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# Government as a Digital Standard Bearer

## Abstract

This article explores the key role the government can play in promoting the digital economy through the uptake of global digital standards. The potential of digital standards can be illustrated by the revolutionary impact in the 20th century of the introduction of barcodes on logistics, and the impact of standardised containers in accelerating the growth of world trade and global economic integration. In the 21st century, will digital platforms and standards play a similar role in enabling economic development in the information age?

The key challenge in the digital standards space is for the government to find the sweet spot that is the equivalent of the Goldilocks zone – neither too hot nor too cold: this is where the government acts as a digital standard bearer – establishing the overall regulatory regime and then acting as an agile fast follower, not the leader getting out in front or going alone.

**Keywords** digital government, data standards, GS1 global standards, New Zealand Business Number (NZBN)

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## Introduction – digital government is lagging behind the digital economy'

The Australian Productivity Commission and New Zealand Productivity Commission observed in a 2019 report:

Digital technologies have transformed nearly every aspect of daily interactions between households, firms and governments ... The efficiency and effectiveness of interactions with government agencies – from registering a motor vehicle to completing a tax return – have been improved using digital technologies. But ‘digital government’ remains far from a reality.

The report goes on to conclude:

Despite the plethora of government policies and bodies in this space, the process of digitalising government services has not kept up with technological developments, nor with firm and consumer use of digital technology ... digital government on both sides of the Tasman is something of a patchwork – some government

## Box 1 Chronology of the main digital government initiatives in New Zealand

- 2000:** E-government strategy adopted, and a special unit established in the State Services Commission
- 2005:** National Digital Strategy adopted (updated in 2008)
- 2009–17:** Better Public Services goals include two result areas focused on digital (updated in 2017):
  - Result 9: Business gains value from easy and seamless dealings with government
  - Result 10: People have easy access to public services, which are designed around them, when they need them
- 2010:** Role of government chief information officer (GCIO) created as the functional leader of the ICT strategy based in the Department of Internal Affairs
- 2013:** Government ICT strategy and action plan for New Zealand approved by the government (updated in 2015). The New Zealand Data Futures Forum established (phased out in 2018)
- 2015:** Four functional leads created: government chief digital officer, government chief data steward, government chief information security officer and government chief privacy officer
- 2015:** Digital Government Partnership established with stakeholders from government agencies (disestablished in 2019)
- 2016:** ICT strategy updated, replacing the action plan with an integrated work programme
- 2019:** Strategy for a Digital Public Service released
- 2022:** Digital Strategy for Aotearoa released

services are highly digitalised, integrated and provide a good user experience, while others are confusing, siloed and still partly paper-based. (Australian Productivity Commission and New Zealand Productivity Commission, 2019, pp.1–3, 63)

Nevertheless, New Zealand, while slightly behind pacesetters like Korea, Denmark and Estonia, ranks reasonably highly in world surveys on digital government and the digital economy.<sup>2</sup> One 2017 survey ranked New Zealand's digital economy a 'standout among standouts', meaning a country that is both highly digitally advanced and exhibiting high momentum, but without being in the top group of countries on either dimension (Chakravorti and Chakravorti, 2017). In effect, New Zealand is a top-rate second-rate player in the digital space.

### The New Zealand digital economy is something of a paradox

New Zealand's digital economy is thriving; there are many successful games producers,

a number of software providers (such as Xero) have gone global, and Trade Me is the only instance (outside China) where eBay has been beaten by a local product. In the public sector, the power of information technology has been successfully harnessed in a number of specific applications. The New Zealand Companies Office has long been a world leader, and New Zealand has consistently ranked first in the World Bank's ease of doing business index. Despite these leading-edge examples, we do not seem able to scale up these innovations across the public sector. New Zealand's digital government approaches have not been enduring: changes of government result in new strategies being developed. And despite digitisation's obvious 'network' effects and clear association with economies of scale, there is little obvious central leadership, with responsibilities spread across a range of agencies and roles.

Box 1 highlights the changing institutional arrangements and plethora of digital strategies, which generally had a short 'use by' date. It is an open question how much these top-down arrangements

contributed to the development of digital government in New Zealand. The New Zealand experience shows that it is possible to achieve high rankings for digital government and the digital economy from bottom-up initiatives without much contribution from top-down digital strategies. Arguably, the most important drivers arose from the wide-ranging public management reforms of the 1980s and 1990s, which enabled individual public agencies to more readily take the initiative to adopt ICT into their business models

The government plays a pivotal role in society. Its monopoly on the exercise of coercive powers makes it uniquely well placed in the digital space to promote standards (see Box 2) and develop platforms based on datasets with universal coverage, but the use of that coercive power is a two-edged sword. There are restrictions on how that information can be used because of other policy objectives, such as privacy and the need to protect against re-identification. Data re-identification or de-anonymisation involves matching anonymised or de-identified data with other data to identify the individual concerned. Re-identification is a problem because government-held data on citizens and business data can be used for unintended purposes, including for criminal use.

### Transformational change through standardisation

Recent world economic history provides two examples of transformational change brought about by standardisation: barcodes and container sizes.

Since the 1960s the introduction of barcodes and associated data standards has affected labour productivity in two ways: they increased labour productivity by accelerating work throughput; and they generated labour cost savings from a combination of automation, eliminating tasks, reducing errors and removing duplication. But the transformational change brought about by barcodes involves much more than cost reductions. They profoundly affected the supply and logistics sector, and enabled the growth of market research through the improved visibility of consumer behaviour (Basker, 2011).

Containerisation has been a major driver of globalisation. Use of containers

started in the 19th century and developed slowly thereafter, but the breakthrough came in 1956 with the introduction of standardised containers. Containers provided more than just a better means of shipping goods from one port to another; they transformed the whole logistics chain from factory to the final destination. The growth in containerisation led to dramatic reductions in transport costs, which transformed production through allowing global value chains. The impact of international standardised containers was more important for the growth of world trade after World War II than successive rounds of tariff reductions (Levinson, 2006).

#### Global data standards could be transformational

In the digital space, both public and private data standards are important. While New Zealand has a significant high-tech sector, it is largely a technology taker, so the relevant private standards are largely developed offshore. New Zealand has been active in contributing to the development of several global digital standards, but is generally more of an adopter (and adapter) of public standards rather than an initiator.

There is also a plethora of competing private standards. ICT development is led out of the private sector, and this has produced a wide array of both proprietary and open standards. Bluetooth is a classic example of an open standard. Apple is an example of an ecosystem of proprietary private standards.

The government has an important role to play in supporting the adoption of global data standards that can be readily adapted to a range of applications. The potential role of the state can be illustrated by examining the impact of GS1 digital standards, including a case study of the New Zealand Business Number (NZBN), a digital platform based on GS1.

#### GS1 – a key part of the global digital standard architecture

GS1, an international non-profit organisation, is a key part of a global ecosystem of public and private standards, along with domain-specific regimes such as the International Standard Book

## Box 2 Standards can be a two-edged sword

Standards can be hugely beneficial by reducing switching costs to consumers and enabling producers to achieve economies of scale. As Swan observed, ‘Several detailed econometric studies have established a clear connection at a macroeconomic level between standardisation in the economy, productivity growth and overall economic growth ... Estimates vary somewhat from study to study, but overall, the growth of the standards catalogue over recent years may account for between one eighth and one quarter of productivity growth over the period’ (Swann, 2020, p.i).

The benefits of standards extend beyond cost savings and productivity gains to include the building of competencies, reducing barriers to entry, building network effects and increasing trust between trading partners (Swann, 2020).

However, standards can have

a downside if they aren’t set well, particularly if they are derived with a specific technology in mind. Standards development is often very path dependent (examples include VHR vs Betamax videos; Phillips vs Robertson flathead screws). The potential for lock-in is particularly high with the use of proprietary solutions based on one technology or business model.

Private standards, even though they are voluntary, can have similar effects to non-tariff measures introduced by governments in creating non-tariff barriers. Research in the food sector commissioned by the APEC Business Advisory Council discusses how private standards mimic non-tariff measures introduced by regulation: for example, the requirement by some businesses for standardised package sizes for fresh fruit precluded trade in pineapples (APEC Business Advisory Council, 2016, pp.66-7).

Number (ISBN), GPS for geo-spatial data and SWIFT in international finance.<sup>3</sup>

GS1 provides global data standards that can be applied to the global supply chain by regulators, public border agencies, exporters, logistics providers, wholesalers, retailers and consumers. The aim is to have standards created by industry, for industry, with GS1 acting to facilitate a dialogue among business and technical experts. These standards are developed through a global standards management process which is a community-based forum for businesses to work together and develop standards-based solutions (GS1, n.d.-a).

#### Significant gains and untapped potential

Studies of the impact of GS1 on both non-tradeables and the trade sector in New Zealand show that, while GS1 has yielded significant gains, considerable potential gains have yet to be realised.

A report by NZIER (NZIER, 2019) identified several applications of GS1:

- E-commerce: GS1 data standards support e-commerce through the accurate representation of product

characteristics such as specifications, location and origin. For example, Amazon requires a unique product identifier, known as a GTIN (global trade item number), to create new listings; Google adopted the GTIN in 2015.<sup>4</sup>

- E-invoicing: a joint study by the Australian Taxation Office and New Zealand government (Australian Government, Australian Taxation Office and New Zealand Government, 2018) estimated that e-invoicing using standards could result in cost savings for the Australian economy of A\$28 billion over ten years.
- Product compliance: a scoping study of electronic tracking of construction materials showed a reduction in the incidence and cost of non-compliance, saving the industry NZ\$23 million annually (Dowdell, Page and Curtis, 2017).
- Exporting: automated information in the export supply chain using GS1 standards reduced manual entry errors, resulting in Australian meat exporters

saving an estimated A\$14 million each year (GS1, n.d.-c; GS1 Australia, n.d.).

- **Traceability:** GS1 data standards can be used to trace the origins of imported food. Some consumers are willing to pay more for traceable food compared to food that is not traceable: Koreans indicated they were willing to pay 39% more for traceable imported beef products compared to non-traceable products (Lee et al., 2011).
- **Authenticity:** standards can also be used to protect against counterfeiting (GS1, n.d.-b).
- **Product recall:** GS1 standards provide a platform for product recall.<sup>5</sup> NZIER studied the impact of GS1,

### **The gains from standards architecture rise exponentially with increased uptake**

GS1 is an interesting case because it is a particular type of public good – a club good that is non-rival but excludable. GS1 provides an excellent example of how a standards architecture has network effects: the more businesses adopt the architecture, the more valuable it is to everyone in the club. Metcalf's law – that the gains rise exponentially with increased uptake – highlights the potential opportunity. The state has a particularly important role to play as a digital standard bearer where regulatory approvals such as safety checks and customs clearance are an integral part of value chains.

### **Several global digital standards are underway**

There are several multi-country initiatives underway to promote the adoption of international standards, such as the European Commission's Strategy on Standardisation (European Commission, 2022) and the International Chamber of Commerce (ICC) Digital Standards Initiative (ICC, 2023). The ICC initiative is aiming to address the fragmentation in current attempts to digitise the global trading system by mapping out what standards already exist (and how they co-exist), exploring how they can best be leveraged to help drive wider adoption, and creating new frameworks to unify digital trade processes.

The government has a crucial supporting role by proactively encouraging adoption of common standards and not going it alone by developing bespoke stand-alone regulatory regimes or unique standards for public data services.

### **But there are costs**

History teaches us that there are also considerable obstacles to the process of standardisation. For example, standardising container sizes was highly path dependent, and switching costs were a major obstacle. While there were major network effects and spillover benefits, these were often dissipated rather than concentrated on those actors that faced the switching costs. The government played a pivotal role in ensuring the potential network effects of standardised containers were realised.

Once standards are established, switching costs are higher and vested interests (including accreditation and certification agencies) have an interest in their continuation. History provides numerous examples of 'standards wars', in which inferior technical standards end up dominating standards with superior performance – such as QWERTY over Dvorak keyboards, VHS over Betamax video format, and Phillips over Robertson screw heads (Shapiro and Varian, 1999).

focusing on the effect of these data standards on labour costs and labour productivity with existing penetration of the wholesale and retail industries (non-traded sector). It found that the labour productivity gains of using the GS1 data standards had directly increased GDP by NZ\$417 million, or 0.15%, annually. This estimate is a conservative indication of the contribution of GS1 to the New Zealand economy, because it only focuses on the impact of labour productivity. Additional contributions include:

- connectivity, by making further connections easier;
- credibility gains by having one source of truth – the source documents – for all accredited parties in the supply chain; and
- insights gained by generating more granular data to support better data analytics.

### **The New Zealand Business Number leverages the GS1 system**

The New Zealand Business Number (NZBN) is an archetypal platform where the government provides trusted curated data in readily available formats, including APIs that enable the private sector to develop value-added processes. NZBN provides a model example of how the government can play a key role by providing open platforms that anyone can build on. The business case recognised the spillover benefits accrued to all the members of the network, which went way beyond the direct benefits to individual members. By requiring all public agencies to adopt the NZBN platform, the government is playing an important role in enabling the uptake of digital approaches. This is an interesting precedent for the wider adoption within the New Zealand government of global data standards.

### **Are global digital standards the next big thing?**

Container sizes and barcodes both provide historical examples of how standardisation generated significant, indeed transformational, change. These examples highlight the potential for further transformational change from the widespread adoption of global standards generally. The discussion of GS1 standards has highlighted the significant impact on

both tradeable and non-tradeable sectors of more widespread adoption of global data standards. The government has a crucial supporting role by proactively encouraging adoption of common standards and not going it alone by developing bespoke stand-alone regulatory regimes or unique standards for public data services.

#### **Policy implications – what is to be done?**

The preceding discussion has focused on digital platforms and standards. That is not to say that the government is limited to a supporting handmaiden role in the wider digital space. The Australian and New Zealand productivity commissions' joint 2019 report highlights a wide range of policy issues where the government must take a lead, including consumer protection, competition policy, taxation and cyber security. Digital exclusion – lacking the capability, opportunity and motivation to use the internet to realise meaningful benefits – also needs to be addressed. Emerging artificial intelligence tools like ChatGPT raise new challenges. Small countries can't afford to go it alone, as any domestic requirements need to be nested in wider international agreements and practices.

There are several features of the digital domain that make designing robust public interventions difficult, including the speed of technological development, the presence of competing, often proprietary, standards, privacy (including data disaggregation), and the competing 'data realms' – the US, the EU and the great firewall of China. In a domain as dynamic as digital, the risk of government failure is as real as market failure risk.

The research that this article draws from has used New Zealand cases to explore the role of the government in promoting the digital economy through the uptake of digital platforms and standards. It suggests that the state can play an important, but ultimately limited, role in supporting the development of the digital economy. The discussion of standards highlighted the importance of the adoption of global standards rather than developing stand-alone domestic standards. Cross-country standards initiatives – the European Commission's Strategy on Standardisation and the ICC's Digital Standards Initiative – provide a window of opportunity to expand the role of standards globally.

The government has the power to pick winners, and this gives it influence over outcomes associated with digital government. However, just because the government can select a particular platform or standard does not automatically mean it will be good at comparing options and understanding market trends. Historical examples of the difficulty of picking winners are the failed attempt to apply the New Zealand E-government Interoperability Framework (State Services Commission, 2008), which also had a short (two-year) shelf life, and the failure of the government interoperability standard (GOSIP)<sup>6</sup> when the private sector was

The New Zealand experience also emphasises the importance of bottom-up initiatives in securing the potential gains from adopting digital technologies. That is not to say that top-down initiatives are not important. Digital strategies are useful for lending legitimacy and support to digital government initiatives by general direction setting and articulating a shared narrative. More importantly, top-down initiatives can be required to provide some of the prerequisites needed to achieve the full potential of digital technology.

These top-down initiatives need to focus on where there are significant network effects, and where credible private solutions are not

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rapidly innovating with new desktop software, such as email, spreadsheets and word processing.

In response, governments interested in the potential of digital government can equip themselves with two sources of sectoral knowledge. First, governments need a high-quality trusting relationship with business leaders at the forefront of standards and platforms so that they have access to the latest trends and emerging themes. This access to emerging areas of interest is particularly important in the high-tech sector, where new platforms or technologies can disrupt and displace others. Second, access to private sector knowledge needs to be balanced by having the capability within the bureaucracy to act as an independent and impartial interpreter. Currently that capability is spread across several different agencies, with four distinct roles: the government chief digital officer, the government chief data steward, the government chief information security officer and the government chief privacy officer.

readily available. Digital identity is a good example of such, as there are significant network effects but the market for identity solutions is fragmented, with many competing technologies being used. The NZBN provides an example of a platform that meets that prerequisite by providing a single accepted form of standardised digital identity for corporate entities.

#### **Conclusion – government as a digital standard bearer, leading by being a fast follower**

The New Zealand government does not appear to have a sustained focus on the potential role of global data standards, and global standards more generally. The approach to digital government has focused on technical standards, such as web access to support the government digital architecture (part of the government chief digital officer's mandate), rather than the digital transformation of New Zealand (for which the mandate lies with the Ministry of Business, Innovation and Employment).

Global data standards could fall under the Digital Strategy for Aotearoa recently developed by MBIE, but there was no mention in the consultation document of the role of global standards and how this issue could be addressed, and the final strategy has no sustained discussion of data standards and one passing mention of ISO standards (New Zealand Government, 2022). While the issue of global data standards, and standards generally, is on the radar of MBIE departmental officials involved, there is no evidence of substantive policy analysis underway to move the issue forward.

While much has been achieved from applying digital technologies to government

services in New Zealand, these improvements have been patchy and often incremental rather than transformative. Looking forward, the government's main role needs to be as a fast follower, not a leader. This approach requires actively tracking and building on the lead that others have taken rather than going it alone or proactively picking winners. An active supportive role will be critical in achieving network effects and accelerating important initiatives, such as digital identity. The government's main roles are to establish the overall legal framework and then to be a fast follower and digital standard bearer.

- 1 This article is drawn from the New Zealand country chapter in a forthcoming book, *Promoting Digital Government and Online Public Services*, being published by the Economic Research Institute for ASEAN and East Asia later in 2023.
- 2 The United Nations survey ranks New Zealand fourth on e-participation and eighth on e-government of 193 countries – see <https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/122-New-Zealand>. Similarly, the OECD ranks New Zealand 12th out of 37 countries in its Digital Government Index – see <https://www.oecd-ilibrary.org/docserver/4de9f5bb-en.pdf?expires=1643676906&id=id&accname=guest&checksum=0B153FFF2ED7FDE0A5AA4F2A6DAF2CE2>.
- 3 Incoterms, or International Commercial Terms, a series of predefined commercial terms published by the International Chamber of Commerce relating to international commercial law, is another example of standardisation.
- 4 <https://sellercentral.amazon.com/gp/help/external/200317470>; <https://developers.google.com/search/blog/2021/02/product-information>.
- 5 The GS1 classification code GPC is used in the OECD Global Recalls portal as a mandatory attribute <https://globalrecalls.oecd.org/>.
- 6 The Government Open Systems Interconnection Profile (GOSIP) was a technical standard for open networking products used by governments in the late 1980s and early 1990s. In practice it went out of use, apart from the odd specialised security application, with the arrival of the internet.

## References

- APEC Business Advisory Council (2016) 'Non-tariff barriers in agriculture and food trade in APEC: business perspectives on impacts and solutions', Marshall School of Business, University of Southern California, <https://www2.abaonline.org/page-content/22613385/non-tariff-barriers-to-food-trade-an-obstacle-to-the-lasting-prosperity-of-the-apec-region>
- Australian Government, Australian Taxation Office and New Zealand Government (2018) 'Early thinking: operational governance for trans-Tasman e-invoicing', discussion paper, [http://img.scoop.co.nz/media/pdfs/1810/eInvoicing\\_operational\\_governance\\_discussion\\_paper\\_.pdf](http://img.scoop.co.nz/media/pdfs/1810/eInvoicing_operational_governance_discussion_paper_.pdf)
- Australian Productivity Commission and New Zealand Productivity Commission (2019) *Growing the Digital Economy in Australia and New Zealand: maximising opportunities for SMEs*, Melbourne and Wellington: Australian Productivity Commission and New Zealand Productivity Commission, <https://www.productivity.govt.nz/research/growing-digital/>
- Basker, E. (2011) 'Raising the barcode scanner: technology and productivity in the retail sector', working paper 11-16r, Center for Economic Studies, US Census Bureau
- Chakravorti, B. and R.S. Chakravorti (2017) *Digital Planet 2017: how competitiveness and trust in digital economies varies around the world*, Tufts University
- Dowdell, D., I. Page and M. Curtis (2017) *Electronic Traceability of New Zealand Construction Products: feasibility and opportunities*, study report SR 365, Judgeford: BRANZ
- European Commission (2022) 'New approach to enable global leadership of EU standards promoting values and a resistant, green and digital Single Market', [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_22\\_661](https://ec.europa.eu/commission/presscorner/detail/en/ip_22_661)
- GS1 (n.d.-a) 'How we develop standards', <https://www.gs1.org/standards/development/how-we-develop-standards>
- GS1 (n.d.-b) 'Protecting Australian brands from counterfeits in the Chinese market', <https://www.gs1.org/system/files/private/gs1-sase-study-norco-australia.pdf>
- GS1 (n.d.-c) 'Streamlining the beef export business from Australia to the U.S.', <https://www.gs1.org/docs/news/Beef-case-study-APEC.pdf>
- GS1 Australia (n.d.) 'Saving the meat industry over \$200 million each year', <https://www.gs1au.org/download/gs1au-case-study-Traceability-Meat.pdf/file>
- ICC (2023) 'The ICC's Digital Standards Initiative', <https://www.dsi.iccwbo.org/>
- Lee, J.Y., D.B. Han, R.M. Nayga Jr and S.S. Lim (2011) 'Valuing traceability of imported beef in Korea: an experimental auction approach', *Australian Journal of Agricultural and Resource Economics*, 55 (3), pp.360–73
- Levinson, M. (2006) *The Box: how the shipping container made the world smaller and the world economy bigger*, Princeton: Princeton University Press
- New Zealand Government (2019) *Te Rautaki mō tētahi Rāngai Kāwanatanga Matihiko | Strategy for a Digital Public Service*, Wellington: Department of Internal Affairs, <https://www.digital.govt.nz/digital-government/strategy/strategy-summary/strategy-for-a-digital-public-service/>
- New Zealand Government (2022) *Te Rautaki Matihiko mō Aotearoa | The Digital Strategy for Aotearoa*, Wellington: New Zealand Government, <https://www.digital.govt.nz/assets/Digital-government/Strategy/Digital-Strategy-for-Aotearoa-English-PDF.pdf>
- NZIER (2019) *The Economic Impact of GS1 in Retailing and Wholesaling Industries*, NZIER report to GS1, <https://www.nzier.org.nz/publications/the-economic-impact-of-gs1-in-retailing-and-wholesaling-industries>
- Shapiro C. and H. Varian (1999) *Information Rules: a strategic guide to the network economy*, Boston: Harvard Business School Press
- State Services Commission (2008) 'New Zealand E-government Interoperability Framework (NZ-eGIF)'
- Swann, P. (2010) 'The economics of standardization: an update', Innovative Economics Limited report for the UK Department of Business, Innovation and Skills