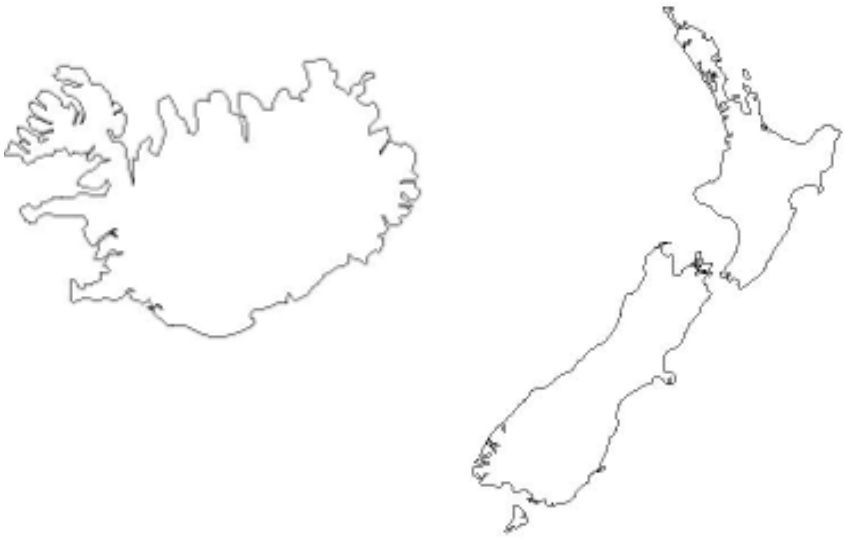
Small and remote: *Getting more shots on goal*

Observations from Iceland
August to October 2012



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This document contains opinions and is not a policy or an academic document. My thanks to the generosity of the Icelandic entrepreneurs and their supporters and to those that helped me here in New Zealand, in particular Sir Owen Glenn through the Glenn Family Foundation and the team at New Zealand Trade and Enterprise. Hopefully this effort benefits both countries.

"New Zealand must embrace science in order to be a truly innovative nation. We have not yet answered the question of why science is so important to all of us. New Zealand is a nation struggling to keep its head above water. Our economy is underperforming, social problems are mounting and New Zealanders are frustrated by their inability to build a better country. We are on the threshold of amazing times. The nations that are prepared to create the environment for people, institutions, technologies and businesses to be a part of this are going to find the future a wonderful place." Quoting Massey University Vice-Chancellor Feb 2012

"Our second priority this term is to continue building a more competitive and productive economy... Over time we will be adding more initiatives that contribute to building a better environment for business growth... The public sector will become more innovative, efficient and focused on delivering what New Zealanders really want and expect." Prime Minister Key March 2012

Author with Iceland's President Ólafur Ragnar Grímsson at Bessastaðir, the Presidential Residence

Executive Summary

Innovation-driven wealth creation is a crucial element in every economy, yet there is little agreement on how to best stimulate, measure and support technology entrepreneurship. New Zealand has actively sought solutions from many nations -yet few nations are similarly advanced, small and remote.

This document contains the findings of an investigation into innovation-based growth in Iceland, another remote and small advanced economy that is succeeding. Between the two countries there may be sufficient insight to set about improving economic performance through innovation.

Being small and remote, New Zealand has no better analogue than Iceland. Reduction of challenges facing innovation companies down to geographic fundamentals of scale and remoteness is a useful method when searching for fresh, yet applicable thinking from outside New Zealand. It tells us where to look.

Unsurprisingly, Iceland has remarkable similarities as well as divergences from which New Zealand can learn. Of particular interest is Iceland's entrepreneur-led recovery and understanding how Iceland is able to grow large companies from a very small base.

The mission was as much about uncovering New Zealand's unique path, as it was an investigation into Iceland. While each nation's history and culture is heavily path-contingent, opportunities for learning are present. However, simply duplicating solutions without carefully adapting them invites unintended consequences.

The work was undertaken over a seven-week period and explored Iceland's innovation ecosystem mainly via discussions with active and successful entrepreneurs and other key figures including the President of Iceland.

Key findings:

- New Zealand is almost completely missing a key driver of growth to scale in innovation companies
- New Zealand might investigate creation of capital-providing mechanisms and access talent to fund greater growth in certain companies as Icelanders have
- New Zealand might benefit by encouraging more successful and experienced people to actively engage and take companies internationally from New Zealand much faster
- New Zealand can learn from Iceland's collaborative models to achieve enabling changes in the overall environment
- New Zealand might benefit from a targeted approach supporting growth in a small handful of high potential firms concurrent with the wider `business as usual' approach for all firms
- New Zealand has an opportunity to build the first deliberate system-level national infrastructure to drive performance in innovation companies and create an unfair national advantage

Key achievements:

1. Seven week immersion in Iceland's innovation environment specifically investigating how it functions from the perspective of the value creators rather than policy teams
2. Established a connection point between the two countries and built a network and relationships in Iceland
3. Identified opportunities to improve outcomes from innovative companies and make this repeatable
4. Recalibrated what New Zealand's endgame might look like by uncovering the potential for larger sustainable technology companies

Understanding New Zealand's unique approach is the first step toward exploiting and improving the advantages. The obvious extension is to look to similar nations to try to establish and better understand these patterns. By identifying and enhancing advantages and minimising disadvantages, New Zealand can learn to play its own game better.

Background

To prosper in a world of large emerging powers, small open economies (SMOPECs) like New Zealand must work harder to access markets. SMOPECs are more exposed to economic turbulence because they are less diversified and more open to the global economy. While New Zealand can be fast and flexible, being exposed and increasingly marginalised is not where we want to remain. (After Skilling 2012)

- New Zealand is `sliding down a cliff' on many key performance indicators (OECD, WEF, GEM, UNCTAD)
- There is an increasing disconnect between our aspiration and reality
- More revenue means more choices with regard to health, education and communities
- The global economic situation is rapidly becoming more challenging and likely to worsen
- We recognise the need to shift to a diversified higher value-added economy but don't know how
- We frame the challenge poorly, tuning into inappropriate signal – opportunity cost
- We are at the crossroads and need to confidently secure our future in the global economy
- We are remote and subscale. New Zealand will never be a large marketplace
- Being remote and subscale determines strategic options for innovators – defining factors
- We can learn from successes of other SMOPECs who are remote

Leverage point: innovation and entrepreneurship

These are important processes that yield money, jobs and confidence. Top line revenue into NZ is redistributed through taxation and spending, converting to other goods such as healthcare, education and community support. The balance of these helps underpin our real wealth and wellbeing as people. Jobs also redistribute wealth through earnings and taxation and provide a sense of contribution.

Growth of technology firms is the focal point with the highest potential to put New Zealand ahead. We have limited resources so must apply this carefully to creation of highest possible return on inputs. Technology is usually higher-value and diverse (unique) in nature. It can boost existing competitive elements (like dairy) in our economy or exploit new niche and/or emerging markets. (Hogenbirk & Narula, 1999)

- Only technology can earn >$1m/job, dairy $350k/job. Standstill for NZ is $120k/job (Callaghan 2011)
- Young companies disproportionately bring new technology to market –valuable jobs (Kauffman 2012)
- Young high-growth firms (~1% of all companies) account for 10% of net new jobs (Kauffman 2012)
- Top 1% of all growth firms account for 40% of net new jobs created in any given year (Kauffman 2012)
- High value industries of tomorrow may not exist today - doing nothing is dangerous
- Over time and as industries move to scale, NZ's advantages are eroded – must keep moving

The average taxpayer would simply want to know that support is getting to the people and companies that can make the biggest difference to the community and New Zealand as a whole. It would be interesting to poll laypeople and have them nominate and rate attributes of ideal innovation companies. It is likely that attributes such as number and quality of jobs created and

sustained, the amount of taxable profit earned and the duration (longevity) of these benefits would be highly rated attributes.

But no clear ideal exists for which firms might contribute the best return for New Zealand. No clear plan exists to make sure that younger versions of these firms fill incubators and receive disproportionate support. Questions of which firms will endure in New Zealand ownership and create hundreds or thousands of high-paying technical jobs and which firms will exit early have never been definitively answered.

It is established consensus that New Zealand needs to focus support on innovative companies. But we have yet to form a consensus on what the end-game companies look like. The debate needs to become more sophisticated so that we better understand the rationale of why we should support companies that are likely to exit early, while we focus differently on the companies that are likely to offer a deep and long-term benefit to New Zealand.

How these two concepts fit together is very important. New Zealand does not need to choose; in fact our model, which is already evident now, relies on doing both. We do need to design the environment to achieve more of what we want and better understand how to do this.

Currently we treat all innovation companies as if they will travel an identical road. It is little wonder then that New Zealand's incubators are heavily populated by apps, web and other consumer propositions, rather than deep IP or capability plays or companies exploiting some unfair advantage arising from New Zealand. The latter group are not well served by the wider environment which is passive at best.

Given the political importance of economic growth, and therefore innovation (which supposedly drives growth), it is surprising that the environment would be only passively supportive of the companies likely to benefit the economy the most.

It is also surprising that there is little measurement of innovation and entrepreneurship and such little effort is put into communication and design feedbacks within the existing ecosystem to ensure that programmes and interventions are fit for purpose and not counter-productive. In a small country it is disproportionately easier to coordinate efforts, so there is little excuse for not doing so.

New Zealand's economic growth challenge

"To create the conditions that enable an increase in the number of fast-growing job creators or to enhance the pace at which the most successful firms expand." (Kauffman Foundation 2012)

New Zealand requires valid, pragmatic input to actively create culture, habits and structures that will grow top line revenue. This will be defining for our next few decades. Our future isn't what it used to be. Creating solid strategy is a good start, but isn't enough on its own. We must build culture and habits to action these strategies and tie these to clear and strong motivation. This

touches on the need for compelling vision, which New Zealand lacks on a widely held basis. Our challenge is cultural more so than structural.

While input from experts in large markets or even other non-remote SMOPECs can create opportunities and create strategic options, the highest value input will be from others who feel our pain and are succeeding in spite of being small and remote.

Table 1: Examples of how being small and remote affects strategy (not exhaustive)

Key Fact	Impact	Observation	Strategic Implication
Small	No home market	Internationalise early	Under-resourced c.f. competitors
	Small resource base	Niche play, avoid competition	Develop `unfair' advantages
			Seek niches unattractive to others
	Large corporate structure less common	High specialisation in workforce rare	Important skills are rare and may not be valued in the first instance
		Corporate disciplines rare	Frequently start on doomed missions
			Frequently start and create value. High attrition
	Tight social graph `petri-dish' effect	People can be readily accessed – new combinations can arise	Market/industry boundary crossing innovations and new combinations arise comparatively easily. High attrition
			Value can be quickly proved – or not
		Value relationships over business disciplines	Cannot only rely on relationships and networks over disciplines in large markets – need both
Remote	Frequently lack Relationships in markets	Time delays to establish relationships. Hard from a distance	Can slow growth until bridged with time in market or hiring-in local relationships
	Lack of market Sophistication	Often lacking first hand experience. At worst `guessing' about the market.	May lead to sub-optimal execution. Can slow growth while learning or hiring in market experience. Risk increases but can yield `wild card'. High attrition
	Inconvenience factors e.g. trade, cultural, distance, cost and psychic barriers	`Islander mentality' - sense of apartness from the world. Creation of lower commitment strategies to reduce risk, capital requirements and the need to leave New Zealand	More partnering Less ownership of value chain Value left on table Shorter time horizon Greater likelihood of exit

Others who feel New Zealand's pain

Other advanced countries that are small are numerous. Those that also have appreciable elements of remoteness are few. New Zealand and Iceland are the standout examples, but arguably countries such as Finland, Israel, Singapore and Ireland might also suffer some aspect of remoteness or isolation. All of these countries contain a comparable population and are advanced.

While we can learn from all of these countries and look at innovation in isolation of other cultural aspects, it is important to remain aware of the `path-contingent' nature of many successes and failures. In a more generalised sense, New Zealand has broadly more in common with Ireland, Finland and Iceland, than Israel and Singapore whose histories and culture are not as similar.

Iceland and New Zealand: a comparison

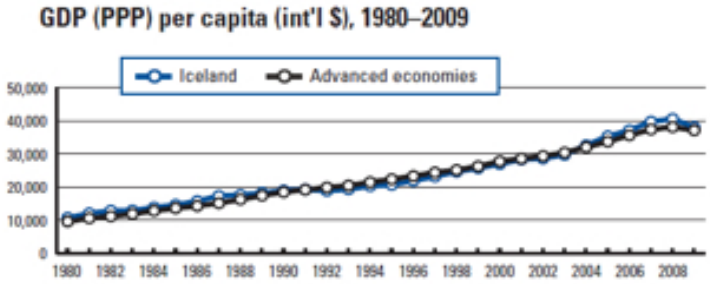
One of only a very small handful of remote SMOPECs, Iceland has remarkable similarities to New Zealand but also key divergences worthy of attention, most notably their crisis in late 2008. Iceland is an enviable society, even after their financial meltdown. Their innovation-led recovery is underway, and compared with New Zealand they are a more productive, equal, long-lived and wealthier society. Iceland is not perfect and 2008 was an enormous setback that has left a deep scar. Like New Zealanders, Icelanders have traditions of self-reliance and inventiveness from having to make do. The following quote might have been written for either country;

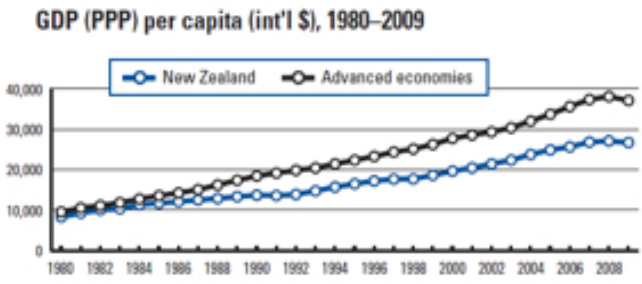
"Lines of communication are short, and key people are accessible, and little bureaucracy, together with a small and transparent market, make it easy for entrepreneurs to start a business. Expanding to foreign markets is difficult as they are both distant and different in nature from the Icelandic market, in the view of the experts." 2002 GEM Report

Some key facts about Iceland follow;

- Internationally rated as among the most innovative nation on the planet
  - Ranked 1st INSEAD 2010 Global Innovation Index (GII)
  - Ranked 1st WEF 2011 for firm-level tech absorption
  - Global Entrepreneurship Congress Award 2010 for best entrepreneurship movement
  - President Grímsson led MIT Global Startup Workshop (GSW) in 2010 in Iceland
- Also remote innovation-driven SMOPEC (WEF, GEM)
- Very similar economic challenges, potentially greater than New Zealand's
- Have national plan forged from severe crisis; burning platform and a reason to succeed
- Well-progressed with innovation-led recovery supported at Presidential level
- Leader in applying tech to food (fisheries & lamb), geothermal and aluminium smelting
- Icelandic firms are born global with no choice; very few follow the Uppsala growth model
- Proves size does not matter when investing in growth abroad where firms focus carefully
- Patterns of growth in new and emerging niches; have dominant Multinationals, examples being;
  - Össur: Orthopaedic design firm named Technology pioneer for the year 2006 (WEF 2011)
  - Promens: Largest rotational moulding group in the world
  - Marel: Multinational food processing tech firm. 3900 employees in 30+ countries
  - Actavis: 5th largest generic pharma. 11,000 employees in 40 countries and sales of €1.4 billion

Fig 1: Iceland in leading pack of advanced nations – New Zealand lagging





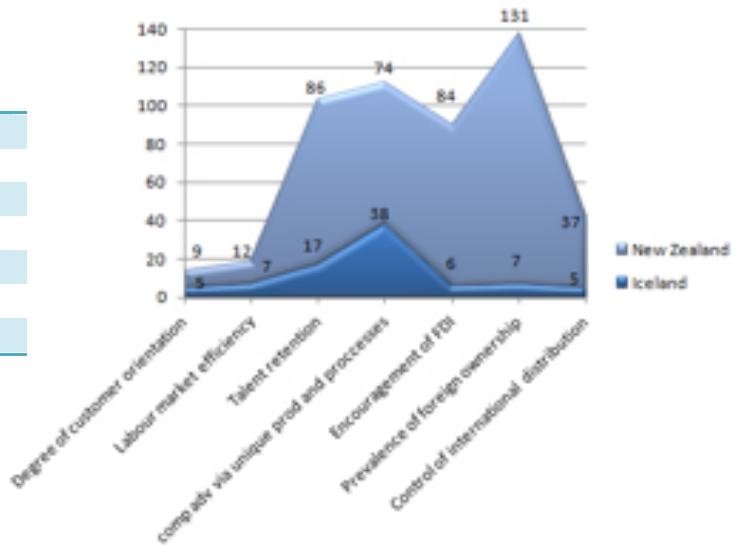
According to the World Economic Forum, in 2011 Iceland and New Zealand both ranked very highly in customer orientation. But Iceland has greater labour efficiency and far greater talent retention. They apply talent to high added-value products – an area where New Zealand does poorly overall. Icelanders make more money in shorter working hours per year.

Of huge importance is foreign direct investment (FDI). Up until recently Iceland was investing almost 60% of its GDP in outward FDI (OFDI), a much higher proportion than any other OECD nation (OECD, 2006). This is critical, as this is the mechanism by which companies in other SMOPECs grow to scale. OFDI appears to be completely lacking from New Zealand's vocabulary. We rank extremely poorly in the encouragement of OFDI, falling well outside the range for advanced economies. At the same time, New Zealand is the third most open economy for imports (WEF 2011).

Related to this, New Zealand has one of the highest rates of foreign ownership prevalence on the planet. This is startling. Iceland is far better at controlling international distribution; possibly due to tight integration arising from their seafood competence (40+% of GDP). In 2005, approximately 75% of the revenue of companies listed on the Iceland Stock Exchange was generated abroad, a figure not equalled by any country since then.

Fig 2: Key indicators, World Economic Forum (WEF) 2011 Ranking of 139 countries

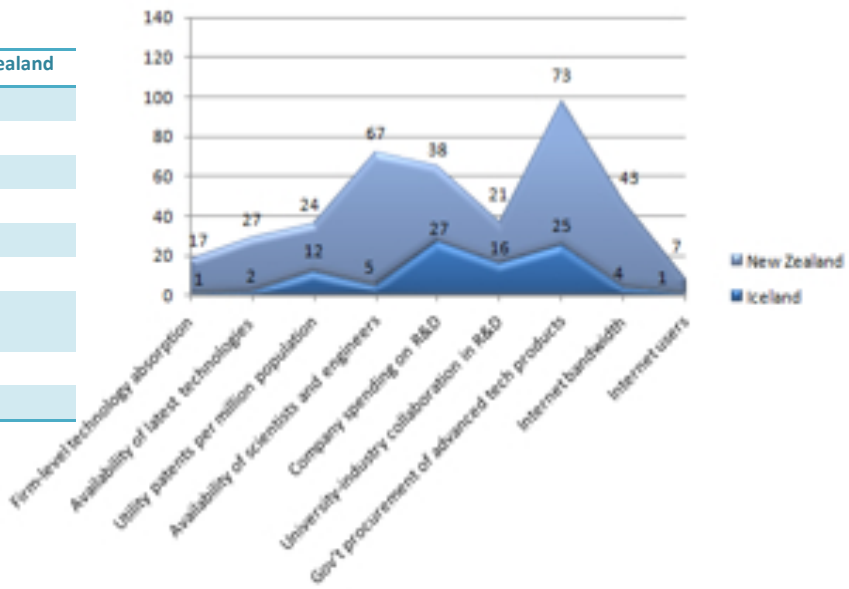
	Iceland	New Zealand
Degree of customer orientation	5	9
Labour market efficiency	7	12
Talent retention	17	86
Comp adv via unique prod and processes	38	74
Encouragement of FDI	6	84
Prevalence of foreign ownership	7	131
Control of international distribution	5	37



The WEF rate Iceland as best in the world for absorption of technology into firms. They have greater availability of technology, patent in a more focussed manner and their firms have better access to scientists and engineers, even though proportionally more (20%) of these skills are in Government institutions. Only 11% of this group in New Zealand are tied to Government (OECD 2011). They are doing a superior job of efficiently focussing their science and technology into company innovation and success. Their system is fitter than ours in terms of commercialisation.

Fig 3: Innovation indicators, World Economic Forum (WEF) 2011 Ranking of 139 countries

	Iceland	New Zealand
Firm-level technology absorption	1	17
Availability of latest technologies	2	27
Utility patents per million population	12	24
Availability of scientists and engineers	5	67
Company spending on R&D	27	38
University-industry collaboration in R&D	16	21
Gov't procurement of advanced tech products	25	73
Internet bandwidth	4	43
Internet users	1	7



Of concern for the human resource pipeline in New Zealand, is a comparatively high (47.6%) but **dropping** percentage of graduates to population of university age people. Iceland is in the top handful in the OECD at 63.1% and **increasing** (OECD 2011). This has future workforce implications.

At the firm level, Iceland has been outspending the OECD average (2.34% GDP) on R&D at 2.65% of GDP leaving New Zealand well behind at 1.18% of GDP (OECD 2011).

Although currently changing, New Zealand Government lags the advanced nations group in the procurement of technology. This has productivity implications, results in a loss of early customer opportunity for tech companies selling into Government and also indicates that Government has little present affinity for technology companies, despite their importance in the economy.

The 2012 WEF Competitiveness report was published In December 2012 after visiting Iceland. While comparative placings remained largely similar to 2011, Iceland did move up one place to 30th overall. Despite their recent difficulties, Iceland continues to benefit from a number of clear competitive strengths such as their excellent educational system at all levels and innovative business sector that is highly adept at adopting new technologies for productivity enhancements.

The Iceland mission

The purpose of this broad non-academic mission was to spend several months immersed in the Icelandic Innovation ecosystem to investigate how elements within the environment stimulate and support individual entrepreneurs. Critically, it is from the viewpoint of the value creators – the entrepreneurs and CEOs with additional input from other key figures in their ecosystem.

Iceland is an interesting country for New Zealand, spending time there to look for opportunities where New Zealand might improve its performance was the entire point of the exercise. If being small and remote is central to New Zealand company strategy, then it is important also for Icelandic company strategy. It was also a chance to reflect on what strategies New Zealand might focus more on, what is working for New Zealand now, and how to optimise and share our strategies amongst ourselves and do better.

There were four requirements to making the most of this opportunity;

1. Understanding the challenges facing New Zealand's technology companies so that promising solutions can be recognised and evaluated when considering Icelandic experiences
2. Perceived independence and useful to entrepreneurs in Iceland – not too high-level or official
3. Allow sufficient time for patterns to emerge from conversations and relationships to develop, even if simply to reach the right people through word of mouth

This is a novel approach, honing in on a country that New Zealand has little knowledge of. The focus is technology entrepreneurship from the entrepreneurs' perspective as the creators of opportunities, jobs and wealth. This is very different to brief, top-down evaluation of policies by people who do not work with entrepreneurs every day. It takes time to identify the true influencers, and it takes time to listen carefully.

While some facts have been gathered, most of this document is opinion formed during the mission and coloured by constant daily interaction with hundreds of New Zealand entrepreneurs over the past decade. Facts can later be gathered on areas of interest as necessary to build arguments or as an academic exercise. This mission was more about going, observing and reflecting. It's a chance to connect ideas and try to get to a more coherent understanding of how we can do better.

Objectives

1. Spend two months in Iceland building an understanding of how New Zealand might lift its game while being immersed in the aspirations, challenges, successes and failures of another small remote nation.

2. Several months understanding Iceland's Innovation ecosystem from the entrepreneurs' point of view, documenting key learnings for New Zealand from a country recognised internationally for innovation, yet with remarkably similar constraints and challenges to New Zealand.

3. Specific intelligence on how Iceland supports technology entrepreneurs with investment, R&D funding, incubation and cultural initiatives, along with other success factors that contribute to the Icelandic ecosystem as important background.

4. 30 interviews with Iceland's leading entrepreneurs and key influential figures within the technology business segment.

5. Build relationships of interest for New Zealand where there may be need for further investigation and make linkages.

Operations

The base was a desk at Innovit, Iceland's main business incubator at the University of Iceland in Reykjavík. This environment was highly relevant to the mission but was chiefly useful as a `network connection point' into larger Icelandic technology businesses. Almost all meetings took place at the premises of these businesses.

The series of conversations were strategic and around key competitive themes to uncover the relative advantages and disadvantages of the Icelandic approach, and how these play out for tech companies in Iceland.

Several initial relationships were established prior to departure to provide a starting point. Local networks were accessed to filter and reach top entrepreneurs and key influencers.

Each meeting was also an opportunity to present New Zealand's experience and situation in a two-way discussion. Outside of the main effort, an opportunity was taken to speak to an auditorium of entrepreneurs and to attend a business roundtable lunch (as guest/subject) to discuss the mission with eight highly influential business leaders. A contribution was made at a `Ministry of Ideas' session also, a session joined by a Fast Company Magazine journalist from the US.

The group interviewed consisted of entrepreneurs, CEOs, investors, advisors, Government investors and the President of Iceland who has long been a champion for innovation in Iceland. Meetings were conducted with the following people (further detail on the people and their organisations are at APPENDIX B);

1. **Margrét Ásgeirsdóttir**, Innovation service manager, Landsbankinn
2. **Ari Johannesson**, Chief Technical Officer, Sprettur
3. **Eggert Claessen**, Manager, Frumtak investment fund
4. **Dilja Valsdóttir**, Project Manager, Innovit
5. **Ragnar Kormaksson**, CFO, Innovit
6. **Erling Gudjohnssen**, CEO, Liveshuttle
7. **Hilmar Gunnarsson**, Partner, Investa and Director of Mint, Meniga, Datamarket, CAOZ, Gagarin
8. **Dr Gisli Hjálmtýsson**, Partner, CEO and Director of Thule Investments
9. **Gunnar Harðarson**, Founder, Co-owner and Managing Partner, Arnason Faktor

10. **Arnar Ólafsson**, CEO and Founder/Owner, Cloud Engineering ehf, Founder at Datatracker
11. **Gunnar Holmsteinn**, CEO and Founder, CLARA
12. **Frosti Sigurjónsson**, Director, Arctica Finance
13. **Halldor Jörgensson**, Country Manager, Microsoft
14. **Skuli Morgenssen**, Founder, Oz, Owner/CEO WOW air, billionaire
15. **Dr. Eyjólfur Guðmundsson**, Chief Economist, CCP Games
16. **Georg Ludviksson**, Co-Founder and CEO, Meniga
17. **Ólafur Harraldsson**, CEO/owner Designing Reality
18. **Stefán Karlsson**, COO and cofounder, Controlant
19. **Kristján Kristjánsson**, CEO Innovit
20. **Helga Valfells**, CEO, NSA Ventures
21. **Dr Eyþór Ívar Jónsson**, Managing Director, Klak
22. **Bala Kamallakharan**, CEO, GreenQloud
23. **Guðjón Már Guðjónsson**, Founder of Oz, Ministry of Ideas and 5 other organisations
24. **Ólafur Ragnar Grímsson**, President of Iceland
25. **Ornolfur Thorsson**, Secretary General, Office of the President of Iceland
26. **Jói Sigurðsson**, Angel Investor, Investa and Senior Staff Software Engineer, Google
27. **Thor Gunnarsson**, VP Business Development, CCP Games
28. **Orri Hauksson**, Managing Director, Federation of Icelandic Industries
29. **Asgeir Kroyer**, VP Corporate Finance, Arion Banki
30. **Einar Gunnar Gudmundsson**, Corporate Development, Arion Bank
31. **Bjorn Vikingur Agustsson**, Senior Adviser Technology and Innovation, RANNIS
32. **Sigurdur Bjornsson**, Head of Innovation and Development, RANNIS
33. **Helgi Hjálmarsson**, Managing director, Valka
34. **Dr Hilmar Bragi Janusson**, Dean, School of Engineering and Natural Science, University of Iceland - Vice President of Research and Development, Össur

Opportunity Areas

What follows are areas of overlaps in the many conversations, and reflections/implications arising from these conversations where themes began to present themselves. Below are the areas that may present opportunity for New Zealand to lift its game should there be sufficient will and cohesion.

The third phase of growth

When speaking to Icelanders in technology related business there is a broad awareness of financial instruments and the ability to use them to grow companies very large. The technology companies that have grown large in Iceland have all been through periods of aggressive acquisitions. In particular Actavis, Marel, Össur and Promens. What is interesting is that all four companies have a three-decade history, much of which was spent in relative small scale.

Both New Zealand and Iceland are prolific starters of companies. In fact the WEF in 2011 rated the two countries first and second respectively. Both countries use their small scale and interconnectedness to quickly hatch businesses and prove them up, often calling on friends and family in the process. Because both countries are advanced nations, from the outside, this early progress appears compelling. In the context of a large economy it would be. This first phase of growth is the most straightforward for both countries and is typically dominated by the technical aspects and disciplines. We are good (to a fault) at this part.

In both countries, companies heading into the growth curve requiring internationalisation suffer very heavy attrition. The second phase of growth requires teams to absorb sales and marketing disciplines and usually involves internationalising early without the support of an established home market. Furthermore, companies are typically under resourced financially and more critically, lack a strong and experienced team. There is almost always a significant cultural disconnect between the team and the market.

Of the comparative few that make it onto a solid growth curve in the second phase, the majority of companies will exit to an offshore buyer. However, a small handful over some decades will develop some deep advantages relating to unique country-specific positioning (fishing in Iceland, Dairy in New Zealand) or possess a deep intellectual property position (e.g. Össur 700+ patents). Of the technology companies that succeed in the second phase of growth, it is this group with unfair advantages that have potential to enter a third phase of growth. Icelanders seem aware of this potential from day one, New Zealanders do not seem aware and eventually exit nearly 100% of the time without an aggressive third growth phase.

The third phase is financially driven growth that leverages some unfair advantage. Like New Zealand, Iceland is inherently a niche player, lacking the resources to take on large players in large markets head-on. If a company truly owns a niche and is the best at what they do, then extending aggressively into new and emerging geographies is a logical step, provided there is the motivation and culture to do so. Icelanders are aware of the methods of financing such expansion and have access to these skills. In contrast, New Zealanders have a very low awareness and understanding.

Each phase of growth requires new competencies taking a company from the statement “we’re good at technology” to “we’re good at technology, sales and marketing” to “we’re good at technology, sales, marketing and finance/M&A”.

If New Zealand is serious about being a niche player and exploiting innovation globally to achieve significant returns to the shareholders and nation, create thousands of valuable jobs and build our reputation, then serious effort needs to go into this gap in New Zealand's `vocabulary'.

Given these patterns typically takes decades to play out, this would mean deliberate education and skills interventions with leading technology companies that have already established an unfair advantage as a starting point. Many will not have the hunger to go further but a small handful may.

What will be critical over the long term is that work is begun to close this gap now with education for people studying and those just beginning technology businesses. If people are completely unaware of this potential then they will not imagine it as a possible path for their businesses. New Zealand may actually already have some success stories that could be revisited in light of this to place emphasis differently.

In 2011 the World Economic Forum rated New Zealand as the third most open economy for imports as well as having the eighth highest foreign ownership of companies. Clearly we are achieving a high inward FDI but our outward FDI is out of balance. Sophistication and having a globalised view means taking a stake in businesses offshore as well, to balance the stake that other countries are taking in New Zealand. It should be more like a `conversation'. The macro picture fits with this propensity of New Zealand technology companies to exit before undergoing this third phase of growth that is so much more worthwhile for New Zealand.

Icelandic teams intentionally grow their technology companies through acquisition to seek markets, rather than simply looking for a buyer as they build distribution. They have a habit of acquiring their distribution and owning more of the value chain – the WEF rated them 5th overall for control of international distribution in 2011 and 2012. At 37th place New Zealand stands to learn from Iceland in this regard. Famously, Iceland owns the rights to take fish from the sea, turns those fish into high-value finished products and sells them into European High Streets via Supermarkets also owned by Icelandic firms.

Back in 2002 Benito et al wrote a paper arguing that Multi National Corporates (MNCs) from smaller economies have a higher propensity to internationalise than firms from larger home economies. Hogenbirk & Narula had already concluded in 1999 that MNCs from small countries tend to be competitive in a few niche sectors as a result of their limited resources and a preference to engage in activities in a few targeted sectors rather than spreading the available resources thinly across several industries.

Icelandic companies prove that size does not matter when investing abroad. It does not matter that the economy is small or that the firms are small in the beginning, if they focus on investment scope, speed and specificity, they might have a more efficient external growth through FDI/acquisitions.

Pension funding of growth to scale

New Zealand has an opportunity to look closely at Iceland's Enterprise Investment Fund (EIF). It is a model for investing into mature and proven technology companies to fund financially driven growth and scale to help New Zealand's technology companies achieve their full potential. Iceland proves that growing more technology companies towards $1B in revenue is completely achievable. There is no expectation for these companies to challenge large consumer giants, it simply means making the most of global niche opportunities.

The US$432m Iceland Enterprise Investment Fund (EIF) was created in 2009 by sixteen Icelandic pension funds representing about 64% of the total assets of pension funds in Iceland. Other groups have since joined the EIF. The stated aim of the EIF is "participating in and shaping the financial and operational restructuring of the Icelandic economy" and follows the collapse of Iceland's financial system and the failure of its major banks in 2008 which generated a pressing need for revitalisation of the Icelandic economy. By investing in promising Icelandic companies in all economic sectors it seeks to build strong companies with the potential of becoming leaders in their respective fields while generating sound returns for investors. By law the pension funds cannot directly invest in private technology companies.

Many of the large, successful and growing Icelandic technology companies have received significant investments from the EIF. This provides the resources to expand and make acquisitions offshore. This activity is contingent on the skills available to execute such a strategy.

As many of the other sources of growth capital have dried up from international sources, most notably from Icelandic investment banks post 2008, the EIF has become a lifeline to maintain a progression on growth opportunities and job creation in Iceland.

Interrelated are the issues associated with taking technology companies public. While EIF investee companies are frequently also public companies, accessing public markets is seen as far too distracting and heavy in compliance for growing technology companies. As a growth funding mechanism, the Icelandic exchange is viewed to be failing technology companies – arguably also stock market investors, as these are frequently the most competitive opportunities in which to invest. On balance, since 2008 there has been decreased levels of investing in public markets and trust in regulators is at a low point.

Getting public investment into growing companies that have an unfair advantage remains a large opportunity for Iceland as well as New Zealand. It is not an opportunity that should be ignored from those in Government wishing to see New Zealand do better. The EIF model may be a useful starting point.

If the upside of growing technology companies to scale was more widely recognised here in New Zealand in real terms of jobs, income, foreign earnings, tax base and standard of living and we had a

clearer model of how the growth could be achieved (thanks to Iceland), then perhaps there might be the motivation to create a more coherent strategy for growth.

One key conclusion from Iceland is that this growth to maximum possible scale for niche technology companies is expensive and the capital and skills need to be readily available.

Further investigation of the EIF model including time to build relationships with the keys figures and `personalities' might yield the tactical know-how to create such a mechanism in a country like New Zealand. The people are easily identified and are accessible through the network.

Building links to offshore investment and skills

Investment is required to achieve scale. In most cases, the large Icelandic success stories in the technology sector grew organically for decades before reaching an investment `platform' status. Availability of the capital and skill was essential to the growth. Local investors in Iceland play a significant role in this regard through their connections and provide infrastructure.

Speaking with many active Icelandic funds, a clear focus on international relationships was apparent and striking. This level of focus on international relationships and sharing of these is not as readily evident in New Zealand. The people in Iceland's funds see themselves as generally skilled at preparing and nurturing growth opportunities in their portfolios, but acknowledge that not much can happen until foreign investors bring their skill and money to the table. They work very hard to maintain linkages and relationships with funds in the US and Europe, particularly Scandinavia.

Through these relationships, Iceland has enjoyed high rates of reciprocal inward and outward foreign direct investment in recent times. This arguably might lead to a more sophisticated `conversation' rather than unbalanced inward foreign direct investment, as is the case in New Zealand.

In the current climate and with currency controls, maintaining the `bridge' is a difficult task as not much activity can take place. The `Islander mentality' is returning. Any opportunity to maintain relationships are taken and current activities like Seed Forum and StartUp Reykjavík are the only lights in the darkness, creating opportunities for Icelandic venture capitalist to visit funds such as Union Square Ventures in New York.

In Iceland, large amounts of growth funding are now mostly unavailable, it's hard to be that better funded company. Icelandic payments company Handpoint won `best in show' recently at a European trade show and is considered one of three industry thought leaders. Yet they're possibly a full order of magnitude behind direct competitors in growth funding. Handpoint are currently raising growth funds outside of Iceland.

So where to get the growth money? Iceland is not one of the world's venture funding hubs. Accessing local seed and early expansion money is one thing, but the serious money required to dominate even a niche market is unlikely to be available from the remains of the Icelandic banks that are risk-averse and a bit jumpy. Venture funds including the Icelandic Government's own funds are tapped out and still holding assets that were marked for exit years ago. The Government is not going to provide significant growth funding.

And IPOs are problematic. Iceland's stock exchange reflects low public opinion of financial markets after the collapse of 2008 that saw a 76% fall upon reopening. Listed companies fell from 75 to eleven. Being part of the European Economic Area means universal stock exchange regulations are overkill for the small to medium sized companies that make up 99% of Iceland's businesses. It takes reasonable scale just to cope with the regulatory burden.

Little wonder that pension funds are topical in Iceland. By law these funds are not able to directly invest growth funds into promising unlisted ventures. Yet this is the only potential source of funding that is significant enough to significantly benefit Iceland. Even if the legal situation changed, there are debates on investment timeframe and risk matching. Technology ventures can require patience and are often high risk.

While the EIF (discussed page 17) is largely pension fund money, this tends to form large strategic investments in expansion opportunities rather than growth funding.

Local early investors need a return and this is unlikely to be achieved within Iceland. It's highly unlikely they can meet their targeted returns by exiting to another local company or investor. Local investors will try to access significant growth funding as a key milestone, and it's usually far more than money they seek from offshore funding partners. Venture funds in particular have a mandate and a finite fund life. The fact that the industry is well supported by Government in Iceland indicates that Government accepts many exits as a logical consequence.

Several investors in Iceland commented that activity should be predominantly seen as investments in people, keeping channels alive and creating opportunities. Even if Iceland were to lose $20M each year this would be worthwhile in their opinion.

Getting the balance right is important. Accessing capital outside of the country often initiates the almost inevitable transition to foreign ownership. It's a logical progression based on the fact that a small country may have neither the funding, nor the exit opportunities. Getting funds often leads to a loss of local ownership but the growth and experience is still viewed as being a positive even if more Icelandic ownership would maximise returns from successful companies.

Many companies choose to grow organically, or not to grow at all and enjoy a sustainable lifestyle business. This is valid if all shareholders agree this early on. Generally, making the most of the potential opportunities requires investment to achieve competitive velocity.

Loss of ownership is debated in Iceland. Good or bad, it may simply be a progression that arises from being small and remote. Until there are large amounts of capital available from local sources, for example pension funds or a vibrant share market, this progression will continue even where some companies could grow to far greater scale and be sustainable from Iceland.

Perhaps seeking outside money is just that little bit more obvious to Icelandic society, meaning that they are a little less surprised when a local company exits. Perhaps it helps that the wider population has greater financial sophistication following the crisis.

Maintaining Icelandic ownership is a vexed issue in that there is a balance to be struck with foreign investment and eventual offshoring of Icelandic companies. The counter argument is that the

growth, jobs and wealth creation won't happen at all without the capital, so a share of the benefit is better than nothing.

If foreign investment or acquisition is accelerated through the activity of local investment, which may be totally appropriate, then the opportunity to scale up `unfair' advantage niche plays under Icelandic ownership and control may be lost. The majority of technology companies are unlikely to develop an `unfair' advantage in any case and an exit is usually a good outcome.

This does highlight the need for local sources of capital to be available if more benefit is to be retained locally. High-value niche `unfair' advantage companies will not require enormous sums by global standards anyhow, – it may be achievable to fund such opportunities from a small country. But the mechanisms need to exist to do so.

In the meantime, there is worthwhile activity, growth and learning to be had with capital from outside sources while domestic sources of capital are purposefully created.

The focus on capital can obscure the far more important and scarce resource of skill and focus that often comes with investment. If domestic capital were to completely crowd out foreign investments into Icelandic companies, then the skill, attention and caring from the right people in the large markets of the world may be excluded. This massively increases the risk of a poor outcome. Clearly a blend of foreign money and skills also allows for the domestic capital to be spread (diversified) more widely also. Getting the balance right is important.

Angel and institutional investors in Iceland are unanimous on the need for the interest, talent and capital from people and teams who know how to execute in large markets. It is seen as a key milestone in any Icelandic technology company's roadmap. That is why relationships with foreign investors are so highly prized in Iceland – it is difficult to succeed without them.

Icelanders appreciate their cultural disconnect, and what that means for risk around executing in large markets. Having buy-in from proven teams changes everything. It is a big part of how they operate and is implicit in most company strategies.

New Zealand could review its performance and the maturity of the debate around this area. Because of a variety of factors including external global events, New Zealand's Venture Capital industry is not enjoying high levels of activity currently. While Iceland is in a very similar position, they continue to find ways to engage and maintain the relationships. This may be happening in New Zealand also, but given the importance of this mechanism to economic growth, appropriate resourcing, education and focus on this area should be carefully considered.

Other ways to build and maintain important international connections might also be investigated. The LARTA CEO, Rohit Shukla visited New Zealand around 2005. At the time, Rohit was building

what became the Global Bridge programme. This has since gone on to become a network centric approach to link companies and countries together to access key resources `as and when required'.

Network-centric approaches are the contemporary solution to the problems that Michael Porter's clusters have been unable to solve in small countries that do not have significant industries. Interestingly, Porter visits Iceland often. Cluster theory is debated in Iceland, the only clusters are either so small as to be an informal group of five companies who knew each other well anyway, or be marginally larger but so broad that it is a `one-size-fits-none' approach limiting value to members.

Building dedicated cluster infrastructure requires significant effort and is `hard-wired' to some extent. Network-centric alternatives are `just-in-time' methods of finding collaboration partners. The cost/benefit equation of clusters may be quite different in sub-scale nations no matter how attractive clusters may seem.

Deliberately building New Zealand's connectivity to the world is a far bigger opportunity than sourcing capital. There is an opportunity for the Government to be a catalyst in building the connectivity as a public good. At New Zealand's scale it is realistic. This is broader than the opportunity on which KEA has been executing for a decade now, and it is broader than the existing Governmental channels. Entering networks via relationships or a trusted process like LARTA needs evaluation.

New Zealand technology firms are not yet placing enough value on international connections. Because many companies may not be aware to even ask for these connections, it does not mean that they are not required for growth and stimulating opportunities as well as breaking open the mind-set.

Establishing better infrastructure for companies that are ready and understand this (probably VC portfolio companies) is one step. Systematic sharing of stories and experience, along with educating people is the longer-term commitment to closing the gap. It takes time to shift the business culture across New Zealand.

Successful people engage and take companies international quickly

Related to the value placed on experience from within large markets, a key accelerant across many earlier stage technology companies in Iceland is the pressure to become established offshore as early as possible. In Iceland, innovation companies are founded the usual way, typically with the technology first and occasionally starting from a market need, then connecting to the technology as enabler. Early-stage companies benefit from the Icelandic environment for validating and establishing credibility, but generally early capital for growth is required from angel investors.

In Iceland, the active angel investor group appears to know each other very well (many derive their wealth from the same small handful of success stories in a `family tree' effect). The consensus amongst this group is to make founders establish themselves and a team in their large market almost immediately. The thinking is that they will never be ready and it's always going to be easier to keep selling to friends and family or at least selling via your network.

Education of entrepreneurs is beside the point, if founders knew all of the implications of raising capital beforehand some would choose to avoid this. Most do seem willing to go and build their companies, but they would be otherwise `strong-armed' to leave by their investors anyway.

As for venture capital, not every company is a candidate for this type of activity, but the majority would like to be. Iceland also has companies with distinct advantages arising from being in Iceland. There are companies growing genetically modified barley in geothermal hothouses on barren lava fields. The climate and terrain guarantee containment. There are companies leveraging their world leading fishing industry. There is a company providing carbon-neutral data centre access arising from geo and hydrothermal assets. As in New Zealand, there are also companies that have created their own unfair advantages through intellectual property. These companies are not the type that need to leave so abruptly.

While not perhaps a deliberate national strategy, the Icelandic angels as a key group are actively executing on a strategy that is working at the individual firm level. They support each other and work vigorously. While any of them could choose to play more golf, each of them has achieved success in large markets - they work hard to show the next wave of entrepreneurs the ropes.

The angel scene is far less hyped in Iceland; there are no organised groups. The people that are involved appear to be highly skilled and relevant. They are also very hands-on. It would be interesting to review angel investment in New Zealand and examine quality over number of investors and capital availability. Many of the most relevant skills and experience do not participate in angel groups. Some of these people may not even consider themselves investors. Perhaps if greater focus went into matching skill and focus rather than placing money, more pressure might go onto the things that count for growth.

At present, it is possible these people are being lost in the noise of angel activity and valuations that allow entrepreneurs to take `soft' money when it is the experience of a harder taskmaster that may count in the end. There is a large opportunity cost in getting this wrong.

The picture in Iceland appears to be one of dedicated and highly skilled investors who are at the top of their game, leveraging their skills, relationships and money to show others the ropes. It is a way of life for them.

While this naturally occurs in Iceland and attention might be drawn to this critical piece of the growth puzzle, it is difficult to know how it might be deliberately emulated. It seems far too important to ignore.

Perhaps it is as simple as bringing several of their most impressive angels here to share this at an angel event to get people and companies thinking. Perhaps a local organisation may take up the role of better matching skills to companies ahead of the money. These subtleties actually make an enormous difference to the outcomes in Iceland. It is simple and pragmatic but has a disproportionate impact on risk and execution. It is a small and remote strategy and one that New Zealand ignores to its disadvantage.

Grassroots and mixed models

The Icelandic reaction to the adversity of their financial crisis in 2008 was not to immediately look to Government for solutions. They felt Government was largely to blame for what happened by allowing institutions to become weak and failing to put in place appropriate checks and balances on the finance industry.

During periods of rapid change, structures that are hard-wired for efficiency like those in Government struggle to adapt fast enough. What was particularly interesting in Iceland's collapse was that the entrepreneurs stepped in and played a role. Their skillset is generally better oriented to rapid change.

Iceland has no tradition of large Government, while the basics are all taken care of, people otherwise tend to solve many of their own issues as individuals and groups. It does help that Icelanders are highly cohesive (98% Icelandic) and have a long tradition of collaboration required to survive on the Arctic Circle for a thousand years.

In Iceland it was evident that the lines can be blurred significantly between who is `inside' or `outside' an organisation. Many of the people stepping in to help pick up the pieces after the disaster were high net-worth and extremely successful entrepreneurs and business people. There seemed to be no sense that it was the Government's role to fix everything.

Therein lies an opportunity for New Zealand to find ways to co-opt the skillset and human resource required to use innovation to change our economic future. The productive sector is unlikely to be told or led by Government alone in any case. Real collaboration and communication recognises the respective skills, capabilities and roles. In periods of rapid change, the entrepreneurial skillset is particularly valuable and allows execution to far outpace the speed of policy, which may be busy solving yesterday's issues in the current environment.

In Iceland, the people with the credibility and insights cared enough to make themselves available. They found a way to connect with a bigger plan. They were not looking for jobs and did not want to be paid. They are busy, successful and wealthy and took satisfaction from their contribution. New Zealand is filled with these people. Government seldom talks to them meaningfully.

Iceland has one potential model for engagement called The Ministry of Ideas. This non-partisan think tank brings people together across many areas of life including business, the arts, academia and politics. It has received attention from Governments around the world. Fast Company Magazine recently sent a reporter to investigate. The people driving The Ministry of Ideas are highly productive and credible entrepreneurs. It is Iceland Inc. This group can do and say things that Government can't do and say.

And yes, Government in Iceland does find that mildly threatening, but there are many interconnects and key projects are progressing between Government and this group.

In New Zealand, there are many opportunities to involve highly skilled people around the core missions of many Government and non-Government organisations. NZTE Beachheads programme is the best example, and some years ago TechNZ (now Callaghan Innovation) had a Reference Group making investment decisions (this became untenable). None of these people get involved for money as the primary motivator. That would automatically make them the `wrong' people.

In 2013, it does seem unreasonable that Government officials and their policy people should know all of the answers. Perhaps it's time for innovation and borrowing ideas from the non-profit sector to increase engagement in New Zealand. It is worth exploring groups like the Ministry of Ideas to get things done differently, arguably better, faster and at a fraction of the cost.

It is no coincidence that one of the first initiatives for The Ministry of Ideas was to try to get the people of Iceland on the same page. Following the crisis, The Ministry of Ideas (a group of high profile entrepreneurs) used social media to catalyse a national assembly of 1,500 attendees who worked through Iceland's challenges, came up with opportunities and forged a new vision for the country.

It's worth relating some key factors behind The Ministry of Ideas;

1. Crisis is the mother of innovation
2. Politicians have in the past been afraid to embrace crowd sourcing as they believed that others would be doing their job – or in other words: they would lose their power
3. Old fashioned politics kept decisions and information hidden
4. If an `open source' process is trusted, it effectively selects the good ideas

Iceland's Constitutional Council used social media to crowd source the constitution by collecting input and amendments from ordinary citizens. This also required politicians to push some of the power back out to the crowd who ultimately own the power anyhow.

To quote President Grímsson; "In the aftermath of the financial crisis, we realized that this wasn't just an economic or a financial crisis; it was also a social, political and judicial crisis. If we were going to allow the nation to regain its strength and position, it wouldn't be sufficient to deal with it in traditional economic and financial ways. We needed a different democratic approach."

Iceland was forced to pioneer new solutions when they suffered the biggest relative financial catastrophe in history in October 2008. They were forced to examine the intangible and important contextual factors upon which their economy was seated. Convening a national conversation about who they are, what they stand for, and what will be their place in the world is a sensible starting point.

The outcome was a revised national constitution, a document that had lay unchanged since 1944.

This crowdsourcing resulted in a collaborative vision for Iceland out to the year 2020 which in turn feeds directly into the formal recovery plans which are also documented. People talk about the plan and they think about it. They're able to interpret and organically add to the plan in meaningful and unforeseen ways. A good example might be the major Icelandic bank that established innovation grants for start-ups, and employed staff to help with connections, education and mentoring of early stage businesses. All consistent with the plan, no further instruction needed.

Icelandic models of inclusion offer a competitive advantage and reduce the risk and consequence of wasting resource. They are better able to tap into the wisdom within their population and have interesting ways of doing this that are working.

This is a natural area of opportunity for New Zealand also. But in the absence of a real crisis, this might require Government to open its doors, instigate more collaboration and be brave enough to adopt some mixed models. The missions of most Governmental organisations are not exclusively the domain of the organisation and may be keenly felt by others in a position to contribute. At the very least, grassroots initiatives need to be nurtured.

And this has been the subject of a World Economic Forum project undertaken by KPMG over eight months and involving more than 200 leaders and experts. There are interesting conclusions for Government. See: http://www3.weforum.org/docs/WEF_FutureRoleCivilSociety_Report_2013.pdf

What Iceland does in this regard is not expedient. But it is powerful, resilient, inexpensive and sustainable.

One $1B technology company

In Iceland there is a lot of talk about the Oz Communications family tree. Some years ago, an entrepreneur actually mapped the tree but is now living in Silicon Valley and a copy could not be sourced for this document. The point is, if you can create one big success story the future becomes more `path-contingent' around that – it changes the future. It is the clear difference `before' the $1B company became successful and `after'.

Creating one big success spells it out for people; it captures the imagination and attracts people. It is the effect that Microsoft had on Seattle and Fairchild Semiconductor had on an early Silicon Valley. To a more limited extent it is the impact that Oz Communications and Decode Genetics had on Iceland.

Arguably in Silicon Valley, the first "tree" was Fairchild Semiconductor (1957) which begat Intel (1968) which begat Apple (1976) and Oracle (1977), which begat Sun... then Twitter (2006) and Zynga (2007), which begat Square (2010), Dropbox (2008), and many more." (Wamda)

In Iceland, some institutional investors believe that performance should not be measured on portfolio internal rate of return (IRR) and that on the basis of IRR at the national level it makes no sense to invest in technology. The argument is that the real return is from investing in the people to create opportunities. Even if money is lost, there is still a benefit as up to 85% gets spent on team and there is little loss to Iceland.

Oz Communications was the first Icelandic company where everybody interviewed had to have a college degree. While it burned money for five years, it was also the first time there were more than 100 people solving real computer science problems. They would hire all the best people, more than half of the available graduates over a five-year period. While many mistakes were made, most people learned something and learning is the enduring value. Oz Communications is an exemplar because of the family tree it begat and is credited with changing the mind-set of an entire generation.

In contrast, Decode was a massive disappointment. Not because of the money that was lost or because the company didn't do well for a time. The company started in 1995 and hired 500 PhDs, moving 250 foreigners to Iceland. This was a chance to create so much more than just Decode. It could have been the start of many family trees. Most of the foreign PhDs have now gone, along with 1/3rd of the Icelandic team.

More positively, CCP Games is now 700 strong and is looking like a contender for Iceland's next $1B technology-based business.

Icelanders understand the progression of companies up the growth curve (through the third phase) to scale and eventual move to foreign exchanges where tax is more favourable. In the case of Iceland, this process is being heavily accelerated by currency controls making capital extremely

difficult to get, so long as the company is `Icelandic'. Blame is also being levelled at an uncompetitive tax regime also driving large companies like Actavis (5th largest generic pharmaceutical manufacturer) away. Actavis sold last year following a move away from Iceland.

There may be a more sophisticated view in Iceland on the value of `embeddedness' – a company's place within an economy, the value that flows, and the desire to extend the time this value flows for as long as possible.

Creating a single large and visible success is critical to wealth creation and producing skill within the local human resource, much of which will spill over into new ventures that raise capital from founders of the original successful company. Visible success is the most powerful way to send a message of what is both possible and desirable. Beneficial feedbacks include drawing an influx of investors and talented people leading to further shots on goal.

Perhaps the most direct path to meaningful achievement in technology as a nation is to focus on creating a single amazing success story. As a strategic element, it need not interrupt broad efforts across hundreds of companies. It certainly does not mean that New Zealand should stop building an ecosystem to support any growth company.

It might mean a small team of highly connected, skilled and well-resourced people working with a handful of companies that have the foundation and ambition to reach $1B status. It would require a completely different focus as `facilitator' of inputs and activities involving global and local sources and a willingness to do whatever it takes. A mind-set of working across any infrastructure or boundary to achieve this goal would be required.

This would not be an alternative to the business as usual of existing `infrastructural' organisations such as Callaghan Innovation and NZTE. It requires an entirely new model to ensure that the appropriate skills are on-board. The closest existing analogue in New Zealand might be venture capital but the incentives are quite different as they are rewarded by liquidity events (often exits) and are not independent.

Building a system-level view

While there are many disadvantages that relate to being small and remote, there are also unique advantages. One of them is that certain strategies are achievable at the scale of New Zealand or Iceland.

Visitors to New Zealand and most textbooks reflect the Uppsala model of company growth. At the individual level, most entrepreneurs may think that this is the path that they are starting out on. Yet one by one, the majority will find out that the patterns from small remote countries are different, and those that are successful will mostly exit. Others will finish the journey they started.

Recognising this, and playing a small remote game in an optimal manner is a wake-up call and in many ways a relief, as the odds of playing `by the (text) book' and winning are long. Winning actually requires playing to advantage to some extent. Doing this well is what will sustain a way of life, create opportunities for next generations and pay the bills. While New Zealand does attract back some of its talent (often to raise children), cultural `stickiness' alone is not enough. A pipeline of excellent opportunities is what keeps talent in New Zealand.

Perhaps the furthest-reaching insight arising from time in Iceland is the possibility of building an `operating system' that sits atop and leverages the various pieces of public and private infrastructure in the innovation ecosystem. In Iceland it appears obvious, but the implication is that it is entirely possible in New Zealand also.

Bala Kamallakharan, CEO, GreenQloud had several conversations with Brad Feld in Iceland about a systems level view and this thinking also formed part of a book released in late 2012. The discussion here in this document goes back to 2010 conversations with key figures in New Zealand and formed part of the motivation to visit Iceland.

A deeper proposition than what Feld discusses exists. The opportunity is for systematic national-level measurement, learning and optimisation to use innovation resources in a far more targeted manner. Like an operating system, this would comprise a learning system sitting atop existing programmes, but would bring them all together in an increasingly intelligent way to `make the boat go faster'.

It would make areas that are working well clearly visible, along with deficits in resource, process or environment. From such a system, a clear view of `the game' as New Zealand plays it well, will emerge and improve. There are a handful of people who already know what to design for.

Such a system pitches a data-driven collaborative model against the opinion of individuals (however influential) and short-term political needs. Better arguments enable better decisions for the greater good, over the longer term. Creating solid opportunities for generations of New Zealanders over the next few decades is a core challenge that cannot be left to short-term processes.

An operating system would be a core piece of 21st Century infrastructure that would underpin New Zealand's competitiveness for coming decades, possibly longer. Because it is a vision that only a small handful of nations might pursue immediately, it could become the factor that uniquely secures New Zealand's future place in the world as did refrigerated shipping (1881) and dehydration of whole milk (1930's) in the past 130 years.

Explaining examples of success as some extension of New Zealander's unique innovative DNA only encourages the attitude that it is an entitlement to remain an advanced and competitive nation. It reinforces that New Zealanders need not work hard and build the habits that we will need for the future. It ignores the need to understand the success and replicate it time and again.

In the future, as demonstrated by countries like Singapore and Israel, the critical resource will be each other, along with the systems that allow collaboration on high-value opportunities. New Zealand might carefully question past habits built around New Zealand's own emerging `resource curses' and begin to operationalise collaborative habits and work hard towards new goals.

The nations with which New Zealand will compete are working hard to educate their populations and put them to work on the highest possible value opportunities. The playing field is becoming level, yet countries like Iceland and New Zealand continue to be very small players, suffering from scale factors and other disadvantages. The time for creating the next successful strategic advantage is wasting.

Scaling the population in either country is unlikely to be a successful `me-too' response to scale challenges. Increasing population is slow, creates additional pressures and may undermine or dilute the source of unique strengths. It is a strategy that ignores a `way of life' and asserts that economics is the most important thing of all.

Motivation to do better is strong when building a nation or coming from a very low base. This becomes more problematic from nations of `advanced' status. Iceland's crisis offers interesting motivational value, and formulating a clear vision to do better in the future is difficult where people's needs seem mostly met for the time being. In the absence of clear and widely held goals, there is something to be said for investing in smart systems that operationalise meaningful targets and begin to build habits and momentum.

In fact, New Zealand is banking on better performance in the future and is already spending money on that assumption. It follows that the work to build the foundations for this future performance must be undertaken as a serious priority. It is not equitable to spend future money now without ensuring that it can be affordable in the future. Doing so would violate the social compact between generations.

A system level view offers a completely different perspective on the world, taking existing patterns that are working for small and remote nations and deliberately amplifying them. The system identifies strategies to mitigate the downsides. The system takes the firm-level process view and cuts across existing silos immediately without the requirement to endlessly re-engineer structures. An economy is only as strong as firm-level execution. Measuring and improving execution is fundamental.

Switching from an infrastructure-centric view to a focus on taking each individual and company through an increasingly refined process is potentially where a small country like New Zealand might get a competitive step-change. Preferably before the rest of the planet catches on that high-value, knowledge-rich companies create the greatest return on resource.

Arguably, New Zealand has been discussing this publicly since the build up to the Knowledge Wave Conference in 2001. Without measures, New Zealand will never know what has been achieved over baseline for all of the energy and money expended thus far.

Small remote nations are niche players. High-technology niche exporters will be increasingly important. Advantages and disadvantages in small remote countries play out differently in company strategy. Systematically understanding and optimising these patterns creates new and unique competitive advantage that may be difficult or impossible for large nations to emulate.

Creating a real operating system in New Zealand is an `unfair' idea for the rest of the world. It is an approach that builds on culture and strengths of being small and connected. It would be easier again to achieve in Iceland, but at that scale it may not be possible to resource appropriately.

More specifically, this is about creating a system that measures the right things, learns from a collective view of performance and adjusts accordingly. It is not software nor is it a funding programme. It probably includes a team of people with toolsets and the right culture.

The point of having an operating system is that for a very small scale and limited resource, New Zealand gets disproportionately more shots on goal. At the same time, if operationalising means the shots are becoming more accurate, then the nation begins to pay more than lip service to innovation and its long-term benefits back to New Zealand.

This is about building 21st Century infrastructure that uses our resources more effectively and allows us to manage what is important. If people were arriving in New Zealand only now, then dams and roads would be built and fibre would be laid to create the basic infrastructure that enables the country to function and earn a living in the world. The 21st century is about human capital and knowledge, and no concerted attempts seem to have been made to build appropriate infrastructure for the most important resource of all – people and culture.

New Zealand could continue to be overtaken and continue to slip. New Zealand could wait for other nations to build new infrastructures that confer further advantage. Most advanced nations are at a scale that makes this difficult; even if they understood the opportunity as laid out here. New Zealand is at a point where fresh competitive advantage is possible, leveraging past progress and creating a vision for taking next steps.

It is unlikely that this is a role only for Government, as it will require a mix of entrepreneurial skills and possibly best practice from non-profit and volunteer sectors. It may be Government's role to catalyse and support such an institution, but it is critical that such an important competitive function sits well clear of short timescales and interference.

Getting started requires the right team of resourceful people around the table to create the blueprint and a business case. Because this is New Zealand, the names and phone numbers of these people are already known. Creating the frameworks is not an impossible task for the right people, yet would be hugely rewarding. These people may not require payment.

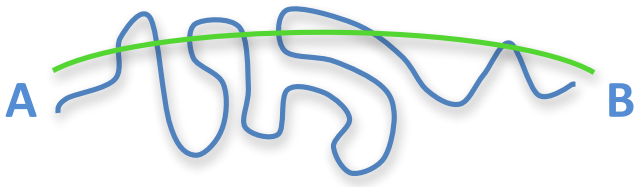
Operating the framework long-term will take resource, but should be seen as a core element of New Zealand's future. It might be aligned to private investment models and have other resource available from private and community sectors. It might be established as a non-profit or institutional foundation for best practice and heavily populated by the entrepreneurs themselves.

Israel has built a unique model and has its unashamed cheerleaders. They cannot be criticized as underselling the Israel story. New Zealand needs to build something unique on our own strong foundations. And New Zealand also needs cheerleaders for our own amazing and unique story. It isn't rocket science to systematically organise rocket scientists and increase their success rate. As Lord Kelvin said "If you cannot measure it, you cannot improve it." Right now we are attempting neither.

Without an operating system, companies seem to repeatedly take in the order of seven years just to get to the stage where they are promising growth opportunities. In Iceland, there is data that innovation companies take 13 years to succeed – this number does not consider the attrition rate. Whatever the case, speed to success or failure is a key metric. An operating system would need to quickly fail opportunities and recycle talent. By reducing `time to finding out' to two to three years, New Zealand would more than double the shots on goal.

A blueprint is required for a system that can straighten the line overleaf in Fig 4 between starting point A and target opportunity point B. The system would also help to establish what the opportunity really might be.

Fig 4: Accelerating through more efficient pathways in innovation



Such a system helps firms to locate themselves on a growth curve, opens up the horizons and sorts the companies with `fast' trajectories from the relatively rare firms that have the potential to grow very large and contribute thousands of valuable jobs over some decades.

While Government and the average citizen may picture innovation companies to be world-beating, long-term providers of well-paid jobs, the reality is that the super-majority of innovative firms do not become these companies over time, exiting early, failing, becoming license deals or simply reverting to unique lifestyle businesses. Of the firms attempting growth, the two ends of the continuum can be described as `fast' wealth and experience creating firms or `unfair' advantage firms that have the potential to become large and make long-term contributions to the economy.

It isn't about choosing one group over the other, arguably both are required. Especially where talent and money leaks from the `fast' model into the `unfair' model to help grow more of the latter companies to their full potential in New Zealand. It is about using strengths to build and prove value, and mitigating weaknesses to try to play the optimal `small remote country' game.

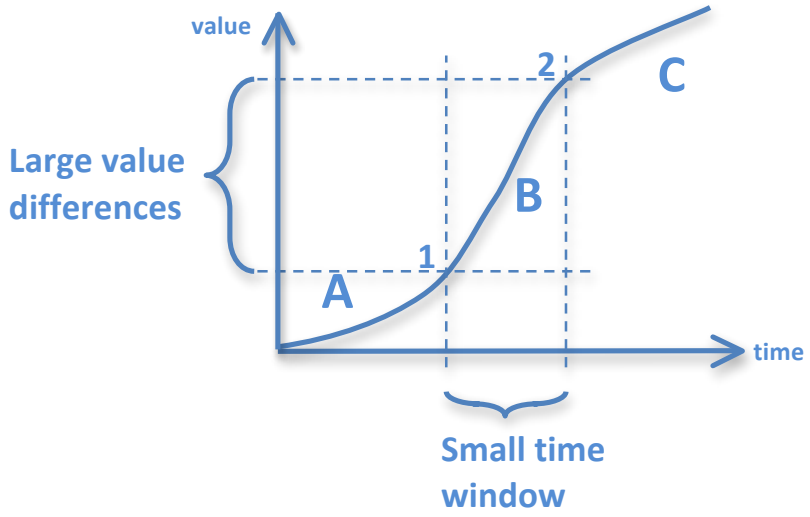
A 2011 Danish study examined the performance of start ups across the entire range of the Danish economy finding that entrepreneurs benefit from regional embeddedness: their ventures survive longer and earn more in annual profits and cash flows when they start firms in the regions in which they have lived for a long time. This would indicate that the firms that can exploit some home advantage and remain without compromising growth, do better than those that may be forced to leave to grow (or for any other reason).

There are many reasons entrepreneurs start companies that need to connect quickly with mass markets. Some opportunities simply must grow and exit within large markets. While many companies carry the label `technology venture', that doesn't mean they should all share the trajectory of ventures with some unfair advantage. Nor should they be treated the same.

Not everyone will take decades to grow an empire around an invention or discovery. The home country will still invariably be better off for their efforts. If the country continues to provide a good environment and experiences, people may increasingly return to invest and contribute in myriad ways.

Below is a classic `S' curve adapted from Christensen's technology curve but with axes of value against time rather than adoption against time. This curve is useful in explaining the challenges of growth from New Zealand and also the differences between the `fast' and `unfair' advantage companies.

Fig 5: Value versus time in New Zealand and Icelandic technology firms



A: `Getting started'/early milestones: usually technical team, infrequently starts with market opportunity
1: Transition to growth – usually requires good sales teams and process
B: Growth companies – requires internationalisation and market traction
2: Maturation and beginning to achieve scale
C: Companies reaching their full potential – usually tech + sales + financial skills

In large markets it may be possible to grow firms to scale without ever leaving the home market. In New Zealand and Iceland it is highly improbable to `own' the entire curve without leaving as well as keeping to a tight niche. In the majority of cases, technology companies in these countries will lack the sustainable competitive advantage to make the entire curve without exiting. Further, a failure to exit may diminish the curve and destroy value. Exits or growth-limiting decisions are perfectly valid choices so long as shareholders make them consciously as early as possible.

New Zealand and Iceland are excellent at getting started - to a fault. Both countries are very strong in the early part (A) on the curve. Various explanations of this range from the petri-dish effect of a small accessible population and mixed society, through to lack of large corporate disciplines that would stop teams, and force them to justify their case. The downside of having too many start-ups in a limited talent pool is that it can be more challenging to build teams and get resource to the best opportunities.

Both countries would rate themselves as weak on the growth part of the curve (B) and attrition is high. Theories on this are broad, some relate to being forced to internationalise early without the opportunity to consolidate a good home market. This means that funding, risk and experience are all outside the `normal' parameters for companies internationalising from a large established home market. This impacts execution and performance.

For remote nations, there is a further cultural disconnect and comparative lack of relationships or impediments to maintain them. Basically it amounts to playing someone else's game, from a distance, on their home turf, to their rules with less experience, talent and capital. When put that way, it becomes quite clear why New Zealand and Icelandic companies are niche players, almost always avoiding head-to-head competition with global giants.

The time scale differs for `fast' companies, who seldom traverse the full curve in the hands of the Icelandic or New Zealand teams e.g. if reaching the growth phase an exit is highly likely, ideally somewhere on the steep part of the growth curve (B) and at strong valuation. The majority of technology companies fit this `fast' model, and as exits are the logical step for most of this group, there could be greater system-wide support and make each exit more calculated. Currently both countries are neutral to outright critical of technology companies that exit.

Exits are necessary for many opportunities to continue growth in the hands of appropriately skilled people up the value chain. Exits bring wealth and experience back into play in a virtuous cycle. Exits often create the patient investment required to build or leverage the comparatively slow IP-dense or `unfair' advantage opportunities. Many individuals are simply not interested or skilled in anything other than the `fast' model. Nations cannot make people start and grow companies– it is an intrinsic activity.

Niche `unfair' advantage companies are those that are IP-dense or have advantage arising from the home country. These have far better odds at growing to maximum possible scale and the opportunities are far more forgiving of poor execution. The time-scale is longer and it typically takes 20+ years to achieve the platform for growth to scale. Growing companies to their full potential is more common in Iceland than in New Zealand. Icelanders have many more precedents for using financial tools to exploit any strong advantage with aggressive mergers and acquisition strategies.

New Zealand companies predominantly use a strong advantage to create a better exit rather than pursuing growth of a solid platform to its full potential. This is an area where a small handful of Icelanders could open some eyes and raise the horizon in New Zealand.

The `Fast' model

Highly visible in Iceland is the low-barrier model of consumer/business apps, software and the like that involves building value quickly before someone cuts your lunch. There isn't typically time or scope for traditional IP protection, and the venture is often value-driven rather than profit-driven because there is a strong exit focus. These are the `fast' group of technology companies for want of

a better term, as their success usually depends on speed and getting the venture into the hands of those who can get finished.

In Iceland the optimal configuration of `fast' ventures seems to involve a domestic technical team with the business focus, sales and marketing offshore where customers are concentrated. There are many great examples; payment technologies that are rated in the top 3 in Europe, gaming community analytics, personal finance management tools, live crowd-sourced event coverage tools and many others, all making their way and looking promising.

There is often a clear sense of limited shelf-life, at least in the hands of the resource-constrained Icelandic team. These are the ventures that fuel public debate at exit, as to whether they contributed greatly to the Icelandic economy or not. While they may not always create an on-going, broad benefit through jobs and grow the tax base significantly, they are a wealth and experience engine. Icelanders often return with both when they are successful in this model so it has additional strategic value. Ideally the skills and money will find a way into other technology ventures.

Individuals are motivated to build these companies to create wealth quickly. There are fewer barriers to entry, but also few barriers to competition. It is a model that is highly contingent on execution as there may be little that is unique that cannot be rapidly copied. Funds raised are not typically spent on securing patents and tend to be targeted towards things that allow the opportunity to accelerate.

According to the law of universal seeding, after decades of quiet there can be a sudden flurry of activity around the same idea from unrelated parties spread across the planet. Perhaps in a small, connected world, similar situations provoke similar responses. If one person has had a great idea, it's likely others have too. A small handful may try to execute on it.

But if four people around the world move on the same idea at the same time, the teams trying to grow organically in smaller markets with limited talent and growth funds are at a distinct disadvantage to the first team to successfully take the idea to fertile regions where talent and money reside.

This is the `race to the valley' challenge, but really it's the race to the place where it makes most sense to grow any given business. Other founders can hide from that successful team but unless there is some unfair advantage, the team in the fertile soil is likely to limit value or abbreviate opportunities for everyone else eventually.

So with no unfair advantage, and with a desire to grow the opportunity as quickly as possible, in all probability these companies will ultimately be leaving New Zealand sooner or perhaps even be started and grown 100% away from New Zealand. This makes strategic sense. While there are plenty of successful hybrid models with the R&D team in New Zealand and the `front of shop' in

large markets, these models are both challenging and unforgiving of poor execution over time. Often the very act of raising capital and expanding sets the exit fuse burning. This progression is value-neutral, neither good nor bad, and is certainly preferable to no innovation activity at all.

There is abundant research demonstrating that entrepreneurs believe they make the future happen. They use effectual logic and don't worry about finding the perfect opportunity. They just get started. Entrepreneurs have more impact in fertile ground because there are more means available to them and bigger goals can therefore emerge.

Entrepreneurs residing in New Zealand and Iceland usually have greater constraints. Talent is constrained as too is capital, but more so the talent for solid execution at speed.

When talking to several returning Icelanders who have built and exited companies outside of Iceland, a recurring theme is to be distinctive. When (not if) a team can get to fertile ground, they will not attract funding and resources if they can't stand out. Without these resources, firms will struggle to make it and might hope for swift failure. These returning Icelanders are engaging themselves as mentors, investors and Directors within the next wave of `fast' companies.

Among those returning to Iceland are people with houses in Silicon Valley. This group is insistent that the entrepreneurs they work with must spend most of their time in-market. From personal experience they've learned that time in the market speeds everything up. If the company has a real opportunity, then more time spent in-market leads to more opportunity. Focus then shifts to the best opportunities in a virtuous cycle; it doesn't take long for entrepreneurs to understand this point.

Gunnar of CLARA is a convert, following 18 formative months in Iceland one of his investors sent him to stay at his house in Santa Clara. Through an Icelandic contact Gunnar landed a major corporation in the U.S. within a short period of time. With the biggest client now in the U.S. the company's centre of gravity soon shifted and fresh opportunities arose in the U.S. Showing people the ropes is a simple and powerful approach.

A key success milestone amongst Iceland companies of this ilk is achieving offshore venture investment, particularly for the skills and relationships that come with this. Several repeat entrepreneurs mentioned to me that outside of large markets there are too few people that have the expertise and `calibration' to understand which ventures might succeed and which might fail.

If scale at speed is the goal, then staying too long in the small home market `reality distortion field' can leave entrepreneurs with the belief that doing small deals with friends and relatives isn't too bad. Too much time and effort spent on early revenue streams in a small home market can be expensive in opportunity cost. A conscious choice to stay for family, lifestyle or any other reason is fine too. But that's a different argument.

The `unfair' advantage model

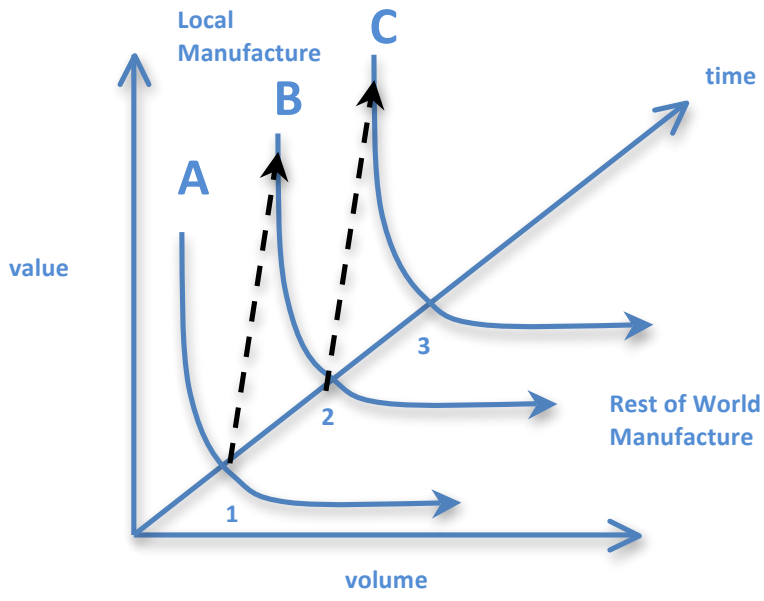
At the opposite end of the continuum to `fast' companies are those with some genuinely sustainable competitive advantage. This usually relates to IP, know-how or some factor relating to geography or historic competencies arising from this.

Niche IP-dense ventures have an `unfair' advantage. Not limited to patents, this could also be know-how, but really it's down to some unique discovery, which may have come from a single person's unique experience. Sir Paul Callaghan called this the `weird stuff'. A great Icelandic example is prosthetics leader Össur with 1,800 people in 15 countries and revenue north of US$400M. With more than 347 patents and another 358 pending, they created the breathing space from competition to remain in Iceland and grow.

A good New Zealand example would be Buckley Systems. BSL have deep capability built over decades that no competitor can match. These companies are unique. Like the first `fast' group, they can arise anywhere but differ in their competitive buffer and `embeddedness' into a matrix of local 2nd tier support companies to give a long-term and broad benefit to their home countries through jobs, supplier arrangements and skills.

Overall, companies like Össur follow a model similar to Fig 6 below. As a new innovation is created (A), high value is exploited for a time but as the innovation begins to run to scale and reaching a stage (1) where it may best be manufactured elsewhere or is otherwise dropping in value, the company will render previous outputs obsolete by creating a fresh high-value innovation (B) and repeating the pattern. This `saw-tooth' model naturally reflects where competitive advantages of small advanced and remote nations lie.

Fig 6: Value versus volume in technology manufacture



Finally, there is the `country-specific' group. The unfair advantage might arise from some physical resources that are either unique to a country such as a unique native-derived bioactive, or a deposit of zeolite. Perhaps it may arise from a national core competency such as fishing in Iceland, or dairying in New Zealand. Marel is a €643M Icelandic company with 3900 employees in 30+ countries. It arose from fish processing technologies and has moved into other protein processing niches. Technopak in New Zealand arises from bulk dairy powder packaging and may have the foundation for similar scale.

A future example of this group might be GreenQloud aiming to utilise geothermal energy to power carbon-neutral data-centres and also leverage Iceland's cool-climate image. Not many countries could copy that proposition easily and that is the whole point of this group.

These `unfair' advantage companies are most likely to make large and long-term contributions to Iceland as a nation. As long as the market needs they serve are not completely disrupted, they have the potential to grow into sizeable opportunities for their home country. While there are always shades of grey, these appear to be the main groups.

Venturing into the grey is the 600-strong Icelandic gaming company CCP. Before `minimum viable product' were buzzwords, these guys decided to test all the elements of their gameplay with a board game. One in eight Icelandic households bought the board game over a single Christmas giving them the validation and cash to build out the game. About the same time Oz Communications flamed-out in Iceland unleashing hundreds of talented people onto the streets of Reykjavík. 30 roosted within CCP, many going without pay for an entire year to breathe life into the game.

The company has largely self-funded growth from profit, becoming somewhat immune to investor-driven exit-pressures. And so they grew.

The `why Iceland' question is interesting. CCP was heavily path contingent and unpredictable. With no unfair advantages, CCP could exist anywhere on the planet. While any technology venture requires dedicated and passionate founders with a clear vision, there were also many coincidences that led to success. Something equally unpredictable could arise next week in Iceland so long as the environment remains fertile enough. Why it remains Icelandic is a matter of personal choice. The founders are Icelandic and they like to live in Iceland.

In Iceland it costs about 1/3rd to run your product team compared to San Francisco. You're less likely to have your team poached and with fewer alternate local prospects, retention is stronger. Industry groupthink is avoided a little, but then fresh blood can be hard to come by. 35% of CCP's team are from outside Iceland so they're doing okay there.

Nobody in Iceland is sure if another CCP will materialise, but people point out that it was the creative destruction of Oz Communications that powered up CCP and many other companies on the

family tree. CCP's Economist felt sure that their team members would go on to create many more success stories if CCP ever failed. If environment and culture are right, then there is nothing stopping more similar successes.

In Iceland, people simply can't ignore the prospect of accessing two billion people via the web. To quote a local, "The key to continued success for Iceland in this arena is not to focus on gaming, but to focus on the fact that location does not matter for success." It's an interesting thought.

Summary of operating system opportunity

Being small and remote poses a unique set of conditions on a country. It is unsurprising that these conditions would yield unique strategies and approaches that large countries or regions would find difficult to emulate. It is not enough to be only world-class, nor is it enough to be another `me-too' knowledge economy player. The opportunity is to do something distinctive that is difficult to emulate and better than world-class `standard'.

The opportunity is to create a learning system that measures, observes and learns as each company or team arises. It tracks the success rates of individuals, later involving them with similar future companies. By tracking and engaging, this operating system takes some of the risk out of execution.

Similarly, it also allows for people to quit opportunities if the company is not building value. Resources are cut to chronic underperformers.

By measuring and assisting with smart resourcing (talent more so than capital) of companies, the emphasis can clearly go on to what is working well and mitigating repeating weaknesses. The patterns are visible now, but with appropriate measurement they can be better managed.

This allows for individual challenges that are routinely faced by internationalising technology companies to be aggregated and addressed with the best possible interventions – people, connections, capital, environment as available.

Having a data-driven model coupled with a learning system, means that the environment can be measured along with individual firm performance and interventions over time. Those companies with potential to grow to full scale from New Zealand can benefit from a model that improves the environment over time in real ways, identifying road-blocks, uncompetitive areas of legislation or areas where other countries simply offer a better deal.

Decisions can ultimately be made based on appropriate data as to whether at-scale technology businesses and jobs can be further retained, or whether it might be finally time for them to exit New Zealand. There will be only so much elasticity and it is the pipeline view that counts, not `holding back the tide'.

The pipeline view is more than being the `goose that lays the golden eggs' or the `nursery model'. While this best describes New Zealand's overall strategy in innovation at present, it is important to

recognise that some of these niche companies are viable at significantly larger scales, and that a pipeline of these opportunities is needed, because there will always be companies graduating offshore (hopefully after some decades of benefit).

Predominantly, the model will continue to be `selling golden eggs', but even then, a more sophisticated market for golden eggs might be created and the value of each might be lifted.

Over time, being systematic about innovation means the processes can begin to accelerate. The speed at which the limited resources can be reassembled into new propositions and tested can be increased. Having a system for running faster processes is a critical source of competitive advantage when less resource is available to be leveraged. Recycling limited talent quickly is a key factor in getting a disproportionate amount of shots on goal, especially where each shot also has improved odds of success.

Treating all technology firms as anything other than unique propositions is a weak approach. Strategies, people and environment for `fast' propositions would differ from those that are IP-dense. Yet, the operating system must also design suitable interactions to ensure cross-pollination of skills, investment and business models takes place. This would leverage the `petri-dish' effect more systematically.

The operating system links the `fast' end of town with the `unfair' advantage companies, serving them both in different ways. While it accelerates and de-risks both ends of the continuum, it creates more short-term gains at the `fast' end (volume). This is only deeply beneficial for the whole nation when that `fast' activity is harnessed to the deep long-term `unfair' opportunities (rare) to help grow them to their full potential. This activity requires abundant capital as well as valuing and engaging the right talent.

A country that is committed to economic growth based on innovation will struggle to deliver much without a cohesive plan and solid measurement. Coordination cannot be left to the individual companies to arrange for themselves, an operating system is public-good infrastructure. To not pursue a coordinating approach would be to waste the cultural and historical assets and advantages that do exist in New Zealand. Just ask Singapore or Saudi Arabia, who cannot buy an innovative culture of `getting started' for all the money in the world. New Zealand is taking its real competitive assets for granted – people and culture, rather than high grass growth and scenery.

Building and delivering on a blueprint requires that people be focused on this task. Even then, a long-term commitment is required to operationalise this year after year. It is a long-term vision and requires a large, but reasonable leap of faith. An intelligent learning community needs a brain, and resource costs money. Building a case for resource should be clear-cut in terms of percentage impact over time, and the value of this impact compared to the costs in achieving this.

The opportunity requires a fresh non-partisan approach with reasonable distance from short-term interference, especially arising from its own success. Ideally, it could be catalysed by Government but designed to operate autonomously and have its own resources so that it can succeed over the long term and not be interrupted. It is too important an opportunity to constrain within existing silos where it is less likely to succeed.

Achieving success is about alignment with reality and real communication and collaboration. An operating system must recognise that the motivation of entrepreneurs is the single most important factor.

Without an operating system, New Zealand will continue to see sub-optimal exits along with unnecessary exits of the rare companies with unfair advantages that could have provided strong benefits to the nation for decades. Iceland proves beyond doubt that creating $1B technology companies with thousands of employees is repeatedly possible. New Zealand has no excuses and must coordinate better.

Ignoring the opportunity to build an operating system means a strategic choice to continue competing at increasing disadvantage whilst existing advantages are simultaneously eroded.

New Zealand needs to confirm its real future competitive advantages and build an engine that cranks these up. This would create an unfair advantage at the national level. By operationalising such a system, New Zealand might create the most enduring value of all through the habits such a system creates, not least of all, in collaboration.

Future competitiveness of innovation companies within small countries of limited resource will be determined by who can play the fastest while still focusing on quality and `accuracy'.

What happens next?

This document relates opportunities and observations arising from the Iceland mission. The findings are freely shared with individuals who are in a position to influence the performance of New Zealand's innovation space. It is for these individuals and their organisations to act on identified opportunities as appropriate.

Key findings were:

- New Zealand is almost completely missing a key driver of growth to scale in innovation companies
- New Zealand might investigate creation of capital-providing mechanisms and access talent to fund greater growth in certain companies as Icelanders have
- New Zealand might benefit by encouraging more successful and experienced people to actively engage and take companies internationally from New Zealand much faster
- New Zealand can learn from Iceland's collaborative models to achieve enabling changes in the overall environment
- New Zealand might benefit from a targeted approach supporting growth in a small handful of high potential firms concurrent with the wider `business as usual' approach for all firms
- New Zealand has an opportunity to build the first deliberate system-level national infrastructure to drive performance in innovation companies and create an unfair national advantage

Next steps may include;

- Discussing with local organisations the areas that are most promising and deciding how to explore these further
- Follow on introductions and communications between New Zealand and Iceland to learn more about Iceland's situation and solutions
- Contact with local firms to connect them to Icelandic opportunities (underway already)
- Potential to host key people from Iceland in New Zealand on key initiatives

APPENDIX A: Observations

1. Icelandic technology companies leave Iceland for growth earlier than New Zealand companies. Extreme small scale leaves Icelandic teams under no illusion that they can stay for long and partly investors push them out quickly to help get returns and force execution on growth.

2. Investors are frequently highly skilled in sales and educated in prestigious American or English universities. Overall, there seemed to be an abundance of deeply experienced MBAs involved in growth stage technology companies and many speak three to five languages. There seems to be a collective view on getting out of Iceland quickly. They do not believe that it can be done by `remote control' from Iceland.

3. Some technology executives in Iceland live commuter lifestyles. The Icelander running Actavis spends four days a week in Switzerland and three days a week in Iceland. It is possible for Icelanders to achieve this with frequent flights and easier access to North America and Europe. For New Zealanders, Australia is a possibility, but even commuting up to Asia each week would be prohibitive.

4. Icelanders tap into networks of well-placed Icelanders in a concerted way. They stay at Icelandic houses in Silicon Valley available through the (investor) networks and hit Icelanders working within large target organisations for introductions and sales opportunities. Anything that lowers the barriers and cost of establishing companies in large markets is valued and identified through the network. This pooling of resource is organic, but other organisations (like KC Start-up Village) are starting to understand the value of creating physical resources for entrepreneurs to base from. This goes beyond serviced offices and provides accommodation and networks and a total packaged environment. This might resemble an extension to the Kiwi landing pad concept and Beachheads Programmes and possibly link more firmly with local resources in markets such as incubators for their network access.

5. Iceland (and New Zealand) has an issue culling underperforming companies and returning talent to the pool. Usually due to relationships. There have been times where Icelandic investors bowed out and let foreign investors come in and kill off companies. Some Icelanders recognise that the US is excellent at failing, killing, cleaning up and getting on with it. While money may be lost, learning is the value. What small countries can least afford are incubators full of living dead companies that take talent out of circulation for many years.

6. Icelandic investors view founders `taking money off the table' as a part of growing massive. Basically the issue is one of risk. When founders have everything riding on the company growth and some future liquidity event they can play too safe. Allowing them to take money off the table by selling down their equity position should not be seen purely as a lack of commitment. It rewards the founder and their families for growth to date and shifts the risk situation so they can take greater risk, knowing they already have some money out of the equation.

7. Iceland sat World War II out. As such, there is no boomer generation running the country or deciding who gets to touch the controls. The younger dynamic is very evident in Iceland and there is a greater sense of future orientation. There is plenty of evidence that people take less risk as they grow older. Post 2008 is a time of change globally and the issue is one of taking enough risk. New Zealand could watch Iceland take risks and then adopt proven models if it can't bear to take risk or is politically unable to.

8. Iceland is extremely cohesive. Icelanders are foremost a tribe, while New Zealand is only a nationality. There is a huge difference. There is a much deeper sense of identity. While this cohesiveness may help with execution, it is also somewhat fragile as it is not inherently diverse. New Zealand is very diverse but lacks a strong sense of identity. It is difficult to act together. If this could be addressed, New Zealand would be extremely resilient.

9. In business, the automatic trust that is implicit between Icelanders is strong. In most countries it takes many years to earn trust. New Zealand might work on stronger business ethics to try to build trust and collaboration which is comparatively weak. Business ethics needs to be taught and expected in business. If New Zealand is serious about economic growth, then collaboration and ethics in the education curriculum needs to be examined. Trust, reputation and credibility are becoming the key enablers, especially as more countries are figuring out that competitiveness in the modern knowledge economies focuses on getting the most from human resources. Israel and Singapore have few natural resource distractions (also known as resource curses) and their growth is driven by human resource and culture.

10. Some Icelanders criticise themselves for being short-term thinkers and overly opportunistic rather than strategic and playing to long-term strengths. Their version of the Islander mentality sees them leaping at opportunities at the last minute rather than planning deliberately for years towards something significant. This resolves itself as shallow or unsophisticated interactions with markets rather than deep and sustainable relationship-based business activity.

11. At the University of Iceland it is compulsory for all students to participate in a multi-disciplinary team to take a business idea as far as possible. This is different to a business plan or pitching contest – it actually means going as far as you can during the course. It may be that nothing is written down but money was made. It might mean validation of the idea. What is important is the message sent that all people studying at the university have a duty to think about how a future contribution might be made towards the real costs of education and the standard of living. Everyone must earn his or her keep. It also teaches teamwork and collaboration and the value of other disciplines beyond your own.

12. Considering that both Iceland and New Zealand believe that innovation and entrepreneurship is the route to prosperity, then it is extremely surprising that there is no serious internal measurement of rates of innovation or entrepreneurship beyond the work that the World Economic Forum undertakes. In particular, the Global Entrepreneurship Monitor looks at

motivation and rates of entrepreneurship. Amazingly, New Zealand dropped out of this global benchmarking programme in 2005 and Iceland dropped out 2002. Establishing a measurement framework and then seeking improvement each year should be of great interest to the Governments of both countries.

13. With measurement baselines in place, both countries need a plan and `business model' and set some realistic targets. Both countries simply talk about having more innovation. This is not specific enough, realistic targets are important. Setting targets too high or low is demotivating and if targets are too intangible or meaningless they will fail to connect at the individual or group level. An economy or sector –even an industry, is simply an abstraction. Decisions to take risk and grow are made by people, often individuals. Part of doing better involves measurement, achievable and motivating goals and creation of better-aligned financial and cultural incentives. Having high expectations is not a strategy.

14. There appears to be more willingness in Iceland to try to work with and improve culture. Only so much can be achieved by tinkering with infrastructural elements, structures and mechanisms. If it really were as simple as optimising these things, New Zealand would be a far wealthier nation already. To improve national performance organisations must be increasingly prepared to step out from the safety of facts and `evidence' and go after cultural changes. A good example of the need is culture-envy of Silicon Valley where failure is seen as a necessary precursor to success. In Iceland, failure is stigmatised and this is seen to be really holding back the country. They have yet to take orchestrated action to try to shift culture around failure. Similarly, there is little orchestrated targeting of young people to inspire them to take a science and technology pathway. Both New Zealand and Iceland espouse science and technology as the way to wealth, yet neither country is deliberately trying to build capability within the population and neither country is measuring innovation and entrepreneurship adequately.

15. Addressing how failure is viewed is a keystone initiative to lower the perceived cost of failure and recycle talent faster. Many people go to college in the US with the intention of quitting to start companies. These people understand that within five attempts they are likely to start succeeding. There intention is to go and fail so that they can succeed.

16. Icelanders, like New Zealanders are renowned for being circumspect. Opinions are given in a low-key and non-judgemental manner. Speakers visiting Iceland are told to expect few interjections or questions. Apart from isolated incidences, both countries fail to promote their success stories in a robust and sophisticated manner both to their own populations to inspire and to outsiders to encourage their involvement.

17. Icelanders are reportedly the hardest working people in the OECD. They appear to be a deeply pragmatic culture even amongst the pragmatic Scandinavian nations. Compared to New Zealand there are less lifestyle alternatives and work is taken more seriously overall. The level of commitment and intensity seems higher.

18. The public debate around innovation in Iceland seemed more sophisticated in the media and generally. Icelanders have a track record of growing their niche technology businesses to maximum possible scale and take a pipeline view of this. There will always be companies at the upper end of the spectrum going public and listing on foreign exchanges, eventually moving head offices away. What matters is that Icelanders have benefitted from the whole exercise usually over some decades. Some Icelander's see this as a graduation event and that it is inevitable that companies will someday leave Iceland. Being an even smaller home market it is also perhaps more obvious that the majority of technology companies started that do not have some unfair advantage will exit or leave Iceland quite quickly and that this should be the way. There is groupthink that the faster the better for those companies.

19. Because Iceland does not have a history of having `big Government', highly skilled and internationally experienced entrepreneurs have stepped in to help take ideas and turn them into an internationally competitive business. Government structures in Iceland are present but do not appear to be highly entrepreneurial in their approach. Perhaps successful members of the business community do a better job of this.

20. Icelanders are fiercely autonomous and pride themselves on being independent. They prefer to find their own solutions to issues but will adapt the ideas of others also, but not slavishly. There are numerous examples of this, such as their decision to resume commercial whaling in 2006 and their referendums not to pay back European banks following the crisis despite international attention and pressure. They were recently vindicated on the latter point.

21. Icelandic people do seem aware of what countries like Israel have achieved but understand that they must start at the beginning and build the talent to go with the capital. Dropping capital into the ecosystem in an unbalanced way without the talent to manage it would be destructive. Assuming market failure creates a self-fulfilling prophecy, it does not seem to occur to Icelandic companies and incubators to look to Government for substantial resourcing. As a result, their system is more efficient. It has to be. Whether more capital and support would lead to greater effectiveness is a separate issue. The one lesson of particular value from Israel is to build an extremely deep relationship with a single large market. An Icelandic investor noted that Israel gives U.S. Jewish citizens a free year in Israel and issues them a passport. It's an effective loyalty programme.

22. Iceland with its constrained talent pool may actually have a start-up problem. Anecdotally it is hard to find people to team with to form competitive ventures because so many other talented people are trying to assemble a team themselves. There would be something to be said for a system view that can identify and cull, returning talent back to the pool for another shot on goal. If you have a start-up problem, perhaps the focus must go on quality over quantity and better metrics so that the most precious resource – talent, is preserved. Starving promising firms becomes an unintended consequence of an overactive start-up environment.

23. Iceland cannot afford to `buy' innovation by pouring in money. Without more talent, better systems or acquisition track record through Multi-National Corporate R&D centres or similar, it is likely that money would do more harm than good. Over-funding runs the risk of forcing early investors out, often the only ones with the skill and interest to really make a difference. Too much capital creates living dead companies that tie talent up for years. It is critical to carefully match capital to talent and track record in the context of where Iceland's innovation ecosystem is currently at. Again, if the Icelandic Government were to dump money into start-ups without acknowledging a potential talent and experience gap they would incinerate value.

24. Iceland has a track record of maximising the long-term value from many of their technology businesses that possess unfair Icelandic or IP advantages. Of greatest enduring value are the habits and beliefs that reside in the population that give them the potential to repeat this activity again and again. Arguably they have learned self-sufficiency but have yet to turn this into something more systematic. But the examples have been set. Being remote and focussing on owning value chain yields a longer term picture than would say, selling out too early every time (even where there was an unfair advantage) or simply building firms and selling them to MNCs via local R&D centres. Both are comparatively fragile strategies (reliant on others) that may even build questionable habits. In the build-to-sell countries, Governments can get a faster return. But it will be a smaller return and be more fragile in the long term.

25. While communication and collaboration between firms in Iceland is seen to be very valuable, the jury is very much out on clustering. Porter frequently visits to try to make his theories work there, but many Icelanders believe that the full concept of clustering is untenable at their scale. If the whole country were to bet on just one industry then maybe then it would work. This does not stop them from implementing mechanisms that capture the low hanging fruit that clustering also provides.

26. Iceland rates top in firm-level technology transfer from universities. While there may be a different culture in universities and firms that focuses more on relevant problems and avoids waste (Icelanders hate waste), it is also possible that owning more of the value chain helps to expose problems and focus efforts also. Being such a small country, there may be social pressure to always be working on real problems and improving business. This is in contrast to other nations that do not rank as well on this measure where entrepreneurs trawl for IP in universities and then build companies around this, much of this is predicated on soft funding availability and is driven by the promise of a swift return rather than solving real problems that make local industries more resilient long term. The latter situation is the best deal for the nation.

27. While New Zealand may have last been rated the most peaceful nation on Earth in 2010, Iceland has held that title the past two years. New Zealand and Iceland cannot ignore the influence of militarisation on national culture and disciplines. The benefits flow to business and technology

businesses in particular. Iceland and New Zealand seem to frequently compare themselves with other nations that have compulsory military training. Opportunities to build similar cultures around the environment or peacekeeping are simply not as compelling as a fear of attack.

28. Famously, In Iceland the fishing mentality permeates the culture, within fishing there is a value placed on collaboration, excellence, ever-greater improvement and efficiency. Icelanders believe this translates well into their business culture. Another example set by the fishing industry is near-complete ownership of the value chain through to high value products. It may seem more natural to Icelanders to be small and niche players yet, also own as much of the value chain as possible. This is a stark contrast to New Zealanders.

APPENDIX B: Background of people

Meetings were conducted with;

1. **Margrét Ásgeirsdóttir**, Innovation service manager, Landsbankinn: Following the crisis this commercial bank created this position to connect people and support companies to grow. Margrét sits on the Investment Council of Frumtak (see below)

2. **Ari Johannesson**, Chief Technical Officer, Sprettur: Involved in many of Iceland's success stories and now running a software integration company for Government and commercial projects.

3. **Eggert Claessen**, Manager, Frumtak investment fund owned by the Government-owned evergreen New Business Fund Nýsköpunarsjóður (NSA) banks and pension funds investing in post seed start-up and innovation companies.

4. **Dilja Valsdóttir**, Project Manager, Innovit: Innovit is Iceland's main business incubator. Dilja manages the Annual Entrepreneurship Competition and interfaces into The University of Iceland where all final year students must participate in multi-disciplinary teams to take a business concept as far as possible.

5. **Ragnar Kormaksson**, CFO, Innovit: Ragnar is responsible for planning and programmes within the Innovit incubator.

6. **Erling Gudjohnssen**, CEO, Liveshuttle: Entrepreneur and founder, Liveshuttle is a crowd sourcing tool for social image sharing within geofenced and timebound events or areas.

7. **Hilmar Gunnarsson**, Partner, Investa and Director of Mint, Meniga, Datamarket, CAOZ, Gagarin: Investa is Hilmar's investment vehicle. Hilmar returned to Iceland to raise a family after notable successes offshore including posterchild OZ Communications.

8. **Dr Gisli Hjálmtýsson**, Partner, CEO and Director of Thule Investments: Over 20 years of experience as an innovator, entrepreneur, and Manager. Prior to founding Thule Investments, he was the Chief Technology Officer and Fund Manager at AVX-e.com. Before joining AVX, he conducted research on the Internet and novel network services, joining AT&T Research at Bell Laboratories in 1995, later AT&T Research at AT&T Shannon Laboratories promoted to a Technology Consultant. He has been a Director of Emerald Networks Inc. (Emerald Atlantis Limited) since July 2012. Dr. Hjálmtýsson serves as a Director of Cadec Global, Inc. (also known as Cadec Global, LLC), Bru II Venture Capital Fund S.C.A. SICAR, and Voice Commerce Group Limited. He serves on the Boards of FS-10 ehf and Enpocket, Inc. Dr. Hjálmtýsson was a Director of CCP hf. He served as a Director of Straumur-Burðarás Investment Bank Ltd. Dr. Hjálmtýsson was a Professor at Reykjavík University and has held positions on the Faculty of Columbia University, University of Iceland, and Reykjavík University. At Reykjavík University, he was the Dean of Computer Science and Engineering. In 1993, Dr. Hjalmtysson was a visiting research

scientist at Telecom Research Laboratories in Melbourne Australia for six months. He has been an invited Speaker at numerous symposia, universities, and leading companies. He has published over 80 papers, holds over 20 patents, and is a voting Member of IEEE and ACM, and active in organizing professional conferences and serving on program committees. He is a co-recipient on significant grants from EC, NSF, DARPA, with leading researchers from MIT, Dartmouth College, Carnegie Mellon University, Princeton, and more. Dr. Hjálmtýsson has a Ph.D. in Computer Science from University of California, Santa Barbara and a B.S. degree in Applied Mathematics and Computer Science from University of Rochester, New York.

9. **Gunnar Harðarson**, Founder, Co-owner and Managing Partner, Arnason Faktor: Arnarson Faktor is Iceland's main intellectual proporty services company. Gunnar has a 25-year career in the patent sector and serves on various advisory committees on intellectual property rights, as well as on the boards of professional organizations in the field of intellectual property rights. Gunnar is a mechanical engineer and has also completed a master's degree in law. Gunnar is a member of the Associate agents trademarks and patents (FUVE), European Patent Institute (Institute of Professional Representation before the European Patent Office (EPI)), and FICPI, AIPPI, UNION and Inta.

10. **Arnar Laufdal Ólafsson**, CEO and Founder/Owner, Cloud Engineering ehf, Founder at Datatracker: Cloud strategy, implementation and managed services. Arnar also owns and manages the Miss Iceland Pageant as his father did before him.

11. **Gunnar Holmsteinn**, CEO and Founder, CLARA: Gunnar is under the age of 30 and leads a team of nine employees in Iceland and Silicon Valley who help companies to understand the online buzz about their brands. The firm uses advanced semantic analysis to 'listen' to customers' online discussions, enabling marketers to target their messages more effectively and discover new opportunities.

12. **Frosti Sigurjónsson**, Director, Arctica Finance: Frosti is a central figure in Icelands innovation space and now a local politician. He was previously CFO of Marel a $1B+ Icelandic fish processing technology organisation. Frosit is chairman of Duhop, Datamarket, Spurl, a board member of the University of Iceland Science Park and former chairman of CCP Games. Frosti was also formerly CEO for Nyhergi a large IT solutions company and founder of Sonos. He holds an MBA from London Business School and is a voluntary member of the boards of Icelandic Chamber of Commerce and Reykjavík University.

13. **Halldor Jörgensson**, Country Manager, Microsoft: Over 25 years of experience in the IT industry and dealing with adverse economic and political situations. Microsoft and a small handful of multinationals helped play a role in Iceland recovery.

14. **Skuli Morgenssen**, Founder, Oz, Owner/CEO WOW air and billionaire: Mr. Mogensen is the Founder of Títan, which is among the largest shareholder of Advania. He is involved in several successful ventures in Scandinavia and has extensive international business experience. Mr. Mogensen Co-founded Arctic Ventures and was its General Partner. He founded OZ Communications, Inc (OZ.COM) in 1990 and served as its Chairman of the Board, Chief Executive Officer and President from 1990 to June 2007. In 1998, he Co-founded Islandssimi. He is a seasoned executive with over 15 years of broad business experience in the technology, telecom and venture capital industries. He co-founded Mobilestop Inc. in 1999. He was a Co-Founder of Og fjarskipti ehf (also known as Og Vodafone). He was also the Co-founder and Chairman of telco Íslandssími from 1998 to 2000 which then merged with Vodafone in Iceland. He has been active private and public investor in the high tech sector for 10 years. He has unique insight and understanding of the new economy and is frequent speaker on both sides of the Atlantic. He serves as Chairman of Carbon Recycling International (CAOZ) Ltd, Títan and Strax Holdings Inc. He serves as the Vice Chairman of MP Banki in Iceland. He has been recognized as one of Europe's top entrepreneurs based on his work at OZ and through his involvement in the start-up of several companies in the telecom field.

15. **Dr. Eyjólfur Guðmundsson**, Chief Economist CCP Games: CCP Games is a 700-strong online gaming company founded in Iceland. Eyjolfur was hired in the spring of 2007 to meet the ever increasing demand for economic information from the EVE Online community. His responsibilities are to provide community members with accurate information on economic indicators as well as in-depth analysis of interesting events in the EVE Online economy. He is also responsible for cooperation with academic and research institutes and in assisting future development of the economic/business environment within EVE Online. Prior to joining CCP, he was Dean of the Faculty of Business and Science at the University of Akureyri in Iceland, which he joined in 2000 after his studies in the United States. He holds a PhD. in Environmental and Resource Economics from the University of Rhode Island and a B.Sc. in Economics from University of Iceland.

16. **Georg Ludviksson**, Co-Founder and CEO, Meniga: Meniga is a leading provider of personal finance software for European banks and financial institutions. Since 2008 Meniga has been building a best-of-breed Personal Finance Management (PFM) solution that rivals any other available in the world today in terms of functionality, usability, scalability and security. Georg holds an MBA degree from Harvard Business School with emphasis on Entrepreneurship and Finance. Georg also holds a Software Engineering degree from the University of Iceland. Georg is an experienced technology entrepreneur with over 10 years of experience of founding, building and managing software startups with a global perspective. Georg co-founded UpDown.com in Boston in 2007 and served as VP of Product Management. UpDown.com is a leading social investing web site in the USA with over 400,000 members. Before co-founding UpDown.com, Georg served as VP of Sales for Men & Mice, a provider of specialized enterprise software to many of the world's largest companies. Georg also co-founded Dimon Software in 1998, an

Icelandic enterprise mobility company that was a big technology provider to Nokia and one of Iceland's leading software companies for several years.

17. **Ólafur Harraldsson**, CEO/owner Designing Reality: Designing Reality is a company exploiting 3D processing technology as a service. Ólafur has applied this at the kilometre scale in several motion pictures and for large consultancy projects.

18. **Stefán Karlsson**, COO and cofounder, Controlant: Controlant offers a turn-key service for cold chain monitoring and quality control; from manufacturing, through transportation, storage and sale. Controlant specializes in wireless temperature monitoring. Controlant has entered into a cooperation agreement with Promens the worlds largest rotational moulded plastic group and also an Icelandic company

19. **Kristján Kristjánsson**, CEO Innovit: Innovit was founded by university students in 2007 and is a privately held incubators operated in the public interest with emphasis on business opportunities arising from the work of Icelandic universities. Innovit cooperates with leading incubators around the world to ensure a good environment for entrepreneurs in Iceland. Kristján is also a Board member of Icelandic Water Holdings and several other companies. He has advised other nations such as Iran around running successful start-up programmes.

20. **Helga Valfells**, CEO, NSA Ventures: The government-owned evergreen New Business Fund Nýsköpunarsjóður (NSA) Ventures is a local partner for investors looking at the Icelandic venture market. The fund is a proven co-investor for international venture capitalists and works with international investors at all stages including non-Icelandic angel investors at the earliest stages of financing, since such collaboration is likely to bring valuable expertise in a given industry or market area. Further along the investment cycle the fund seeks to partner up with international VCs who have the funds and expertise to facilitate further growth. Helga has enjoyed a diverse career in finance and international marketing. Previous employers include Íslandsbanki, Estee Lauder UK, Merill Lynch and the Trade Council of Iceland. Helga has also worked as advisor to the MInister of Trade and Industry and participated in founding 3 startups. Helga joined NSA Ventures in 2009. She is a board member of Innovit, Transmit and Intelscan and the Chairman of the board of Mentor, Gagnavarslan and Frumtak.

21. **Dr Eyþór Ívar Jónsson**, Managing Director, Klak: Klak is an innovation centre which emphasises education for entrepreneurs. Klak operates the Business Accelerator – the fast track for new companies and offers consulting to small and medium sized companies and hosts various networking events. Klak is also an incubator and hosts many different companies in different industries. Klak organises Seed Forum Iceland, an investment forum in an agreement with Seed forum International. The objective is to build investor readiness and investor matchmaking opportunities within seed and venture capital to born-global companies. The forum facilitates international and local investor matchmaking. The companies presenting to investors are nominated, selected and trained in the Seed Forum process to secure that the companies are

investor-ready when they present to investors. The Seed Forum process is also important to reduce the risk for investments in early stage companies. Dr Jónsson is an associate professor at the Copenhagen Business School and CEO/Chairman of Seed Forum Iceland.

22. **Bala Kamallakharan**, CEO, GreenQloud: Founded in 2010, the company exclusively sells cloud computing services, such as web hosting and data storage, known commonly as infrastructure-as-a-service (IaaS), powered by data centres using 100% renewable energy in Iceland. Most hosting companies buy carbon offset credits as a green marketing measure, and host data at multiple data centres on different continents as the solution for international sites. Greenqloud differs from competitors in North America and Europe in that its data centres are powered exclusively by hydropower and geothermal energy; this is possible because of Iceland's energy infrastructure. Iceland's geographical location offers two additional ecological advantages: (1) year-round cold climate in the Arctic Circle offers natural cooling, (2) its mid-Atlantic location eliminates the need for data mirrors on both continents, eliminating the use of multiple data centres and the associated energy consumption. Bala is an investments expert who mentors startups on business strategy, raising capital and global growth. He is the Founder of Startup Iceland, an initiative to build a sustainable startup ecosystem in Iceland then replicated throughout the world. Bala is also a founding partner at Auro Investment Partners LLC, a venture investment company invested in a portfolio of companies in the Technology and Hospitality sectors. Bala was previously with Cap Gemini in the US, formerly Ernst & Young Management Consulting. Bala is on the Board of Directors for several companies and organizations including Iceland-based CLARA.

23. **Guðjón Már Guðjónsson**, Founder of Oz, Ministry of Ideas and 5 other organisations: Guðjón has driven the research, development and design of many leading-edge technologies and is the author of several granted patents. He has served on the board of directors on a number of high-growth companies and acted as key consultant and advisor for several government-associated projects within the telecommunication and utility sectors. In 2009, Guðjón started the grassroots-initiated Ministry of Ideas, which is a forum for discussion and promotion of innovations in industry, education, economics, and society. In 2009 Guðjón was selected by the Junior Chamber International as the Ten Outstanding Young Persons of the World honor. Guðjón cofounded Oz Communications in 1989 and founded Íslandssími (now Vodafone Iceland) in 1998 and took the company public on the Iceland Stock Exchange only two years after he founded it. In 1999 he co-founded Extrada, a software company connecting consumers to digital services in the home. Extrada was acquired by ESP Gruppen in 2002. In 2000 he co-founded mobile application company Maskina, later acquired by Viva Technologies and now called Vyke. Vyke is now publicly traded. In 2003 he co-founded telecommunication systems integration company Industria. In 2010 he founded Agora, an non-profit organisation developing visioning and new form of democratic forums and is also a Board member at LazyTown.

24. **Ólafur Ragnar Grímsson**, President of Iceland: Serving since 1996 and re-elected for a record fifth term in 2012. In 1970 he was the first person from Iceland to earn a PhD in political science becoming a Professor of Political Science at the University of Iceland in 1973. In 1984, with three other left-wing intellectuals, he took part in a debate with economist Milton Friedman. In 2010 the President of Iceland vetoed a measure of the Icelandic government to pay the governments of Britain and the Netherlands for their bailouts of customers of private Icelandic banks. The President's veto was upheld by the people of Iceland when they voted upon the measure in March 2010. This dispute is known as Icesave dispute. In recent years the President has been outspoken on the issues of renewable energy and global climate change. He initiated a Global Roundtable on Climate Change with the participation of a large group of companies and individual opinion leaders.

25. **Ornolfur Thorsson**, Secretary General, Office of the President of Iceland

26. **Jói Sigurðsson**, Angel Investor, Investa and Senior Staff Software Engineer, Google: Investa is a group of angels doing early-stage investing in some of Iceland's most innovative start-ups in the technology sector offering products and solutions that have an international appeal. At Google a key contributor and later Tech Lead for Google Desktop. Creator of the GRIT i18n tool. Tech Lead on a Google Toolbar project. Software Engineer on Google Chrome focused on core architectural and performance improvements.

27. **Thor Gunnarsson**, VP Business Development, CCP Games: Crowd Control Productions (CCP) is an Icelandic video game developer and publisher, majority owned by the company's staff and founders, Novator Partners and the American investment fund General Catalyst Partners. In order to finance the initial development of Eve Online, CCP developed and published a board game in Iceland called Hættuspil ("Danger Game"). In April 2000 the company, with Sigurður Arnljótsson as CEO, raised $2.6 million, through a closed offering organized by Kaupthing Bank (now Arion banki), from private investors in Iceland, including the Icelandic telephone company Síminn. Approximately half of the initial 21 staff were drawn from the Icelandic dot-com company OZ Interactive, the makers of OZ Virtual.

28. **Orri Hauksson**, Managing Director, Federation of Icelandic Industries: Orri is the Chairman of NSA Ventures. He also serves a Member of the Investment Council of Frumtak. He has held various business development, management and board positions. He was responsible for launching new shipping routes for the North European shipping company Eimskip, was the Icelandic Prime Minister's Political Adviser, served as an Analyst and Venture Manager at Arctic Ventures, oversaw venture capital investments at Argnor Wireless Ventures in Stockholm and was a sales manager for U.S. software company Maskina. During 2003-2007, he was a Vice President responsible for R&D, business development and M&A at Siminn, Iceland's incumbent telecommunications operator. He was a board member of Straumur, a publicly listed investment bank with operations throughout Scandinavia, sat on the board of the shipping and storing company Eimskip and on the board of the Finnish telecommunications company Elisa. Apart

from SulphCo, he currently is a board member of Scandanavian Biogas in Sweden and Indian Motorcycle Company in North Carolina. Mr. Hauksson serves as investment manager at Novator Partners and holds an MBA from Harvard Business School and a Mechanical Engineering degree from the University of Iceland.

29. **Asgeir Kroyer**, VP Corporate Finance, Arion Banki: Arion Bank was established as a state-owned bank on the ruins of the Icelandic based operations of the former Kaupthing Bank and placed in control of the old bank's domestic assets and liabilities. On 20 November 2009, New Kaupthing changed its name to Arion Banki. Asgeir is an investment banking specialist providing various services to corporate clients, institutional and private investors, including M&A advisory, acquisition and leverage finance. Prior to banking Asgeir was Chief Technical Officer of Maritech Group, the leading developer of seafood software worldwide.

30. **Einar Gunnar Gudmundsson**, Corporate Development, Arion Bank: Einar has deep expertise in M&A activities and dealing with distressed companies, especially after 2008. Prior to this he has been Country advisor to Ventana Global, a San Diego based Venture Capital firm that invests primarily in biotech and semiconductors in Southern California. He has also served as a professional director and has founded several companies. He also currently assists entrepreneurs and investors in Iceland through Startup Reykjavík (Business Accelerator) at Innovit.

31. **Bjorn Vikingur Agustsson**, Senior Adviser Technology and Innovation, RANNIS: Rannis administers the main public competitive funds in the field of research and innovation in Iceland, including the Research Fund, the Technical Development Fund, the Graduate Students' Fund and the Innovation Fund for Students. It is the Government co-funder of R&D projects.

32. **Sigurdur Bjornsson**, Head of Innovation and Development, RANNIS: Sigurdur is Head of Innovation and Development at the Division of Science and Innovation. Responsibilities include running the Technology Development Fund, supervising the Strategic Research Programme 2009-2015, PC member of ICTI in the 7th Framework Programme, taking part in international projects, such as MariFish, Safefoodera, Matera and SEAS-ERA European networks.

33. **Helgi Hjálmarsson**, Managing director, Valka: Valka specialises in the development and marketing of equipment and automation solutions for the fish processing industry. Although a relatively young company, Valka has already gained a proven reputation for producing high quality products. The company emphasises design in high technology hardware and software aimed at enhancing the customer's productivity, thus increasing their profitability through innovative solutions.

34. **Dr Hilmar Bragi Janusson**, Dean of the School of Engineering and Natural Science University of Iceland and former Vice President of Research and Development, Össur: Founded in 1971, Össur has amassed wide-ranging expertise in the development, manufacture and sale of non-

invasive orthopaedics. An assertive acquisition strategy has complemented ambitious organic growth over the last ten years and the Company is now a leading global player in the industry. Recognised by the World Economic Forum as a "Technology Pioneer", the Company invests significantly in research and product development, and Össur's innovative R&D unit helps ensure a consistently strong position in the market. The business employs a staff of around 1,600 across 14 strategic locations. Össur has extensive operations in the Americas, Europe and Asia, with numerous distributors in other markets. The Company's headquarters are in Iceland. Dr Janusson was only 2 months into the transition between roles in October 2012, and had led research and development for the last 20 years at Össur; one of the most progressive companies in Iceland, and one of the two largest companies in its field in the world. Dr Janusson is on the board of a number of Icelandic companies. He holds a degree in Chemistry from the University of Iceland and a Doctorate in Chemical Science and Engineering from Leeds University in England.

APPENDIX C: The Research and Innovation Council system in Iceland

After Foresight in the Nordic research and innovation council systems, Andersen et al, Risø National Laboratory Technical University of Denmark Roskilde, Denmark

Introduction

R&D performance has been improving in Iceland over the past decade. Because of its very small size, in absolute terms Iceland retains the lowest level of R&D spending in the OECD. However, its relative level of spending is one of the largest in the OECD, at approximately 3% of GDP. Since 1995, GERD expanded at one of the fastest rates in the OECD rising at more than 12% annually, compared to a rate of 3.6% for the OECD as a whole.

Approximately half of Iceland's R&D is performed by the business sector, one-quarter by government research institutions, and one fifth by universities.

Iceland has at times had the highest level of government-funded R&D in the OECD when measured as a share of GDP. Government R&D funding reached 1.2% of GDP in 2003, up from 0.9% in 1995. In recent decades, a marked shift can be seen in government R&D support, from applied research related to natural resources towards basic research, industrial technologies and, in particular, towards biomedical and health and biotechnology related research and development. Industry-financed R&D has also increased rapidly in recent years, accounting for much of Iceland's overall growth in R&D.

The Science and Technology Policy Council (STPC) was established in 2003 to improve government-wide co-ordination of science and technology policy and inform policy making, emphasis has been placed on improving the efficiency of the Icelandic innovation system. The innovation policy objectives of the STPC aim to strengthen university-based research, restructure the public research institutes, improve support to business innovation and entrepreneurship, and enhance science and technology education.

The Organisation of Science and Technology Policy in Iceland

The Science and Technology Policy Council (SPTC) is headed by the Prime Minister of Iceland. Three other ministers have a permanent seat on the Council: The Minister of Education and Science, the Minister of Industry and Commerce and the Minister of Finance. At the discretion of the Prime Minister, two other ministers with research in their portfolio may join the Council. Currently these are the Minister of Fisheries and the Minister of Agriculture. Fourteen other members are appointed to the Council upon nominations by the Ministers with research portfolio (six nominations), parties to the Employers Association and Employees Union (four nominations) and by the coordinating committee of higher education institutions (four nominations).

The Minister of Education and Science appoints nine of the non- ministerial members to the Science Committee and the Minister of Industry appoints an equal number to the Technology Committee. The mutual overlapping membership on the committees contributes to coordination between

science, technology and innovation in the policy making process. The objective of the STPC is to strengthen scientific research, scientific training and technology development in the country in support of Icelandic cultural development and to increase economic competitiveness. The STPC issues declarations for public policy on science and technology. The policy declarations are prepared by the Science Committee and the Technology Committee respectively. The composition of the STPC Council brings STP issues to the highest political level.

The Research Fund was established through fusion of the previous Science Fund and the Technology Fund. The Research Fund is governed by a board, whose chairman also chairs the Science Committee. Linked to the same board is also the Equipment Fund.

Similarly the Law on the public support to technology development and innovation established a Technology Development Fund. Thus link a between policy and implementation through funding is provided. This law also established the Innovation Centre (IMPRA), operationally linked to Icelandic Technology Institute.

The Ministry of Education Science and Culture and the Ministry of Industry and Commerce provide support for the two respective committees in preparing policy documents. Overall co-ordination is provided by the Science Office including a secretary to the STPC placed at the Ministry of Education Science and Culture.

RANNÍS (The Icelandic Centre for Research), reporting to the Ministry of Education, Science and Culture, provides operational support to the committees and funding bodies, to manage the international connections, monitor the effects and impacts of policies and to provide intelligence and informed advice to the STPC and its boards and sub-committees, as requested. Thus RANNÍS administers the Research Fund, the Technology Development fund, the Instrument Fund, the Graduate Training Fund and other funds for science that the government may want to assign to it. It maintains the National Contact Point Coordination and support network to the EU Framework Program, the Nordic NOS - organizations and membership to several other international bodies in science and technology co-operation.

RANNIS was established by a legislation enacted in 2003 and replaced the office of the earlier Icelandic Research Council established by legislation in 1994. This in turn replaced earlier councils that trace their origins to a research council structure set up before the Second World War. The Icelandic Research Council was abolished by the legislation in 2003.

The main functions of RANNÍS are the following:

• RANNÍS operates the competitive financial public support system for research and technological development This includes the Research Fund, the Fund for Research Equipment and the Graduate Education Fund under the Ministry of Education, and the Technology Development Fund under the

Ministry of Industry. Each of the funds is governed by a Board of Directors, the allocation of grants being subject to extensive peer review processes.

• RANNÍS is actively providing the Science and Technology Policy Council and its subcommittees with information on scientific research and technology development nationally and internationally as a basis for the policymaking process.

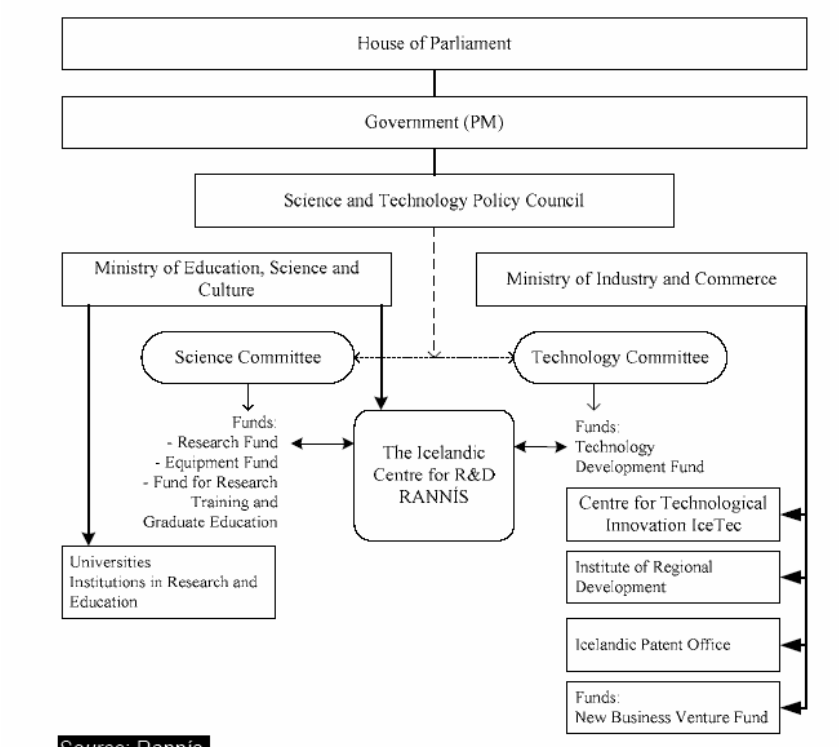
• RANNÍS coordinates and promotes Icelandic participation in international cooperation in science and technology and interacts with corresponding agencies and research councils in other countries. RANNÍS is the NCP-host organization for 7FP.

• RANNÍS monitors the resource allocation and performance of R&D, evaluates the results of scientific research, technical development and innovation, and participates in international benchmarking of the results.

• RANNÍS promotes public awareness of research and innovation in Iceland.

RANNÍS serves the Icelandic science community across all fields of science and humanities. The staff of RANNÍS is a team of 18, including 12 professionals, led by a Director. RANNÍS relies heavily on the involvement of external contacts in its operation. Around 70–80 working scientists and technical experts are co-opted to assist in the evaluation of grants applications and international contacts at any time on a rotating basis.

Structure of the Icelandic science and innovation governance system



APPENDIX D: About the Author

New Zealand needs to do better and it can do so. In fact we already collectively know the answers, these are visible now as patterns across company strategies. I went to Iceland to be certain that I wasn't imagining this.

My hope is that New Zealand can achieve stronger top line revenue and that this can mean better opportunities for Kiwis, especially graduates and returning Kiwis. I want better choices for how we spend our time and money to make New Zealand an even better place.

In my 20+ years of involvement in the non-profit community sector I've seen time and energy available for family and community dry up, my own included. The revenue line is one of the starting points for creating a wealthier society in every sense. There are others working on better choices to spend resource on, but earning our way in the world is how we create the choices in the first instance.

Technology is the highest value game in town and one that we can play. I'm dedicated to supporting New Zealand's technology entrepreneurs to realise their full potential. Innovation is a core strand of our future and we have a unique environment that gives us opportunities to do things differently.

I am currently an independent innovation advisor and strategist working with many of New Zealand's most promising technology firms. I'm 39 years old, my family and I have a long future in New Zealand. I have a strong vested interest and a contribution to make.

Since early 2004, I've been helping hundreds of companies create wealth from technology. These range from billion dollar companies like Fisher and Paykel, rising stars like Buckley Systems and BCS Group, through to companies turning over less than $5m. I've also worked with new companies that have hallmarks for success, such as founders with a solid track record and strong customer demand. I work with people that have an unreasonable focus on changing the world with their technology.

I previously spent 5 years investing in technology ventures for the Government within TechNZ (now Callaghan Innovation). I've also built and sold a business and been General Manager of a technology company. Since late 2008 I have been operating independently as an expert resource to more than 35 technology companies. Since 2005 I have been volunteering as mentor and judge in the SPARK student entrepreneurship challenge.

Overall, I've facilitated more than $60m of investment into technology and currently advise a handful of companies. In the process I've built networks with companies, private investment organisations, Government, research organisations and service providers. More importantly, I've seen the business and revenue models of hundreds of teams trying to translate the value of their capabilities into markets here and overseas.