From:	no-reply@mbie.govt.nz
To:	Research, Science and Innovation Strategy Secretariat
Subject:	Draft Research, Science and Innovation Strategy submission
Date:	Sunday, 10 November 2019 11:20:47 a.m.
Attachments:	Online-submission-form-uploadsdraft-research-science-and-innovation-strategy-submissionsMBIE-RSI-Submission-Stephen-MacDonell.pdf

Submission on Draft Research, Science and Innovation Strategy recevied:

Are you making your submission as an individual, or on behalf of an organisation?
Individual

Name
Stephen MacDonell

Name of organisation or institutional affiliation

Role within organisation

Email address (in case we would like to follow up with you further about your submission)
stevemac@acm.org

Which of the below areas do you feel represents your perspective as a submitter? (Please select all that apply)
Researcher, Provide services to researchers

If you selected other, please specify here:

Gender

Ethnicity

Name of organisation on whose behalf you are submitting, if different to the organisation named above

In which sector does your organisation operate: (Please select all that apply)

If you selected other, please specify here:

How large is your organisation (in number of full-time-equivalent employees)?

Please indicate if you would like some or all of the information you provide in your submission kept in confidence, and if so which information.

Please upload your submission document here
MBIE-RSI-Submission-Stephen-MacDonell.pdf - Download File

7 November 2019

Ministry of Business, Innovation and Employment (MBIE)

Submission on draft Research, Science and Innovation (RSI) Strategy

I am commenting on the draft RSI Strategy as an individual, but drawing on my current roles as:

- Deputy Chair, Software Innovation New Zealand, the national software research network
- Professor in Information Science, Otago Business School, University of Otago
- Professor of Software Engineering, School of Engineering, Computer and Mathematical Sciences, Auckland University of Technology

I am also Theme Leader for Data Science and Digital Technologies in the *Science for Technological Innovation* NSC but the Challenge is making a separate submission, to which I am contributing.

As such my comments come from the perspective of being an active researcher and research leader and manager with particular interests in the digital high-tech sectors. As I found it difficult to structure my feedback in terms of the specific questions asked the following is a bit more unstructured. I hope it is still of some use in this form.

At the outset let me say that there are many positive aspects to the draft Strategy – I applaud the bold sense of ambition, the emphasis on research and innovation (R&I) that is relevant to New Zealand and where there is a clear rationale for that R&I to be undertaken here, the push for a majority of 'at the frontier' R&I (though importantly as stated, this could be of any form, fundamental, translational or applied), the crucial focus on talent, the consideration of larger scale government-research-industry partnerships, and the positive intent regarding Vision Mātauranga.

Areas of focus - more of the same or transformation?

I do not think a sector-based approach is necessarily the best way forward as it presumes we can successfully pick future winners. That said, there are some broad horizontal research domains that are strategically important across multiple sectors. One of these is digital. Software-based technologies have the potential to deliver two-fold transformation: 1. digital enterprises can themselves lead the world at relatively low-cost (being highly scalable and requiring limited infrastructure); 2. software-centric products and services can enable enterprises in all other sectors, including those of particular strength in New Zealand (fintech, agritech, health/medtech), to lead the world. You only need to look at the 2019 TIN200 report to see examples of both. Finally, digital R&I can occur in the regions just as it can in the major metropolitan areas. Yet *public* funding for research in the underpinning science and engineering for digital advances has been low for many years (the recent SSIF Data Science Programme investments notwithstanding). Our own experiences and discussions with MBIE suggest a lack of familiarity with what excellence and impact look like in these disciplines (though I am encouraged by the framing of excellence in the draft strategy as "the best thing possible *in its context*" [emphasis added]). Researchers in these disciplines have also struggled to articulate the importance of their work. To genuinely attract, develop and retain the very best research capabilities in these disciplines, in order to enable true transformation rather than more of the same, we need to strategically address the digital technologies R&I opportunity (perhaps including prioritisation or more targeted/weighted investments). Such an approach has been immensely successful in Ireland, Norway, Sweden and Finland.

'Public' and 'private' R&I (and R+D rather than R&D)

The distinction between public and private R&I is convenient but it is also somewhat artificial, at least as far as some public R&I is concerned. Certain 'public' schemes suggest, encourage or even expect corresponding 'private' investment – applications to the Endeavour Fund's Research Programmes scheme, for instance, are strengthened by private contributions, some in-kind, others in direct cash.

We need also to find mechanisms to encourage higher levels of private investment in R[esearch] rather than/in addition to investments in D[evelopment], to lift business horizons beyond today/tomorrow. One of our challenges with past efforts has been that – in general – too much support has been directed to immediate-term problem-solving by businesses that are too busy to improve. What I hope this Strategy will enable is suitable support for businesses with sufficient vision and scale to undertake *genuine R&I* to serve their growth and productivity ambitions.

Software startups are a case in point: some may be innovative but they are not really among "the main actors within the RSI system" (p.11). Many smaller software-intensive businesses have (very) short horizons; start-ups in particular need capital and business mentoring, and are too highly geared to embrace research whether scientific or otherwise. Such companies tend to not be receptive to opportunities for genuine research, being neither prepared to invest, nor to wait, given their focus on delivery and on building a market. In such circumstances short-term mentoring, capital investment and problem solving via consultancy (and likely focused on efficiency) seem more appropriate. This should not be called R&I, however, nor should it be supported as such. Genuine R&I in software should extend well beyond a single release cycle and/or a single team.

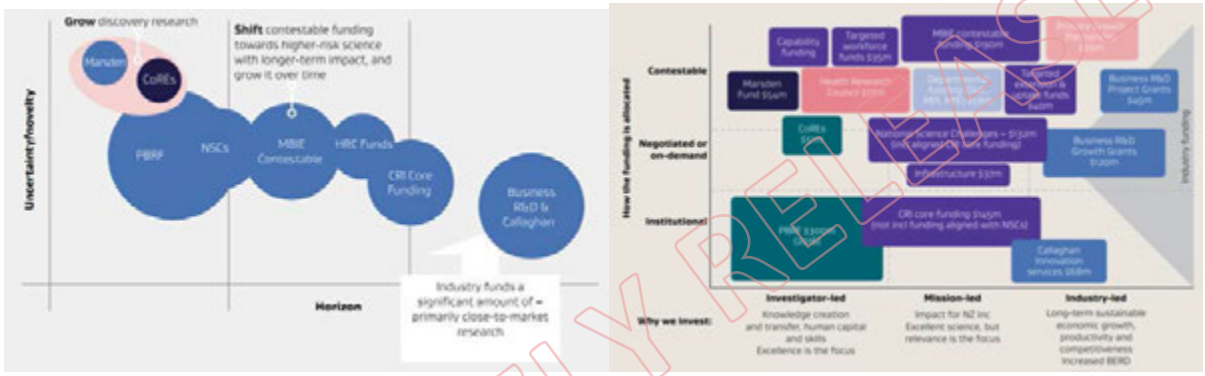
Such mechanisms could require or even incentivise businesses to partner with public research providers to form the best teams to co-design and conduct closer-to-market research. An indirect benefit of such an approach would be the increased capacity of businesses and public research entities, and the individuals involved in each, to engage with one another, enhancing the flow of personnel across structural boundaries. In turn this could help us to retain top R&D talent in New Zealand – a major challenge in some sectors.

Premium service ecosystems as an alternative means of scaling up

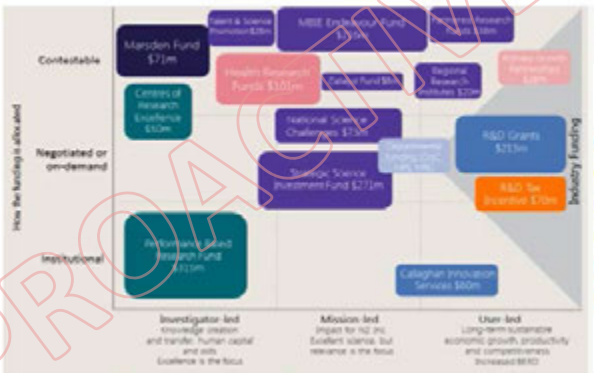
"It means an economy that produces and exports higher value goods" (p.8) – but it is in our services sector that there is the greatest potential for sustained – and environmentally sustainable – growth in productivity. Service ecosystem and platform opportunities in particular enable co-operating partners to scale collectively where they could not do this on their own. Take the Xero ecosystem – a great example where hundreds of smaller players can access a large customer base by leveraging the market created by the central platform. We know that customers will pay more for premium-quality services so that too is an opportunity, given that New Zealand goods and services are highly regarded globally.

Is the Endeavour Fund oriented to investigator-led research?

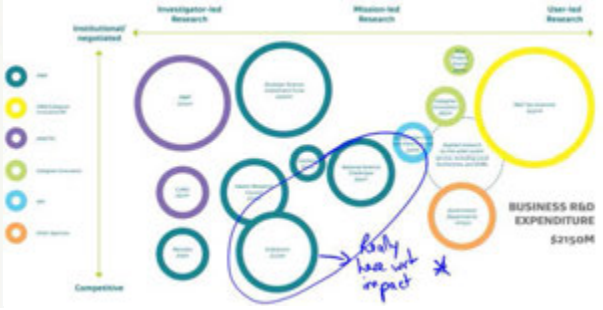
The 2015 NSSI signalled an intent to shift the Endeavour Fund (EF) "towards higher-risk science with longer-term impact" but this does not in itself mean that EF research is or should be investigator-led – yet this is implied in the Strategy's investment figure (pp.2, 15). Moreover, the horizon 3 positioning is not consistent across various MBIE documents (nor in relation to the mission-led NSCs) – see below. The EF is still referred to as "mission-focused" in this year's Guidelines and "mission-led" in the EF Investment Plan 2019-2021. Impact assessments for the EF further reinforce its mission-led nature (and in fact some assessments imply a closer link to user-led research).



Both above from 2015 NSSI



2019-21 Endeavour Fund Investment Plan



Current Strategy document

'Extended' Vision Mātauranga

The vision remains as it was so I'm not sure that 'extended' is quite the right term. The thinking seems to be more related to a deepened or stronger commitment to/engagement with Vision Mātauranga – which is to be commended. Initiatives that are led by Māori for Māori will be key here, as will engagement that is on their terms in respect of time and place. Targeted and sustained capacity development for researchers can shift attitudes and actions so that engagement with Māori moves from obligation to opportunity. Commitment to partnering needs to be sustained, in it for the long-haul, rather than transactional. Finally, care regarding considerations around IP, mātauranga and taonga species is crucial.

"Ensure the RSI system is open to the best Māori thinkers and researchers." (pp.3, 36, 37) I believe we need something more active than this. Ensuring greater opportunities for Māori as researchers (and particularly rangatahi given the median age of Māori is 24) is certainly the right aspiration but there is well-established evidence that the structures and processes right back in secondary school, and perhaps even before that, have profound negative effects on the progression of Māori to NCEA and further education, let alone a PhD, postdoc and a career in research. It is important to do what we can within R&I but the issues are more systemic.

"How can we ensure that Māori knowledge, culture and world views are integrated throughout our RSI system?" (p.37) I'm not convinced that integration as such is the goal – rather, Māori values, Māori knowledge could guide or drive or inform… What is also missing in the document is a definition of what success looks like for 'Extended Vision Mātauranga', this too should be explicitly covered in Part 5.

Other comments

- "Science is a particular way of doing this." (p.17) Apart from a handful of mentions (and of course discounting the many instances of "research, science and innovation" deriving from the title) science is not central to the document, nor to the strategy. Given the breadth of intent of the strategy, and the consequent breadth of approaches that will be needed to deliver on it, I question keeping the word "science" in the title at all. "Research and Innovation" more directly 'connects' the two core elements, and is also more accommodating of non-science disciplines that can just as readily generate new knowledge and inspire innovation.
- "In the near term, we expect RSI to make specific contributions to the priorities where it is best placed to do so." (p.9) – I'm not clear on what this means…
- Patents are a good signal of impact but are not relevant to all sectors/jurisdictions – software in New Zealand being a clear case in point – so a range of indicators of impact will indeed be required.
- I can see how it makes sense to compare our performance against the other SAEs but the differences should be acknowledged somewhere – Denmark, Finland and Ireland are clearly advantaged by their proximity/involvement in the EU (both as a market and in terms of research funding) and Singapore and Israel are far more mature with respect to BERD. In addition "our large firms" (p.22) are not large on an international scale so again the comparisons/expectations are approximate at best.
- "many New Zealand researchers, institutions, and innovators are focused on New Zealand as their frame of reference. As a result they may fail to make connections with global experts, find their place within major business communities, or position their products to major markets." (p.22) While I totally accept this is likely to be true I'm not sure that we can or should solve this with the researchers themselves – rather, what might work is to add brokers to the system, intermediaries who can work effectively across the two spheres of research and commercialisation.
- "international investment into our research system remains comparatively low" (p.24) – in the public sector there are certainly restrictions on what can be supported – typically it is mobility rather than actual research FTE. Greater use of reciprocal funding agreements between nations, building significantly on the Catalyst scheme, would almost certainly lead to stronger connectedness.

- In order to further enable the system to be dynamic and to bring in new people and new ideas why not have a Marsden Fast-Start-like grant opportunity within the Endeavour Fund?
- I was surprised to see reference made to possibly "encourag[ing] further specialisation in our universities where appropriate" (p.38) – to what extent is this within MBIE's brief (compared to TEC, say).

I would be happy to clarify any of my comments or to contribute to further discussions.

Yours sincerely,

Stephen G. MacDonell, PhD FIITP