MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

NOT GOVERNMENT POLICY – NOT FOR DISTRIBUTION

SCIENCE SYSTEM ADVISORY GROUP

PAPER NUMBER	SSAG-MBIE-016	DATE	24/05/2024
TITLE	International Scan of Government Initiatives to Encourage the Commercial Application of Research from Public Research Organisations		
RESPONSIBLE MANAGER	Gina Williamson, Manager, Innovation Policy		
AUTHOR/S	Felicity Merrington, Senior Policy Advisor, Innovation Policy Anna Henning, Senior Investment Manager (Commercialisation), Contestable Investments Georgie Herder, Senior Policy Advisor, Innovation Policy Todd Fortune, Associate Policy Advisor, Innovation Policy		
PURPOSE	To provide international evidence on government initiatives to encourage commercial application of research from public research organisations. This will enable SAGG to consider “how we can strengthen and grow commercialisation pathways.”		

International Scan of Government Initiatives to Encourage the Commercial Application of Research from Public Research Organisations

This paper provides a high-level outline of government interventions that aim to encourage commercial application of research generated in public research organisations. It covers initiatives at different points on the continuum from idea generation through the pipeline to commercial outcomes such as license, acquisition, or transfer (noting that the continuum is not strictly linear, and information and incentives can move across it in both direction).

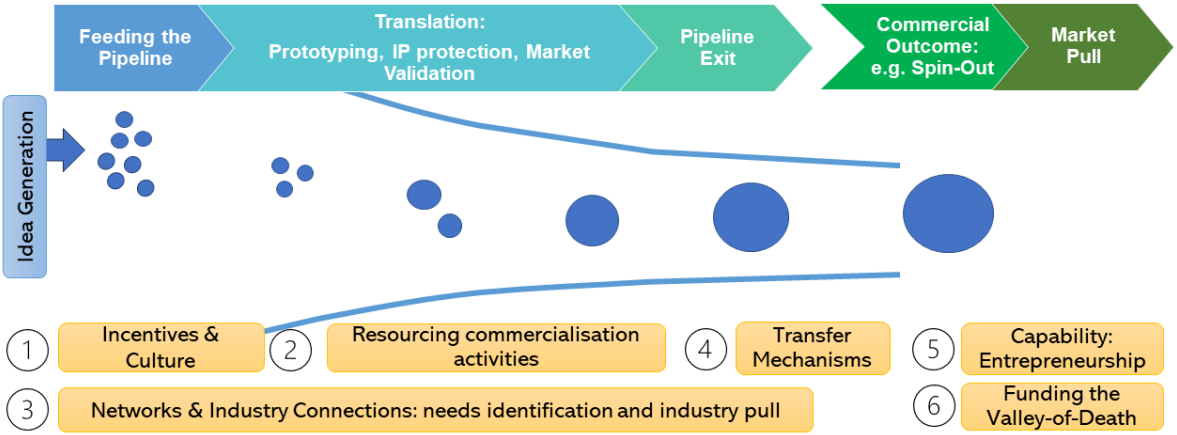
Internationally, countries have taken different approaches, initiatives and interventions to support and encourage commercialisation. This paper examines the interventions countries have implemented at each phase of the pipeline.

This paper is based on a desktop exercise. We have not consulted with experts in these countries to gather information or test how we have interpreted policies. We have selected comparable countries, including small, advanced economies (SAEs) that we think provide a useful overview of successful interventions in this space. Hence this paper should not be read as a comprehensive review of the approach all countries take.

This paper follows an earlier paper providing an overview of interventions in New Zealand supporting commercialisation of research (SSAG-MBIE-010) (Overview of Commercialisation of Research from Public Research Organisations. We also propose to provide to you a paper considering options to improve commercialisation outcomes from public research organisations.

COMMERCIALISATION INTERVENTIONS SIT ACROSS A PIPELINE

The interventions discussed in this paper are organised around the framework below, which presents the continuum from idea generation to a commercial outcome. Each set of interventions seeks to address a particular challenge at a point in this continuum:



1	2	3	4	5	6
IP policies, Commercialisation training	Project or activity funding, TTO resources	Knowledge Brokers & Networks, Clusters/Innovation Centers	Patent Pooling, Standardised agreements, Tech Incubators	Mentoring programmes, student entrepreneurship	Start-up support, Early-stage/Seed to Series A VC funds

For each of the six stages in the diagram, we present an overview of the approach and interventions in a range of countries. The focus is on government interventions at a national level, but where appropriate also refers to approaches taken at an organisational level.

Stage four of the diagram, which relates to Intellectual Property (IP) issues, is not addressed in this paper. We are able to offer further insight to IP arrangements to the SSAG separately to this paper, but have included it in this diagram for completeness of the continuum.

In addition, the table at the end of the paper provides a high-level summary of the different interventions countries implement across the continuum.

INCENTIVES & CULTURE

1	To build a set of opportunities, researchers must create, identify, and disclose inventions. The conflicting incentives created by performance metrics focused on publication, lack of knowledge about the commercial opportunities available from their research, and a lack of strategic support or resourcing for commercialisation functions can pose a challenge to this.
IP policies, Commercialisation training	

Governments may intervene to establish or support a culture and/or incentives that encourage researchers to surface potential commercial outcomes from their research. Examples of a range of interventions, including financial and others are outlined in the table below.

A common government/national approach is to provide a financial incentive or reward for an invention over and above an employee's standard salary. (We note however that these approaches appear less common in the small, advanced economies.)

Challenge	Types of Intervention	Example	Country
Generation	Financial	Direct benefits/returns from the commercialisation process, through employment agreements or Patent Acts	Germany, Thailand, China, Hong Kong, Japan, South Korea, and the Netherlands
	Capability/Skills/ Awareness (covere d in more detail in section 5)	Provision of training to researchers (and in some cases, TTOs) in commercialisation/business	Australia, US, Ireland (TTOs), NZ (TTOs), Singapore and recommended by EU Code of Practice*
	Career progression	Consider IP creation/transfer outcomes in academic performance appraisals	Recommended by EU Code of Practice*
Disclosure	Funding contracts	Require invention disclosure as a condition of funding	United States (Bayh-Dole Act)
Strategic mandate	Financial	Funding to resource/employ staff to operate TTO and/or commercialisation functions	Ireland AND recommended by EU Code of Practice*
	Policy	National guidelines for IP management and/or transfer agreements	European Union, United Kingdom, United States, South Africa

**Note: the EU Code of Practice covers a range of guidelines for enhancing commercialisation and knowledge transfer of PROs*

The Intellectual Asset Management Guide for Universities (IAMGU) hosted by the **United Kingdom** Intellectual Property Office, is an example of a national guideline that aims to help the governance and leadership at universities to set strategies to optimise the process for knowledge transfer and incentivise researchers to be involved in commercialisation.

These activities can also be initiated at the organisational level. A common approach among universities with a top ranking for commercialisation and entrepreneurship is to elevate commercialisation and entrepreneurship to strategic importance. In these organisations, the university funds and resources the TTO to provide commercialisation training to university staff to increase awareness of, and upskill staff on, the commercialisation process. For example, this happens at: Stanford and Utah University (US); Nanyang Technological University (NTU) and National University Singapore (NTU) (Singapore); Cambridge and Queen's University Belfast (UK), University College and Trinity College Dublin (Ireland), University of Auckland (NZ).

RESOURCING COMMERCIALISATION ACTIVITIES (TO ENABLE THE EXPLORATION OF COMMERCIAL OPPORTUNITIES)

2	Commercialisation is perceived as a high-risk activity for researchers and PROs as the gap between completion of research and getting a product to market requires financial resources for projects and activities. It can be difficult to source resources, particularly for a research organisation with an opportunity at the pre-seed stage that is not ready for commercial investment.
Project or activity funding, TTO resources	

To reduce this barrier, governments provide a range of funding support for commercialisation activities to get an invention ready for investment. These include activities such as IP protection, performing market validation, prototyping and further development, or developing a business plan. The target for funding may be either the public research organisation PRO's technology transfer office (TTO) or the researchers directly.

A secondary objective of providing this support may be for the purpose of building skills or relationships with industry (which is also talked about in the capability section below). Finally, these interventions can be used to support the delivery of broader government priorities or strategy (ie, if healthtech was a government priority then commercialisation projects in that space could be prioritised within funding mechanisms).

The table below presents the types of government support for commercialisation of public research provided in the countries studied.

Country	Features of Funding to Support Commercialisation (note, may be across more than one targeted fund)						
	Quantum (low, med, high = 10M, 50M, 100M)	Project Support (commercial activities)	Capability building	Cooperation (Business or PROs) incentivised	Direct vs. Devolved funding	Co-funding required? (low, med, high = 20%, 50%, 70%)	Aligned to Government Strategy
Ireland	High	✓	✓		Direct		✓
Singapore	High	✓	✓	✓	Direct	Low ✓	✓
Norway	Low				Direct		
Finland	High	✓		✓		High ✓	
UK	High	✓	✓	✓	Mix		✓
The Netherlands	Med	✓	✓	✓	Devolved	Med ✓	
NZ	Low	✓	✓	✓	Devolved	Med ✓	

From 2021-27, **Ireland** has committed a total of NZ$181 million for the establishment, equipment, staffing and building capability of regional Research and Innovation offices and related support staff including transfer functions.

The **United Kingdom** government provides the Connecting Capability Fund (CCF), which is a mixture of "formula" (ie, allocation of resources to organisations based on a formula), competitive, and follow-on funding (NZ$31 million, NZ$79 million and NZ$52 million respectively) targeting business

collaboration and explicitly supports the delivery of the government's Industrial Strategy. Following a 2021 review of university spin-outs, the government allocated a portion of the CCF for approaches to sharing TTO functions across organisations, aimed at PROs with smaller research portfolios and a lower critical mass of IP.

NETWORKS AND INDUSTRY CONNECTIONS

3	Commercialisation requires involvement by players from across the innovation system with the relevant domain expertise and resources. Moreover, each project requires a different set of expertise and resources. A lack of connections between different players across the system can lead to opportunities being lost (eg, from a lack of identification of demand) or not being exploited as well as they might.
Knowledge Brokers & Networks, Clusters/Innovation Centers	

To facilitate the building of connections, governments create or support institutions that increase interactions between players across the system such as entrepreneurs, firms, government agencies, academia, public and independent research institutions, and other SI&T system actors and supporting organisations. These institutions include:

- clusters: nation-wide activity of SI&T and sector-specific actors formalised by government.
- centres: a single location or building where the activities happen.
- network of hubs: regional hubs throughout the country making up the network.
- innovation: enabling or engaging in the continuum of innovation activities such as R&D.

Many countries have introduced policies designed to spur the development of clusters as part of their industrial, innovation, and development policy agendas. These policies are often designed to crowd in foreign direct investment, venture capital investment, industry, and researchers.

Our initial analysis has shown that government-supported clusters are often sector-specific. An organisation may be appointed by the government to manage either all national clusters or a specific cluster. New Zealand does not have a national cluster initiative, nor something similar to the sector-specific cluster.

Examples of government interventions relating to clusters, centres, and networks of hubs

Cluster Excellence **Denmark** is a private organisation appointed by the Danish government to lead the consolidation of numerous regional and national clusters into 13 government-supported sector clusters to increase sector effectiveness and reduce duplication efforts.

Singapore's Biomedical Research Council is a sector-targeted national cluster initiative. They oversee and coordinate public sector biomedical research and development activities in the biomedical cluster. Specific initiatives to develop this national, sector-specific cluster includes targeted headhunting of scientists, public funding for research institutes and science centres, building human resource capability in universities and government centre capital for private-sector industrial projects.

In the **United Kingdom**, Innovation and Knowledge Centres (IKCs) are based at universities and act as knowledge brokers. IKCs are also aimed at providing research and infrastructure access to small and medium sized enterprises (SMEs) that would not have otherwise. There is also a focus on technology readiness and pushing emergent technologies.

In **Israel**, the National Infrastructure Forum for Research and Development (TELEM) is an innovation and knowledge centre promoting R&D activity in the scientific and technology fields nationally and

internationally. They achieve this by consultation and coordination between the Forum's member entities on issues relating to R&D: initiating, coordinating and assessing the pooling of resources; and coordinating responsibility of national R&D infrastructure establishments and operations.

Type of Intervention	Country
National active clusters	Denmark (CED), Norway (Norwegian Innovation Clusters)
National emerging clusters	Singapore (ITM), Ireland (Project Ireland 2040)
National sectoral cluster	Singapore (BMRC)
Nation-wide network of regional hubs	United Kingdom (IKCs), Ireland (Technology Gateway Programme), Netherlands (Valorization Program), Switzerland (Swiss Innovation Parks), New Zealand (NZFIN)
Regional centre	Israel (TELEM), New Zealand (NZPA)

ENTREPRENEURIAL CAPABILITY

5
Mentoring programmes, student entrepreneurship

Entrepreneurial capability is crucial for the commercial application of research but the relevant skills (ie networking, business management and planning, communications and marketing) are not usually developed by researchers in research organisations or given the skills to connect with others with the necessary capabilities.

The government interventions that address the lack of entrepreneurial capability include funding support, network access, and building entrepreneurship capability for current and up-and-coming entrepreneurs or founders, including both faculty and students. They can also involve giving researchers the skills to connect with others with the necessary capabilities (rather than developing all the entrepreneurial skills themselves). All of the countries analysed target students, whether undergraduate or postgraduate.

Looking across a range of countries, capability building is seen as integral to and sits alongside almost all funding supports and stages of intervention across the commercialisation pipeline. This means that there is some crossover between these interventions, and those in section 2 above on resourcing commercialisation and the next section (6) on 'funding the valley of death'.

Another way to build entrepreneurship capability is to use visas to incentivise highly skilled professionals to move and contribute to the commercialisation ecosystem, although we do not explicitly examine those types of interventions in this paper.

Examples of interventions to build entrepreneurial capability

Ireland's New Frontiers programme is targeted at founders interested in starting up new businesses. The programme offers connections into a community of founders and experts, building confidence and capability, and capital support package worth over €40,000. As part of a wider capability development strategy, students are the prime target for entrepreneurship education activities in universities and industry training organisations, whereas startup support is more oriented towards researchers, professors, other staff members, alumni, and people from outside of universities.

Universities in **the Netherlands** have knowledge exchange as a core function outside of teaching and reach, proven to be crucial in growing a sustainable entrepreneurial ecosystem. The Dutch have a well-established and strong infrastructure that supports entrepreneurship and private-public relationships in regions where universities are located.

FUNDING THE VALLEY OF DEATH

6
Start-up support, Early-stage/Seed to Series A VC funds

Research commercialisation often requires specialist skills and equipment that come at a large capital expense. However, traditional investors are cautious about investing in these assets while the opportunity is still high risk. The 'valley of death' is the gap between the point at which research funding and support has been exploited and private-market investors are willing to provide capital.

Governments operate VC funds, or provide financing to private VC funds, to support the startups that are seeking to commercialise new opportunities. They look to support or incentivise a higher appetite for risk and willingness to invest into early-stage research.

It is common for governments to intervene in the VC market via a partnership approach. Most governments tend to take a sector-neutral approach to investment in VC funds (ie, not setting up VC funds for particular sectors such as healthtech, climatetech, etc.) with some exceptions, where they have looked to support particular sectors or make connections through to wider government priorities and strategy.

Technology incubators are another intervention at this stage of the pipeline. These are covered in more detail in another paper you are receiving, *Government functions that support innovation in New Zealand and peer countries* (SSAG-MBIE-017).

As noted in the section above, government interventions in this space often provide capability training and funding at the same time, in acknowledgement that navigating the 'valley of death' requires both.

We have not covered it in this paper, but it is also important to consider wider policies around investment at this stage and beyond as startups become established (ie tax policy, workforce for startups).

Examples of government interventions funding the valley of death

Main Sequence Ventures is a large VC fund established by **Australia's** largest research organisation, CSIRO, with over NZ$1 billion in managed funds. The primary target is funding to support commercialising R&D results for both national and international investors. Main Sequence also promotes the Four-Founder model, whereby startups are incorporated with researchers and organisation, industry partner and VC together. Main Sequence Ventures states that they have created over 2,100 new jobs, with the market cap of companies they have invested in growing to over NZ$7.4 billion.

HOW COUNTRIES IMPLEMENT INTERVENTIONS ALONG THE COMMERCIALISATION PIPELINE

This paper outlines some of the primary interventions that are implemented by countries at each stage of the research commercialisation pipeline. However, countries are not implementing these interventions in isolation. The following table provides an initial high-level assessment of how different countries put together the 'package' of interventions.

	High Medium Low Not enough information Government Supported Interventions, by Type					
	1. Incentives & Culture	**2. Resourcing Commercialisation Activities**	**3. Networks & Industry Connections**	**4. Transfer Mechanisms**	**5. Capability: Entrepreneurship**	**6. Funding the Valley of Death**
Ireland	Knowledge Transfer Ireland Training National IP Protocol	€65m National Challenge €33.4m Knowledge Transfer Boost €17.8m Fund the Future	Knowledge Transfer Ireland 17 Tech Networks 4 Business Hubs Enterprise Ireland Technology Gateways (17 Gateways, 3 Clusters)	National IP Protocol IP Protocol Resource EU Transfer Guidelines* 7 Tech Incubators	€28m Innovator's Initiative €40k New Frontiers Accelerator	€HBAN, 177M
Singapore	National IP Protocol T-Up programme	Gap Funding POC Funding POV Funding	Biomedical Cluster ITMs 6 National Cluster	National IP strategy** A*Star Open Innovation A*Star Headstart 14 Tech Incubators	Start-Up Enterprise-Development Scheme	ESVF Scheme AI.SG Technopreneurship IF
Israel		Seed Incentive Program MAGNET Consortiums Bi-National Funds	Israel Innovation Authority TELEM Users' Ass. R&D Infra. Angel Investor Clubs	New Venture Creation – Incubator's Fund	Ideation (Tnufa) Incentive Program	Startup Fund Fast-Track Funding Yozma 2.0 Fund Early Stage Companies Incentive Program

	High	Medium	Low	Not enough information		
	Government Supported Interventions, by Type					
	1. Incentives & Culture	**2. Resourcing Commercialisation Activities**	**3. Networks & Industry Connections**	**4. Transfer Mechanisms**	**5. Capability: Entrepreneurship**	**6. Funding the Valley of Death**
			9 new Regional Innovation Centers			
Norway		FORNY2020 programme	Norwegian Innovation Clusters			SINTEF Venture V
Denmark			Cluster Excellence Denmark 13 National Clusters		Denmark Start-Up	Denmark Start-Up
Finland		NZ$244m until funding ended 2017	Strategic Centres for Science, Technology and Innovation		Start-Up Grant	BFVC and FIIL Start-Up Grant
United Kingdom	IAMGU National Guidelines Founder transition to/from Spin-outs	£126.4m Connecting Capability Fund	7 Innovation Knowledge Centres	IAMGU National Guidelines Easy Access IP	Doctoral internships with TTOs/Spin-outs/VC firms	Innovation and Science Seed Fund
Netherlands	Collective Labour Agreement		Valorization centers	EU Transfer Guidelines*		
Australia	$370M Trailblazer Universities Program IP National Framework	Economic Accelerator (AEA) Early-Stage Commercialisation grants Commercialisation and Growth grants	8 Innovation Hubs	CUREator BioMedTech Incubator Easy Access IP (e.g. UNSW)	CSIRO's ON Program National Industry PhD Program Industry Growth Program	Main Sequence Brandon BioCatalyst

	High Medium Low Not enough information Government Supported Interventions, by Type					
	1. Incentives & Culture	**2. Resourcing Commercialisation Activities**	**3. Networks & Industry Connections**	**4. Transfer Mechanisms**	**5. Capability: Entrepreneurship**	**6. Funding the Valley of Death**
		$370M Trailblazer Universities Program				
New Zealand	CPN Workshops	PreSeed at NZ$9m pa CPN at NZ$4.3m pa	Callaghan Innovation NZ Product Accelerator NZFIN	4 Tech Incubators	KiwiNet's Emerging Innovator Programme Return on Science's Momentum	Brandon BioCatalyst NZGCP with Aspire NZ Fund (NZ$150m), & Elevate NZ (NZ$300m)

*EU Transfer Guidelines Technology Transfer Block Exemption Regulation (TTBER) and accompanying Technology Transfer Guidelines (TTG) = Better license the use of patents, know-how or software held by another company to produce goods and services. Includes patent pooling.

**A*Star indicates the National IP Strategy is a guide, but not a force of law for the purposes to provide a friction-less process