Submission to the Productivity Commission re Services Sector 1st Interim Report

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Topics Proposed

With respect to the three topics proposed for in-depth analysis, and admittedly focusing on ICT and its more effective utilisation, the following topics are recommended:

- Improving occupational licensing in the services sector
- Addressing barriers to the successful application of ICTs

General Comments on Content of 1st Interim Report

The following general comments relate to the 1st Interim Report (as well as other information presented at the Productivity Hub Symposium) and inform the subsequent consideration of two specific issues.

- The key challenge for New Zealand in terms of ICT utilisation is not related to infrastructure, nor in large part to regulation (although some changes re occupational licensing and incentivising may be beneficial). The key challenge relates to the development and retention of human capital *with the appropriate skills, knowledge and experience*.
- I would contend that the 'Information industries' are also, crucially, 'Person-centred industries'. Organisational value resides extensively in the people who create and manage knowledge, as much as in the knowledge itself.
- Following on from the above points, we see the 'Ralph Norris Effect' and the significant impact of Software Heroes. The isolated effect of highly capable individuals, coupled with the predominance of SMEs in this country, contribute to the wide dispersion of productivity across firms intensively using ICT and the limited convergence within the sector.
- New Zealand cannot rely on the up-scaling power of ICT to make gains – we are too small (cf. US retail, Australian wholesale who made gains on the back of adopting ERP, online presence, supply chain efficiencies, JIT). In addition, such thinking reflects a process focus rather than a focus on innovation in services; the former has in-built limits.

- Within the ICT sector (and particularly the software sub-sector) the effect of New Zealand's distance from the rest of the world is reduced, and hence we see activities such as global software development occurring, but time dislocation can be problematic (lending further support to the suggestion made at the Productivity Hub Symposium that we should link more with Asia and Latin America than, say, Europe).
- Regional/specialist agglomeration (via clusters), specialisation and premium quality may provide more effective means of differentiation and growth than via increased scale.
- Within-sector competition is also unlikely to have a substantial effect. It is too difficult to compete given the clear IP advantage of those relatively few individuals with the ideas and the presence and influence of Software Heroes. Less-clever skills (e.g., programming) are easily transportable but are also relatively low-impact. Occupational licensing (or similar) focused on efficient and cost-effective provision of quality ICT goods and services, on the other hand, may have a competitive effect in directing consumers to those in the sector who are signalled to be professionally competent[2].

[1] This is an individual submission and may not necessarily represent the views of my employer.
[2] http://www.itcp.org.nz/

- R&D in ICT and Innovation across the service sectors is very limited (Wholesale Trade and Information Media and Telecommunications notwithstanding). At present there is no dedicated fund to support ICT R&D in its own right. Rather, funding must be sought in relation to other sectors. This has a negative effect on attracting/retaining ICT researchers. If such a policy is to be maintained then, at the very least, a proportion of this funding should be ring-fenced for R&D in ICT and Innovation as applied to other (service) sectors.

Specific Issues – Managerial Capability, Complementary Skills

This part of the submission is motivated by the Commission's 1st Interim Report (specifically the content shown in Appendix A) and centres on two pairs of assertions:

1. In order to attain desired levels of productivity as a result of leveraging investment in information and communications technologies (ICTs) we need Boards to have sufficient ICT expertise; perceptions and actions in New Zealand are working contrary to this need.
2. In order to ensure that measurable business benefits are obtained from investments in the development and/or deployment of software-intensive systems we need development personnel to have sufficient breadth of capability and sufficient domain knowledge; perceptions and actions in New Zealand are working contrary to this need.

I address each of these pairs of assertions briefly in turn.

Board/Executive Expertise in ICT

In order to successfully leverage investments in ICT, New Zealand needs organisations with leaders who are suitably informed – frequently referred to as being 'tech-savvy'. Those involved in the governance, leadership and management of organisations providing market and non-market services require at least a baseline understanding of technology – well beyond the acronyms and buzzwords – to make informed decisions regarding the use of ICTs. A recent survey of Australian business leaders recognises this need[3] - though it is unclear as to whether similar attitudes hold in this country. There is some evidence that the technical expertise of many New Zealand Directors is limited, and it may be, in fact, that other concerns take precedence over ICT knowledge.[4] Irrespective, evidence drawn from US companies indicates a direct link between an entity's IT knowledge and IT governance and that entity's financial performance (Boritz and Lim, 2007).

While admittedly anecdotal (and so begging for empirical research), it is my professional opinion that it is too easy for those studying business to skip what are perceived to be 'technical' courses. As a result, when these individuals emerge as managers and CEOs they are not sufficiently conversant with (or even comfortable discussing) ICT. This means that great reliance is then placed on CIOs, CTOs and the like; however, (i) these roles do not always lead upward in terms of careers; (ii) there is high turnover in such roles as the barriers to switching employers are low, and (iii) in tough times CIO and CTO roles are seen as relatively dispensable.

[3] http://www.enterprisegovernance.com.au/tags/digital-directors
[4] http://www.computerworld.co.nz/article/466914/it_seen_pathway_board_governance/

Developer Capability and Domain Knowledge

The software sub-sector seems to be focused on the recruitment and retention of programmers as opposed to those who might be better placed to leverage ICT for growth. Admittedly it is through programming that 'the rubber meets the road' but – and particularly given the growing dominance of Agile development approaches – the skill set required of good and great developers is much more diverse than an ability to write code. Today's development personnel need to be adaptive and self-organising, and they need to have sufficient domain understanding[5] and communication capabilities to be able to interact with the customers and users of the organisations for whom they are building and deploying software-intensive systems (e.g., see Itkonen *et al.* (2013)). Developers possessing these abilities will be better able to support those organisations in adopting and leveraging ICT in an optimal manner.

Call for Research

In short, in both cases there is an apparent contention between what we (i.e., New Zealand Inc.) need and what we have, or what is perceived as being valuable. These issues require in-depth research, potentially followed by appropriate interventions. In the first instance the research should investigate the current situation in terms of what we have and what is perceived as being valuable:

- Re: Board/Executive Expertise in ICT
    - What are the skills, knowledge and experience competencies of Board Chairs, Board Members and Executive with respect to ICT?
    - What are the expectations of Board Chairs, Board Members and Executive with respect to their own ICT skills, knowledge and experience competencies?
    - What are the expectations of CEOs, CIOs and CTOs with respect to the ICT skills, knowledge and experience competencies of Board Chairs and Board Members?
- Re: Developer Capability and Domain Knowledge
    - What are the skills, knowledge and experience competencies of development personnel with respect to domains of application?
    - What are the expectations of development personnel with respect to their own application domain skills, knowledge and experience competencies?
    - What are the expectations of provider CEOs with respect to the application domain skills, knowledge and experience competencies of development personnel?
    - What are the expectations of client CEOs with respect to the application domain skills, knowledge and experience competencies of development personnel?

The outcomes of these analyses should be compared with those drawn from other nations in the OECD. Based on the results of these analyses appropriate interventions (e.g., targeted training and professional development programs, more suitable tertiary education offerings, R&D incentives, regulatory/licensing changes) may need to be designed and deployed.

References (a sample only!)

Boritz, J.E., and Lim, J.-H. (2007) Impact of Top Management's IT Knowledge and IT Governance Mechanisms on Financial Performance. In *Proceedings of the Twenty-Eighth International Conference on Information Systems,* Montreal, Canada.

Itkonen, J., Mantyla, M.V., and Lassenius, C. (2013) The Role of the Tester's Knowledge in Exploratory Software Testing. *IEEE Transactions on Software Engineering* 39(5): 707-724.

[5] http://www.boxuk.com/blog/importance-domain-knowledge/

Appendix A – Motivating Questions/Content, 1st Interim Report, July 2013

Q8.12: What are the main factors that prevent firms from extracting value from investments in productivity-enhancing ICTs? What can be done to address them?

Q8.13: Are there shortfalls in the complementary factors (eg skills) that are required for firms to successfully make use of ICTs? If so, what are the specific factors, and is there a role for government policy to address these shortfalls?

p4: "Over the past decade New Zealand has invested in ICT at a similar rate to other OECD countries. However, ICT investment alone is not sufficient to generate productivity growth – equally important is how ICTs are put to work and applied within firms. It appears that many New Zealand firms are not extracting the full potential of these technologies. This points to the need for policy settings that encourage ***investment in complementary skills and capabilities.*** Developing the business systems and processes necessary to incorporate ICTs into firm practices are also important." (Emphasis added.)

p6: "One issue is whether the ***technical skills*** and broader human capital (including ***management capability***) that are required to successfully harness technology are available to New Zealand firms." (Emphasis added.)

p93: "However, other market service industries – including wholesale trade; retail trade; transport, postal and warehousing; and professional, scientific and technical services – also have the potential to benefit from ICT adoption and use. But these industries did not achieve strong productivity growth in New Zealand. This suggests they have either not invested in ICT to any extent, or not converted any such investment into significant productivity gains."

p93: "For example, the labour productivity levels of the 75th percentile firms in the information, media & telecommunications industry and the administrative & support industry were 3.1 times those of the 25th percentile firms, and 2.5 times in manufacturing. This suggests that in each industry there exists a long tail of poorer performing firms."

p129: "Another area to look may be the regulation of intangible assets, eg databases, ***organisational know-how, and various forms of intellectual property***. These assets are growing in importance as sources of innovation and productivity gains including, and perhaps particularly, in some service industries. Policy issues include the financing of start-up firms, the treatment of intangibles in corporate valuation and accounting frameworks, competition policy in the digital economy and the role of intellectual property rights.

Large service firms are complex and challenging organisations. ***Managerial skills, and human capital more broadly,*** are fundamental to innovation and related productivity improvements at the firm level. The extent to which deficiencies in these exist in New Zealand and, if so, what policy changes could lead to better outcomes, remain open questions." (Emphasis added.)