, but then can also reap fees from any other research institute (or potentially private partner) that wants to join. This could include, for example, places like the Brain Research institute or Christchurch Clinical Studies Trust.
- Revenue from holding conferences.
- Diverting existing budgets.
- Philanthropic sources or sponsorship arrangements.
- Seeking funding from other government providers such as Otakaro, CDC, Regenerate Christchurch, MBIE, MoH, TEC and Callaghan Innovation.

In respect of this last option, there was clear direction from stakeholder workshops and the interview programme, that a major scale investment was not required at this stage of the programme. Indeed it was noted that there had already been, and continues to be significant Crown investment in the Precinct either directly or via Crown funded entities such as the CDHB and educational institutions.

This programme business case is consequently more focussed on effectively leveraging that investment. However, it is noted that as the success of the HRI grows, there may be opportunities to pursue funding for specific needs from different areas of government.

In summary, the proposed next steps in building the financial case are to:

- Firm up the estimated cost of the preferred options.

- Work through an appropriate cost sharing mechanism for the individual partner organisations.
- Seek in principle endorsement for this budget and cost sharing from HPAC.
- Seek approval from the partner organisations.

The Management Case Outline

The Management Case outline provides an initial assessment of the capacity and capability of the organisation to implement the preferred programme, taking into account readiness and available resources.

The HPAC was established by the partner organisations with the explicit goal of establishing the Precinct and the HRI. In this respect it is the logical group to implement the preferred option. It has proven capability and capacity through its relationships with and into the partner organisations, and the broader health sector stakeholder community. It is expected that HPAC will continue to leverage in-kind resources from its stakeholder institutions as well as employing contract support as required.

The following table contains a summary of the key aspects of the plan for establishment of the Health Precinct/HRI team. These would form the basis of an establishment and implementation plan.

The table does not include a timetable. The timetable is dependent on agreement to the proposal in this business case and the Partners agreeing to the "speed" at which they want to implement the recommendations.

Table 16: Indicative programme

Proposed key milestones
The relevant agencies endorse this indicative business case for the establishment of the HRI (at least at an 'in-principle' level)
Consider the requirements or need for a detailed business case for the HRI
Develop outline budgets for the proposal in this business case, particularly in relation to staff costs, business development and physical space requirements, building on existing budgets and investment.
Agree the identity of the contracting entity – a Research Partner that will "host" the Health Precinct/HRI team (currently provided by CDHB)
Develop the transition strategy, particularly the factors that will trigger the transfer of the Health Precinct/HRI team to an independent entity. This should include assessment of the forms of the entity and recommendation on a preferred form
Document the processes and various agreements that will be needed to enable the Host Partner to commence the process of employing the Health Precinct/HRI team (potentially building off those currently in place through CDHB)
Determine and agree the arrangements for funding the activities of the Health Precinct/HRI team. If this will include the Research Partners funding some or all of the costs, agree the basis for sharing and managing the costs
Agree the HRI's scope of activities and the roles of the Health Precinct/HRI team (and how those roles are allocated the activities of the HRI and the Health Precinct) delegated authorities and accountability framework and the arrangements for governing, managing and monitoring the team's activities
Determine and agree the establishment plan for the Health Precinct/HRI team. For example, the Health Partners agree on the job description for the Health Precinct/HRI team manager and delegate a subgroup from the Research Partners to undertake recruitment. Once employed, the Health Precinct/HRI manager would be charged with recruiting other staff and managing the establishment process with the Host Partner
HPAC to prepare and commence implementation of a stakeholder engagement plan. The responsibility for the plan will be passed to the Health Precinct team once it is established
Review HPAC's constitution (the collaboration agreement) and identify changes that might be required to ensure HPAC's scope and mandate covers its role as the governing entity for the HRI
Determine and agree the arrangements between the Research Partners in relation to their participation in the HRI, including arrangements in relation to access to assets and facilities, ownership arrangements for jointly developed IP, joint marketing activities etc.
Prepare and present necessary documentation to HPAC for endorsement in principle of the steps,

processes and procedures to establish, manage and govern the HRI and its scope of activities.
HPAC members seek endorsement from their own organisations of the HRI preferred option, the funding arrangements, including cost sharing arrangements, if relevant, the indicative budgets and the arrangements for the Host Partner
Develop a resource plan and recruitment approach. This should include identifying the mix of desired skills, including a manager with the ability to drive and champion both the Precinct and HRI. This should also include a detailed budget.
Seek formal approval for proposed budgets.
Development of a marketing/business development plan for the HRI, and key collateral such as websites etc.

Appendix A : Overview of partner organisations

Canterbury District Health Board (CDHB)

Overview	CDHB is funded by central government to purchase and provide health and disability services for the people of Canterbury. CDHB is: • the main planner and funder of health services in Canterbury; • a tertiary provider of hospital and specialist services – both for the Canterbury population and also for the populations of other DHBs where more specialised services are unavailable; • a promoter of the Canterbury population's health and wellbeing; and • the largest employer in the South Island, employing over 9,000 people across its services.
Role / interest in the health sector	Provider and funder of primary, hospital and specialist health services.
Strategic goals	CDHB's vision is an integrated health system that keeps people healthy and well in their own homes by providing the right care and support, to the right person, at the right time and in the right place. This includes: • the development of services that support to people / whānau to stay well and take greater responsibility for their own health and wellbeing • the development of primary and community-based services that support people / whānau in the community and provide a point of ongoing continuity (which for most will be general practice) • the freeing-up of hospital-based specialist resources to be responsive to episodic events, provide complex care and provide specialist advice to primary care.
Current operating environment	CDHB's Annual Plan 2014/2015 notes the following challenges and factors in the operating environment: • The 2010-2011 earthquakes continue to impact CDHB with: reduced capacity of the health sector, increasing demand for services (e.g. mental health services, health conditions caused by poor living arrangements), pressure on workforce. • Canterbury's growing and ageing population is a key challenge for CDHB; it is expected to place significant pressure on its workforce, infrastructure and finances. • CDHB currently has major construction projects underway. The redevelopment of Christchurch and Burwood Hospitals is expected to be complete in 2018. Upwards of $600m is to be invested across the two sites. This will involve disruption and restricted services as CDHB relocates services and awaits construction work. • The Government has given clear signals that all DHBs need to live within their means and rethink how they deliver improved health outcomes in more cost-effective ways.
Aspirations for involvement in Precinct and/or	• Redevelopment of Christchurch Hospital and the new outpatients' facility is a key part of the strategic context of the Precinct. Christchurch Hospital is a teaching hospital, and will be one of the busiest hospitals in Australasia once

HRI	redevelopments are complete. • As a major employer and home to the South Island Regional Training Hub (SIRTH), CDHB has extensive responsibilities for workforce development, training and professional development across health workforce groups. CDHB has strategic relationships with a variety of tertiary education providers including UO, UC and Ara. • The development of the HREF will provide the opportunity for co-location of and collaboration among staff from a range of organisations. CDHB considers this will lead to the development of and access to a shared services model for the wider Canterbury Health system staff including those working in primary care.

More information is available at: www.cdhb.health.nz

University of Otago (UO)

Overview	UO is New Zealand's first university, established in 1869. It offers a full range of courses, including a medical school, with 18,800 FTE students and 3,788 FTE staff in 2014.
Role / interest in the health sector	UO's Division of Health Sciences has campuses in Christchurch, Dunedin, and Wellington. It delivers undergraduate programmes in Dentistry, Medical Laboratory Science, Medicine, Pharmacy, and Physiotherapy. It also offers bachelors' degrees in Oral Health, Dental Technology, Radiation Therapy, and Biomedical Sciences. Recognised internationally for the high standard of its graduates and research, the Division aims to provide New Zealand society and other communities with a highly qualified workforce in the health professions.
Strategic goals	UO's vision: A research-led university with an international reputation for excellence. UO's mission: The University of Otago will create, advance, preserve, promote and apply knowledge, critical thinking and intellectual independence to enhance the understanding, development and well-being of individuals, society and the environment. It will achieve these goals by building on foundations of broad research and teaching capabilities, unique campus learning environments, its nationwide presence and mana, and international links. The following strategic imperatives have been identified by the University: • Excellence in Research • Excellence in Teaching • Outstanding Student Experiences • Outstanding Campus Environments • Commitment as a Local, National and Global Citizen • Strong External Engagement • Sustaining Capability.
Current operating environment	• Priority Development Plan (PDP) – a $650 million programme of building developments to be completed over the next 15 years. Projects on the PDP include teaching and research facilities and a new faculty for the national Dental School. • UO's Annual Report 2014 noted that while UO continues to rank well internationally, UO and other New Zealand universities are gradually slipping in the context of an increasingly competitive global environment. Over the past two decades, New Zealand government funding per student has gradually declined in real terms and, as a result, the numbers of staff per student have been negatively affected.
Aspirations for involvement in Precinct and/or HRI	• UO is a leading New Zealand provider of undergraduate and postgraduate education and training in health workforce professions. It also leads research in the related medical, public health and biomedical sciences. • The Division of Health Sciences has its main campus in Dunedin, but Christchurch and Wellington are critically important for clinical training, postgraduate training and research. The Christchurch campus is a key component of the Division's national infrastructure. • UO's strategic goals and objectives for participating in the Precinct and on the HPAC are: 1. To further enhance and strengthen the University's and the Division of Health Sciences' core activities and contributions in education and training in health workforce professions and biomedical sciences;

research; and community service.

2. To support and foster strong and productive collaborative relationships across tertiary institutions and health provider organisations in Canterbury. Collaborations may include teaching and research activities and support of broader workforce development activities.
3. To make a strong positive contribution to the re-building and re-shaping of the central city. The University is committed to adding to the vibrancy and ethos of the Precinct for the benefit of the wider Canterbury population.
4. To maintain and where appropriate expand the University's research and teaching programmes in Christchurch.
5. To work constructively with CCDU to determine the optimal site for the University's planned new building (noting that the University currently owns the former Tillman site on Oxford Terrace).
6. To develop plans for the new health and biomedical research building with the aim of completing construction in 2018.

For more information see www.otago.ac.nz

University of Canterbury (UC)

Overview	UC in Christchurch is New Zealand's second oldest university. The university offers degrees in Arts, Commerce, Education (physical education), Engineering, Fine Arts, Forestry, Health Sciences, Law, Music, Social Work, Speech and Language Pathology, Science, Sports Coaching and Teaching. In 2014 the University had 11,943 FTE students and 1,886 FTE staff (2014).
Role / interest in the health sector	UC's School of Health Sciences offers undergraduate and postgraduate programmes and research activities that respond to the dynamic nature of the health and education sector and its workforce. These include postgraduate programmes in Counselling, Specialist Teaching, and Child and Family Psychology, as well as various population health and clinical endorsements within the Postgraduate Diploma and Masters of Health Sciences.
Strategic goals	UC's vision: People prepared to make a difference. UC's mission is to contribute to society through knowledge in chosen areas of endeavour by promoting a world-class learning environment known for attracting people with the greatest potential to make a difference. UC aspires to provide all graduates with the opportunity to graduate: • Having mastered their chosen discipline; • Employable, innovative and enterprising; • Biculturally competent and confident; • Engaged with the community; and • Globally aware. UC's 2015/2016 Goals are to: • Enhance the UC student experience • Recover student numbers • Engage staff • Enhance research reputation and performance • Connect and collaborate • Improve campus and IT infrastructure • Manage resources prudently.
Current operating environment	• Ongoing challenges from the impacts of the 2010-2011 earthquakes • Building programme over the next 2-3 years, signalling a major investment in University property
Aspirations for involvement in Precinct and/or HRI	In its response to the earthquake sequence of 2010-2011 the University has developed its UC Futures programme which seeks to contribute to its recovery process through a multi-pronged series of new initiatives in which the Precinct initiative plays a key part. The University sees its involvement in the development of the Academic Health Sciences Centre as a major strand of its approach to consolidating its already well developed portfolio of health research and teaching. A unique opportunity now exists for UC to join a strong, collaborative partnership with Ara and UO to work alongside the CDHB and industry to build a world-class academic health science development where internationally significant research, innovation and teaching are delivered within the Precinct. The University seeks to contribute to the first phase of the HREF through teaching, initially at the post-graduate and post-qualification levels, with limited specialised undergraduate professional education provision being considered. UC also anticipates the location of key research entities which will promote elements of translational research in clinical practice and create new knowledge in

fundamental and applied health research, all of which will contribute to economic growth.

UC is a key partner in the National Sciences Challenge – Better Start project and there are further opportunities to develop Christchurch as a South Island hub for research for the National Sciences Challenge initiatives. These programmes will have a seminal role in improving the health and wellbeing of Cantabrians.

Selected programmes and projects will have the potential to gain significant synergies and benefits by co-location in the Precinct alongside the largest concentration of health professionals and patients/clients in the South Island. Being positioned within the Precinct will also increase capacity in UC's strategic health research through access to a range of urban and rural populations. The collaborative opportunities for staff and students of the University in the Precinct will enable UC to further enhance its vision of being people prepared to make a difference – tangata tū, tangata ora.

For more information see: www.canterbury.ac.nz

Ara Institute of Canterbury (Ara)

Overview	Ara is a tertiary education provider with approximately 6,700 FTE students in 2014. Ara provides full- and part- time education in technologies and trades.
Role / interest in the health sector	Ara provides tertiary qualifications in the areas of Nursing, Midwifery, Medical Imaging, and Applied Science (including human nutrition, sport and exercise science, physical activity and health promotion), among others.
Strategic goals	Ara's vision: Leading education for employment in partnership with communities. Ara's goals for 2015-2017 are: • Market relevance • Graduate outcomes • Dynamic learning and environment.
Current operating environment	• In August 2015, Ara and Aoraki Polytechnic presented a joint business case to the Minister for Tertiary Education, Skills and Employment proposing that a joint Canterbury-wide organisation be established. The two institutes have now merged to form Ara Institute of Canterbury. • Ara Campus Master Plan: a programme of major redevelopment work of construction and refurbishment through to 2022.
Aspirations for involvement in Precinct and/or HRI	Ara is committed to becoming the major health sector training provider in the South Island, working in conjunction with stakeholders to ensure that all opportunities for integrated learning are developed to produce high quality graduates in all areas. Ara is committed to ensuring that all programmes are kept current and future focused through continued involvement in national development processes and connection with international advances. The first steps to this commitment were taken by participating in the development of the Precinct in Christchurch and the delivery of Master Planning Advice to the CCDU. It is of strategic importance to Ara to have a presence in the Precinct and delivery at the Precinct will include all Ara Nursing, Medical Imaging and Midwifery immediately and in due course a range of allied health teaching. It is projected that other academic facilities could be developed as the Precinct is expanded. Significant increases in workforce demands in the next five to 15 years is recognised by Ara as a catalyst for ensuring that the delivery of training is redeveloped to provide greater ease of access and continuing high quality at all levels. Training in the health area at Ara specialises in quality, under-graduate provision although Ara is committed to responding to increasing demand for the provision of on-going graduate and post graduate training and research which is essential to the vigour of the health sector. Themes of delivery have been developed to support the changes that accompany the re-siting of delivery to the Precinct: • Teaching & learning strategies for collaborative active learning • Learning as a pervasive and inclusive activity based on social interaction • Future-focused physical spaces for learning • Technology-enhanced learning • Infrastructure to support learning • Student demographics and needs. Situating nursing and associated health training in the Precinct will mean greater integration of that training with 'real life' experiences in the hospital. The gap between theory and practical training will be lessened and opportunities for the training to be timetabled in new and accessible ways are a feature of this

placement.

The development and economies of scale in costs of the facilities will be enhanced by being a collaborative process with the other stakeholders. Opportunities for development of alternative sources of income will be enhanced by proximity to other health sector activities.

For more information see: www.cpit.ac.nz

Canterbury Earthquake Recovery Authority (CERA) and Christchurch Central Development Unit (CCDU)

Overview	CERA and the Christchurch City Development Unit (CCDU) have a key role to play in the development and implementation of the Precinct through the CCRP. CCDU is an active member of the HPAC and plays an important role in supporting and enabling the work of the other organisations and institutions represented on the Advisory Council. CERA will remain on the Advisory Council and will fulfil its recovery role in the following capacity: • Manage the acquisition of land required in the Precinct • Facilitate private sector led development • Lead targeted marketing strategies to attract private sector investment • Support the stakeholder organisations to leverage philanthropic interests in the Precinct • Support the stakeholder organisations to advance their strategic directions and overcome roadblocks by utilising Crown levers available under the CER Act • Facilitating opportunities for the Precinct to contribute to economic recovery • Take a neutral and enabling role behind the scenes to facilitate collaborations across organisations while the stakeholder organisations provide the outwards face of the Precinct.

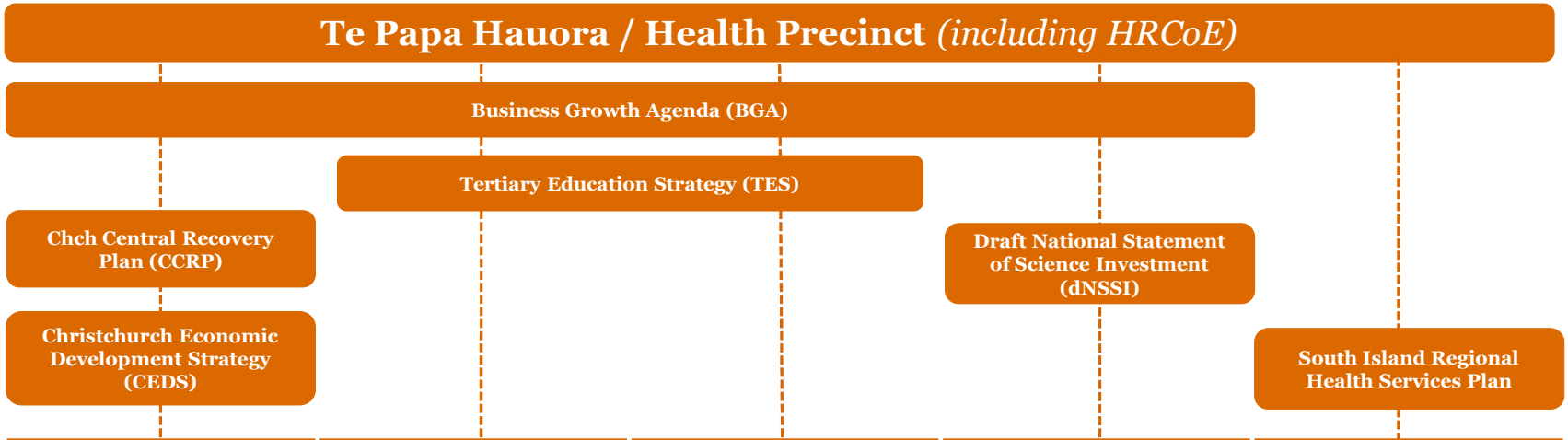
For more information see: www.cera.govt.nz and www.ccdu.govt.nz

Matapopore / Ngāi Tahu / Ngāi Tūāhuriri

Overview	Matapopore is the Ngāi Tūāhuriri earthquake recovery steering group and has been working closely with the Crown, providing advice on the Central City CCRP.
Role / interest in the health sector	Matapopore have an interest in relation to improving health outcomes for Maori.
Aspirations for involvement in Precinct and/or HRI	Matapopore are cautiously interested in the concept of developing a research centre in the Precinct with a focus on Maori health and particularly chronic diseases which impact Maori disproportionately, such as diabetes. They also have a long-term interest in land ownership within the precinct. It should be noted that it is early days in determining the appropriate form and nature of a potential role in the Precinct. Engagement will continue with mana whenua and Maori at a high level over time to align intergenerational health and education outcomes.

Appendix B : Alignment with policy objectives

The diagram below shows the alignment of the Precinct and HRI concepts with various central and local government priorities and strategies. Material relating to the wider Precinct, as well as HRI, has been included here for context, although the aspects that relate most closely to the HRI include Tertiary Education and Research and Innovation. A summary of each of the strategies is provided on the following page.



	Canterbury Rebuild	Tertiary Education	Health Workforce	Research and Innovation	Health Service
Relevant aspects of Precinct	Precinct is one of 17 anchor projects to support the Christchurch rebuild Health is a growth sector within the economy, and a priority focus to keep Christchurch competitive with other cities Developing a world-class hub for health will contribute to the overall success of the central city design and build	Precinct is designed to facilitate and strengthen relationships and collaboration among TEOs and between TEOs and industry Precinct (particularly HRCoE) will strengthen international connections for global recognition and competitiveness Focus on improved and innovative teaching models – improving quality and relevance of tertiary health education	Precinct will enable integrated teaching across theory and practical, and across institutions, training future health workforce better equipped for 'real world' situations Innovative teaching models to recognise changing demands on future health workforce	HRCoE will act as a magnet for talent, attracting leading clinicians, researchers and students to affiliated entities Greater investment into health R&D and improved investment efficiency, through closer links between health service delivery organisations, TEOs and industry will facilitate collaboration	Training health work force that can meet changing demands on health system – e.g. increased focus on primary care and integration across services Translation of new findings and research into clinical practice for better health outcomes

Summary of relevant central and local government priorities and strategies

Strategy	Description
Business Growth Agenda (BGA)	The BGA is the Government's top level programme of work to support New Zealand businesses to grow, in order to create jobs and improve New Zealanders' standard of living. The goal of the BGA work programme is to build a more productive and competitive economy. This goal will be achieved by "building business confidence, and addressing the issues that matter to firms." Specifically, the work programme focusses on six key inputs businesses need to succeed, grow and add jobs. Of the six, three inputs have particular relevance to the Precinct concept: Innovation; Building Skilled and Safe Workplaces; and Infrastructure.
Tertiary Education Strategy (TES)	The TES is one of the key initiatives of the BGA's *Building Skilled and Safe Workplaces* inputs. To improve the tertiary education system, the Government is focussing on four priorities: Build international relationships that contribute to improved competitiveness; Support business and innovation through development of relevant skills and research; Continue to improve the quality and relevance of tertiary education and research; and Improve outcomes for all.
Christchurch Central Recovery Plan (CCRP)	Rebuilding Christchurch is one of the Government's four key priorities, and the CCRP is the blueprint and long-term vision for this transformation. With a focus on creating a framework for investment and building a world class city, the CCRP "gives certainty to business based on the combined infrastructure commitment of the Council and Government." In order to provide assurance and clarity to investors and Christchurch residents alike, the CCRP is based around 17 'anchor' projects which will drive the Christchurch rebuild and economic growth. The Precinct is one of these projects.
Christchurch Economic Development Strategy (CEDS)	Canterbury Development Corporation (CDC) is the economic development agency for Christchurch City Council, and the CEDS provides the framework for long term growth goals and priorities for Christchurch. CEDS "brings together the views of various businesses and agencies in the region to identify ways in which to optimise our economy so that by 2031 Christchurch has a higher quality of life, better income, greater employment and is a vibrant and growing city attracting people from around the globe." The CEDS action plan is based around 5 GDP 'game changers' and eight further initiatives to keep the city competitive with other cities. Several of these initiatives have specific relevance to the Precinct concept: Improving productivity through innovation; Successful central city design and build; Workforce; Sector development; and Connections and Business Networks.
South Island Regional Health Services Plan	The South Island Regional Health Services Plan articulates the regional direction and key principles for the South Island DHBs that will inform regional service development, service configuration and infrastructure requirements over the next several years. The South Island Health Services Plan progresses the direction and key principles that continue to inform regional service development, service configuration and infrastructure requirements. One of the key areas of focus for the plan is to strengthen the education and training network across both the South Island and nationally. Given the changing nature of health service delivery, this focus area is built around encouraging, enhancing and sharing innovative and multi-disciplinary approaches to healthcare delivery.
National Statement of Science Investment (NSSI)	The NSSI sets out the Government's priorities for its investment in science and innovation. To support the ongoing development of New Zealand's economy, investment will be directed not just towards primary industries, but towards growth sectors such as ICT, health, high-value manufacturing and processed primary products, and environmental innovation.

Appendix C : Acronyms

Acronym	Refers to
A*STAR	Agency for Science, Technology and Research (Singapore)
AUT	Auckland University of Technology
CBD	Central Business District
CCDU	Christchurch Central Development Unit
CCC	Christchurch City Council
CCRP	Central City Recovery Plan
CCST	Christchurch Clinical Studies Trust
CSF	Critical Success Factor
CDHB	Canterbury District Health Board
CERA	Canterbury Earthquake Recovery Authority
CIMIT	Consortium for Integration of Medicine and Innovative Technology (Boston)
CMDT	Consortium for Medical Device Technologies
Ara	Ara Institute of Canterbury
HPAC	Health Precinct Advisory Committee
HRI	Health Research Centre of Excellence
HREF	Health Research and Education Facility
IP	Intellectual Property
MoH	Ministry of Health
MBIE	Ministry of Business, Innovation and Employment
MedTech CoRE	MedTech Centre of Research Excellence
NGO	Non-Government Organisation
R&D	Research and Development
SIRTH	South Island Regional Training Hub (delivered by South Island Alliance on behalf of the five South Island DHBs and funded by Health Workforce New Zealand)
TEC	Tertiary Education Commission
TEO	Tertiary Education Organisation
UO	University of Otago
UC	University of Canterbury

Appendix D : Interviews

As part of developing this Programme Business Case, interviews were held with the following individuals and organisations:

Individual and Position	Organisation
Dr Gavin Clarke	Director Research and Enterprise, Otago Innovation Ltd
Prof Peter Crampton	Pro-Vice Chancellor Health Sciences, UO
Prof Harlene Hayne	Vice Chancellor, UO
Prof Richard Blaikie	Deputy Vice Chancellor, Research and Enterprise, UO
John Patrick	Chief Operating Officer, UO
Paul Morrison	General Manager, ENZTEC
Asst Prof Anthony Butler	Chair, HRI Project Working Group UO UC MARS Bioimaging Ltd
Dr Ross Keenan	Director of Research, Pacific Radiology Group
Prof Gail Gillon	Pro-Vice Chancellor Education, Health and Human Development, UC
Kay Giles	Chief Executive, Christchurch Polytechnic Institute of Technology (now Ara Institute of Canterbury)
Prof Peter Joyce	Dean, UO, Christchurch
Stella Ward	Executive Director Allied Health, CDHB
Kate Russell	Chief Executive, Canterbury Medical Research Foundation
Mandy Forster, Stephen Atkins, Tim O'Meara, David Dembo	GE Healthcare
Te Maire Tau	Matapopore
Andy Matheson	IGNESCO Limited, commercial advisor

Several workshops were also held. The dates and participants of these are set out below:

Workshop / Purpose	Date and Venue	Participants
Initial Business Case Workshop	24 June 2015, Christchurch	Dr Ian Town, Health Precinct Advisory Council Emma Hodgkin, Health Precinct Advisory Council Dr Helen Lunt, UO Christchurch and CDHB via Innovations Dr Michael MacAskill, NZ Brain Research Institute Nigel Anderson, UO Christchurch and MARS bioimaging David Grimmett, UO Dr Wendy Lawson, UC Cathy Andrew, Ara Greg Hamilton, CDHB Dr Geoff Shaw, CDHB Andrew Priest, commercial advisor Adam Naiman, CERA Gareth Stiven (Business Case team) Dr Damien Angus (Business Case team)
Investment Logic Mapping (ILM) Workshop	11 August 2015, Christchurch	Stephen Davies-Howard (facilitator) Dr Ian Town, Health Precinct Advisory Council Emma Hodgkin, Health Precinct Advisory Council Asst Prof Anthony Butler, UO, UC, CDHB Dr Tim Woodfield, UO, UC Dr Michael MacAskill, NZ Brain Research Institute David Grimmett, Otago Innovation Limited Dr Geoff Shaw, CDHB Dr Bruce Davey, ARANZ Medical Dr Chris Wynne, Christchurch Clinical Studies Trust Adam Naiman, CERA Bridget Woodham, CERA Gareth Stiven (Business Case team) Dr Damien Angus (Business Case team) Jemma Adams (Business Case team)
HRI Options Workshop	14 September 2015, Christchurch	Ian Town, Health Precinct Advisory Council Emma Hodgkin, Health Precinct Advisory Council Anthony Butler, UO, UC, CDHB David Grimmett, Otago Innovation Limited Dr Bruce Davey, ARANZ Medical Dr Michael MacAskill, NZ Brain Research Institute Sheila McBreen-Kerr, Ara Dr Mark Smith, CDHB Kate Russell, Canterbury Medical Research Foundation Dr Geoff Shaw, CDHB Dr Maggie Meeks, UO Bridget Woodham, CERA Damien Angus (Business Case team) Gareth Stiven (Business Case team) Jemma Adams (Business Case team)

Appendix E : References

The following documents were reviewed as part of the development of this Business Case:

Health Precinct and HRI Strategic Documents

- Health Precinct Advisory Council Terms of Reference
- Health Precinct Advisory Council Collaboration Agreement
- Health Precinct Advisory Council Strategic Plan 2015-2020 (condensed and full versions)
- Health Precinct Investment Gaps and Opportunities paper
- Health Research Centre of Excellence Project Working Group Terms of Reference
- Health Research Centre of Excellence – Report of Workshop held September 2014
- Health Research Centre of Excellence – Report of 2014 Study Tour to Singapore
- Health Research Centre of Excellence Feasibility Study
- Health Precinct Master Planning Advice
- Health Precinct Information and Updates on Christchurch Central Development Unit website, www.ccdu.govt.nz

Relevant central and local government reports and plans

- Christchurch Central Recovery Plan (CCRP)
- An Accessible City: Transport Chapter Addendum to Christchurch Central Recovery Plan
- Briefing to the Incoming Minister of Health (Ministry of Health), 2014
- Briefing to the Incoming Minister of Health (Treasury), 2014
- Briefing to the Incoming Minister of Tertiary Education, 2014
- Briefing to the Incoming Minister of Science and Innovation, 2014
- Tertiary Education Strategy

Reports and plans of partner organisations

- CDHB Annual Plan 2014/2015
- UO Annual Report 2014
- UC Annual Report 2014
- UC 2015 Plan
- UC Futures Report
- Ara Annual Report 2014

References for case studies and other specific points within the Business Case are included as footnotes.

Appendix F Case studies

Introduction

This Appendix contains two sets of case studies. The first set (two case studies) are a demonstration of live collaborative research projects. The second set are examples from other countries of research institute/health precincts – these include a description of the key features of the examples.

Collaborative research projects

Two case studies are provided below – one for a research project (MARS Spectral Imaging Project), and one for the Consortium for Medical Device Technology (CMDT) and MedTech CoRE. Although the latter is not a single research project, it provides an illustration of how health research collaboration and building of critical mass can be encouraged and supported within existing arrangements.

Case Study: MARS Spectral Imaging Project

The MARS Project is a collaborative effort between the Universities of Canterbury, Otago and Auckland. In partnership with various industrial groups, the focus of the project is to develop a commercial spectral (MARS) scanner for molecular imaging. The MARS scanner will be able to provide more detailed images of the body than traditional MRI scans and computer tomography, leading to the earlier detection, diagnosis and treatment of major diseases.

The MARS project receives approximately $12m in external funding, predominantly from the Ministry of Business, Innovation and Employment (MBIE), who provide $4m over 6.5 years through the High Value Manufacturing Services Research Fund, and through a parallel contract with MARS Bioimaging Ltd.

The MARS project has also signed a partnership agreement with GE Healthcare, who will provide funding and the x-ray tube to be used in the system. Several health-related and collaboration grants also provide funding to the project, such as the National Health Foundation; the NZ Arthritis Foundation; the New Zealand Royal Society; and the Royal Australian and New Zealand College of Radiologists.

The goal of the project is to have a full-scale MARS scanner system developed in three years, with use for humans in about five years. As well as the health improvement benefits the MARS scanner will confer, the likely economic benefit to New Zealand will be substantial if the project is successful – the MARS scanner is a high-value product and there are no such scanners commercially available today. This will also lift the profile and competitiveness of New Zealand's technology manufacturing sector in the area of medical imaging. The partnership with GE Healthcare is expected to open new pathways for knowledge sharing and provide a platform for New Zealand to showcase its high-tech manufacturing capabilities globally.

References:

Centre for Bioengineering and Nanomedicine. *Biomedical imaging*. Retrieved from www.otago.ac.nz/bioengineering/research/otago037899.html, August 2015.

Dr Bas Walker. *Global partnership for MBIE funded research*. Retrieved from www.mbie.govt.nz/about/whats-happening/news/2014/global-partnership-for-mbie-funded-research, August 2015.

Case Study:

Consortium for Medical Device Technology (CMDT) and MedTech CoRE

CMDT is a national industry-research network that was established to help grow the medical device industry in New Zealand and to "provide a single point of contact to NZ's capability and resources in medical technology (MedTech)". The CMDT network is a collaboration between Auckland University of Technology (AUT), Callaghan Innovation, the Universities of Auckland, Canterbury, Otago and Victoria University of Wellington.

By enhancing opportunities for collaboration, facilitating access to funding and international connections for both researchers and start-up companies, CMDT is able to provide a single access portal to link research activities with "companies, healthcare providers, regulatory and industry bodies, the Health Innovation Hub, and the Commercialisation Partner Networks."

In 2014, the CMDT partners successfully applied to the Tertiary Education Commission (TEC) for funding to establish the MedTech Centre of Research Excellence (MedTech CoRE). The MedTech CoRE, hosted by the University of Auckland, is focused on developing new technologies to improve "hospital, community and home-based healthcare, for the benefit of all New Zealanders, and also nurture an enhanced MedTech business sector that contributes to the growth of the New Zealand economy."

Reference:

CMDT and MedTech CoRE Website, www.cmdt.org.nz

International case studies

Three international examples were researched as this Business Case was developed:

- The Consortium for Integration of Medicine & Innovative Technology (CIMIT) in Boston, Massachussetts, USA.
- The Agency for Science, Technology and Research (A*STAR) in Singapore.
- Parkville Precinct and Biomedical Research Victoria in Victoria, Australia.

These case studies are also included in the Precinct Programme Business Case. Various aspects of the case studies are highly relevant to both the Precinct programme and HRI project. This is perhaps unsurprising, given the strong overlap in investment objectives, service requirements and expected benefits between the Precinct and HRI. At any rate, the case studies have served as effective points of reference when developing options for both the Precinct and HRI.

The table on the following pages provides a high level summary of each centre's background, physical profile, area(s) of research focus, operating model, funding model, local environment and impacts.

The case studies set out different models for bringing together organisations, encouraging them to collaborate, and then promoting the fruits of that work and engaging with the private sector. The variables tend to run along the following dimensions:

- **Governance and management:** This relates to how closely organisations link themselves to form a Precinct or Centre. For example, CIMIT has a consortium model; Biomedical Research Victoria is a representative body with fee-based membership; A*STAR is a single public sector agency overseeing a large number of research and research support entities.
- **Physical profile:** This relates to how much (or what kind of) shared property or equipment is owned or controlled by the Precinct or Centre. For example, CIMIT and Biomedical Research Victoria do not jointly own laboratory or work space, or research equipment, but have an office base with central staff, while A*STAR's entities are accommodated within two purpose-built precincts with state of the art research facilities.
- **Government involvement:** This relates to how the Precinct or Centre interacts with state or central government in terms of funding and governance. For example, CIMIT is a consortium of hospitals and universities, with government partnerships; Biomedical Research Victoria has received co-investment from the Victorian government over its development, and works with both

Commonwealth and State governments to establish priorities for investment and inform policy development; and A*STAR is a public sector agency.

- **Funding model:** This is tied to government involvement, and describes to how a Precinct or Centre is funded. Case studies range from full government funding (A*STAR), to a co-funding model at Biomedical Research Victoria, to a model which focuses more on philanthropy and venture capital, albeit with some government support at CIMIT.

It is important to note that the way universities and hospitals are funded in each of these cities has an impact on whether we describe the level of funding or governance as coming from "government". In general when referring to government involvement and funding, we are referring to specifically tagged and usually direct involvement or funding from central government.

The models different places follow under each dimension will also be influenced by their unique local context – for example, the local population size, health needs, government and regulatory environment, and existing international reputation and relationships of participating organisations.

The dimensions and models provide a useful framework for developing and shortlisting options the HRI. This is explored in the following Economic Case section.

CIMIT (Boston)

Background

The Consortium for Integration of Medicine & Innovative Technology (CIMIT) was formed in 1998. CIMIT is a non-profit consortium of Boston's leading teaching hospitals and universities, with strategic international affiliations and government partnerships.

CIMIT's mission is to accelerate the healthcare innovation cycle by facilitating collaboration among experts through the development and implementation of novel solutions to improve patient care.

Physical profile

CIMIT has no central laboratories; work is carried out in the laboratories of chosen project leaders.

CIMIT's team of Facilitation Leaders (see below) is based at Charles River Plaza, a medical, office, research and retail complex in the Boston CBD, adjacent to Massachusetts General Hospital.

Areas of research focus

CIMIT focuses on patient care in the following focus areas:

- Clinical Systems Innovation
- Simulation
- Neurotechnology
- Traumatic Brain Injury & Neurotrauma
- Traumatic Stress Disorders
- Biodetection & Sepsis Control
- Biomaterials & Tissue Engineering
- Cardiovascular Disease
- Global Health Initiatives
- Image Guided Therapy
- Inhalation Technology
- Minimally Invasive Surgery
- Optical Diagnostics
- Trauma & Casualty Care

Operating model

CIMIT's consortium partners are:

- Massachusetts General Hospital
- Brigham & Women's Hospital
- Charles Stark Draper Laboratory
- Massachusetts Institute of Technology
- Beth Israel Deaconess Medical Center
- Boston Medical Center
- Children's Hospital of Boston
- Newton-Wellesley Hospital
- Northeastern University
- Partners HealthCare
- VA Boston Healthcare System

CIMIT has a CEO, COO and Chief Academic Officer, and an executive committee comprising CEOs (or equivalent) from each of the consortium partners.

Projects are led by clinicians, so that there is a 'clinical pull' focus to innovation.

However, CIMIT also has a full time team of Facilitation Leaders – business and commercialisation experts that help researchers progress their ideas beyond the lab.

CIMIT also has Program Leaders in various medical areas, and Site Miners within each consortium institution.

Funding

CIMIT actively seeks various sources of funding to support the programme (donations, angel funders, venture capitalists, entrepreneurs and philanthropists). CIMIT maintains a high profile using social media and innovation competitions which garner mainstream media coverage. It is also dependent on contributions from consortium institutions. CIMIT initially received considerable support from the US Department of Defence.

CIMIT required more than $150m from various sources over 10 years to continue functioning.

The consortium has acknowledged financial sustainability is difficult, especially attracting funding for facilitation activities, where the link to project objectives is more abstract.

CIMIT Grants are provided to support early stage, collaborative research projects for improving patient care, with emphasis on devices, procedures, diagnosis and clinical systems. Proposals that reach across consortium institutions and those that may result in technologies that could benefit several medical disciplines are encouraged.

CIMIT does not support drug development, IT-centric projects, basic research or clinical trials, or funding for industry. It does provide a CIMIT Engagement Programme to allow collaboration of companies with the CIMIT community.

Local environment

CIMIT is based in Boston, which is a world-renowned centre of public and private research and technology excellence, and has many medical device companies.

Boston has the top US position in both NIH and Venture Capital funding, which helps research in this area prosper. There is also likely to be greater access to philanthropic organisations than would be available in a smaller centre.

CIMIT's success was also enhanced by pre-existing relationships and collaboration between key personnel, industry and government.

Impacts

CIMIT initiated a Clinical Impact Study which examined 362 projects supported by CIMIT grants between 1998 and 2006. Findings showed:

- >20% of project clusters had received regulatory approval for clinical adoption of innovations
- >30% of project clusters had a licensing agreement with a company or had formed a company
- >60% of project clusters had generated follow-on funding, at about 9x the level initially provided by CIMIT
- CIMIT's greatest "bang for buck" occurred in projects with funding between US$100K-$300K
- Targeted and skilled facilitation is very effective at any stage of the innovation cycle
- Projects conducted as part of a 'cluster' of related activities are more effective than those done in isolation.

CIMIT's Fact Sheet cites the following results:

- 200+ invention disclosures
- 200+ patent applications
- 30+ patents issued
- 10+ licences
- 15+ companies formed
- 60+ industry partners
- 550+ projects funded
- 500+ peer-reviewed publications

A*STAR (Singapore)

Background

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead public sector agency that spearheads economic-oriented research to advance scientific discovery and develop innovative technology. It was formed in 2001 from a combination of existing government agencies and research institutes.

A*STAR now oversees 18 biomedical and physical sciences and engineering research entities. It comprises research entities, commercialisation entities and scientific and shared services.

The entities A*STAR oversees are primarily located in purpose-built twin precincts known as Biopolis and Fusionopolis. These precincts provide purpose-built, state of the art research facilities for public and private sector research, and also retail, office and hospitality space.

Areas of research focus

A*STAR's Biomedical Research Council oversees entities focused on biomedical sciences such as pharmaceuticals, medical technology, biotechnology and healthcare services.

A*STAR's Science & Engineering Research Council oversees entities focused on communications, data storage, materials, chemicals, computational sciences, microelectronics, process manufacturing and metrology.

Operating model

A*STAR is a public sector agency, rather than a partnership or consortium. The model is based on clustering public and private sector research institutes within close physical proximity, and then promoting the exchange of ideas to develop and exchange new technologies and knowledge that will result in increased industry, education and public well-being.

The two Research Councils outlined above represent A*STAR's research functionality. A*STAR also includes:

- A Joint Council which facilitates interaction between the two Research Councils, and between A*STAR and external organisations.
- A Scientific and Shared Services division, which manages research facilities and shared administrative services / central functions
- Commercialisation entities which provide IP management, and facilitate and support public private partnerships and drug development
- The A*STAR graduate academy which provides under- and post- graduate scholarships

A range of collaboration mechanisms support industry to work with A*STAR (e.g. provision of lab space, joint research programmes).

Collaboration between tertiary and medical institutions and A*STAR research centres provides for 'clinical pull' of innovative technology, as well as 'research push'.

A*STAR's commercialisation function provides funding for technology and business incubation (up to S$1m per project).

IP developed solely by A*STAR is licensed to industry, with A*STAR researchers involved receiving 1/3 of the net licensing revenue, and the remainder representing return on investment to the government.

Funding

The Singapore Government funds A*STAR and its research centres as part of its development of R&D capital. A return on investment comes via licence and royalty fees.

Some research centres have been developed in partnership with industry, and other industry players have paid to have their own premises constructed in the precincts.

The long-term financial sustainability of the model appears to be dependent on continued government support, simply because of the scale of the precincts. The current BMS initiative ends in 2015, having injected $16.1 billion into breakthrough research programmes into Singapore Biomedical Sciences.

Local environment

The Singapore Government has established a pro-business environment with strong IP laws. The Government has invested heavily in the past two decades to raise Singapore's R&D profile, to attract and retain talented staff, and to attract multinational corporations to the country. Singapore has excellent logistics connections with key markets and world class infrastructure.

Impacts

As at October 2009, A*STAR's commercialisation arm was managing close to 3,000 active patents, had granted more than 250 licences for A*STAR's technology, and had created 24 spin-off companies. Estimated licence revenues were in excess of S$500M.

According to Datamonitor, Singapore was the third fastest growing market globally in the export of pharmaceutical goods between 2000 and 2010.

- Since 2000, Singapore has experienced the following:
- Biomedical sciences employment has increased 2.5x
- Manufacturing output has grown 5x
- R&D jobs have doubled
- R&D expenditure has increased 6-fold
- 7/10 top pharmaceutical companies, and all top 10 med tech companies have regional or global commercial operations based in Singapore.

Parkville Precinct (Melbourne) and Biomedical Research Victoria

Background

Melbourne's Parkville Precinct is home to the University of Melbourne, three major tertiary hospitals, medical research institutes and commercial biotechnology organisations. It is generally regarded as one of Australia's leading biomedical clusters.

The Bio21 Project was established in 2000 by the University of Melbourne, the Royal Melbourne Hospital, the Walter and Eliza Hall Institute of Medical Research and the Victorian Government to promote excellence in education, in basic and clinical research, and to foster biotechnology development in Parkville and its environs. The Bio21 Project has since developed into Biomedical Research Victoria, the state-wide peak body representing the heart of Australia's biomedical research. Biomedical Research Victoria's office is still located in the heart of the Parkville Precinct.

Physical profile

The Parkville Precinct is located on the northern edge of Melbourne's CBD. It includes 25 entities located within easy reach of each other.

As well as the organisations outlined above, the Precinct contains heritage residential areas, urban parkland, playing fields, a golf course, the Melbourne Zoo, the Melbourne Juvenile Justice Centre and the site for the 2006 Commonwealth Games Village.

Areas of research focus

The Parkville Precinct is acknowledged as one of Australia's leading centres for medical and bio scientific research, education, clinical practice, clinical trials and development of pharmaceuticals and biotechnology products.

Healthcare, research and education institutions within the Parkville Precinct together have established centres of excellence in areas including Cancer, Immunology, Diabetes, Neuroscience and Infectious Diseases.

Operating model

The Parkville Precinct itself is not governed or managed by a formal body. However, Biomedical Research Victoria and its predecessor The Bio21 Project represent organisations within the Precinct (and now, across the state) as members.

Biomedical Research Victoria is a not-for-profit company with seven staff. The principal activity of Biomedical Research Victoria is to facilitate biomedical and health research related projects in support of its members and the objectives of the company. This is achieved through creating forums for the exchange of knowledge and promotion of clinical research and its translation; delivering selected state-wide programs; and developing a shared vision to enhance collaboration and build networks to enable Victoria's researchers to work together more effectively and create new knowledge, treatments and products.

Biomedical Research Victoria seeks to add value to its members and the biomedical sector by:

- Working effectively with governments to establish priorities for investment and to inform policy development
- Advising on research strategy and securing funding opportunities (through their Scientific Advisory Council)
- Advancing clinical research and its translation to the benefit of patients and to improve health care services (through their Hospital Research Directors Forum and Victorian Clinician Researcher Network)
- Inspiring biomedical career paths for students (through their Undergraduate Research Opportunities Program)
- Driving networks for shared use of sophisticated research equipment and other infrastructure (with the Victorian Platform Technologies Network)
- Supporting commercialisation (through the Business Development Forum)
- Creating a critical mass in Victoria that's capable of competing effectively with the emerging life sciences centres in the region.

Funding

Bio21 Australia receives revenue primarily from membership fees and government grants. The company does not directly fund research, it rather carries out support and facilitation activity to encourage collaboration and commercialisation of research.

Local environment

The Parkville Precinct is based in Melbourne, in the state of Victoria, which is home to more than 40 per cent of Australia's biomedical researchers.

The Victorian State Government has provided funding to or been involved with Bio21 and Biomedical Research Victoria throughout their existence.

Impacts

Biomedical Research Victoria's website lists the following collaborative projects that have arisen from the Bio21 Project:

Platforms and capabilities (noting collaborating organisations)

- Bio21 Molecular Science and Biotechnology Institute – a multidisciplinary research centre, specialising in medical, agricultural and environmental biotechnology. (Uni Melb)
- Joint Proteomics Facility – focuses on analytical biochemistry and technical developments in protein separation and characterisation, as well as proteomics. (WEHI, LICR)
- BioGrid – provides a flexible and secure method for interrogating multiple data sources where thousands of records of patient data are re-linked across different databases and institutions. (Melbourne Health, Western Health, Austin LifeSciences, Alfred Health, Peter Mac, WEHI, LICR, Cancer Trials Australia)
- Collaborative Crystallisation Centre (C3) – provides the infrastructure to advance the process of protein crystallisation and the production of the crystals required to obtain atomic-level protein structures. (CSIRO, WEHI, SVI, Austin LifeSciences, MIPS)
- 800 MHz Nuclear Magnetic Resonance Spectrometer (NMR) – an instrument with high sensitivity and resolution and can elucidate structures of normally intractable proteins in solution. It complements the capabilities of the Australian Synchrotron and the Bio21 Institute's high resolution cryo-electron microscopy facility. (Uni Melb)
- High Throughput Chemical Screening Facility (HTCS) – enhanced technological capability in high throughput screening and medicinal chemistry, a state of the art automated system and unique collection of 100,000 diverse chemicals for lead compound discovery. (WEHI)
- Facilities for Human Cellular Diagnosis and Therapy (SVI, SVH, MCRI, RCH, WEHI, RMH)
- Bioresources Facilities – A virtual rodent facility with common high health standards allowing transfer of animals across facilities. (SVH, SVI, Austin LifeSciences, Melbourne Health, Uni Melb)
- Victorian Platform Technologies Network (VPTN) – provides awareness of, and access to, the varied platform technologies and expertise across Victoria and facilitates effective research-industry sector linkages. (BioMedVic, Monash Uni)
- Undergraduate Research Opportunities Program (UROP) – gives undergraduate students an early opportunity to experience life in a research laboratory and gain insight into careers in biomedical research.
- Victorian Clinician Researcher Network (VCRN) – provides a forum for clinician researchers to network and explore issues of common interest
- Invisible Hand
- Victorian Cancer Biobank – a consortium of tissue banks to provide researchers with high quality tissue samples and data in order to facilitate cancer research discoveries.
- Victorian Comprehensive Cancer Centre – a world class cancer centre that will bring together eight BioMedVic Member organisations.
- CRC for Cancer Therapeutics – aims to discover and develop new small molecule drugs for the treatment of cancer. The WEHI/Bio21 High Throughput Chemical Screening facility is a major platform for this CRC.
- Life Science Computational Centre of the VLSCI – an e-research centre focusing on computational solutions for life science research (operational model developed following discussions at SAC).

International examples: General references

CIMIT Website: www.cimit.org

A*STAR Website: www.a-star.edu.sg

Biomedical Research Victoria website: http://biomedvic.org.au, including the 2015 Financial Statements

Parkville Precinct Strategic Plan and Government Response 2005/2006