

## Balancing sound methodology and IT flexibility in statistical production

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### Abstract

Statistics NZ aims to produce statistics that are fit for purpose, and it aims to do this in an efficient and sustainable way. The organisation also wants to be adaptive, however, balancing sound methodological solutions and agility is challenging. Statistics NZ has taken advantage of well-developed IT environments and clear strategic directions in terms of statistical architecture to develop and implement production systems that support the organisation's goals. Production systems are composed of standard methods, tools and processes. Outputs that use similar production methods are processed on common platforms. The platforms also offer analysts the opportunity to create new production systems without the help of IT teams. The new platforms have encouraged standardisation and provide methods and tools that can be used to process and analyse data collected from traditional sample surveys or from an administrative source. The focus when processing large volumes of data is on error reduction and automation of standard methods for each of the process steps in the business process model. Centralised governance systems and a constructive culture of innovation make these changes possible.

Keywords: culture, enterprise architecture, governance

### 1. Introduction

In 2011, Statistics NZ embarked on a 10 year programme of change called *Statistics 2020 Te Kāpehu Whetū: Achieving the statistics system of the future*. The programme of change is extensive: transforming how our statistics are delivered, leading the New Zealand official statistics system (OSS), obtaining more value from official statistics, and creating a responsive and sustainable organisation (Statistics New Zealand, 2013). Standardisation of processes, methods, tools, and systems is a key component. It also includes improving the quality of the statistics produced, by ensuring they are relevant and remain so over time. The size of the programme and the importance of its success led to new governance structures being implemented within the organisation, plus regular formal reporting to government of progress against a set of agreed milestones. Three years on, progress on all major programmes is on schedule.

The New Zealand Government identified five priorities for the Statistics portfolio for 2013 (Statistics New Zealand, 2013):

1. Maximising the benefits from Government's investment in official statistics.
2. Successful implementation of the Statistics 2020 Te Kāpehu Whetū business transformation programme.

3. Building stakeholder confidence in key statistics.
4. Improving access to government-held data.
5. Planning and delivering the 2013 Census and future census transformation.

The Better Public Services programme is a set of priorities for public sector reform announced by the NZ government in mid-2012 (New Zealand State Services Commission, 2013). The goal is a state sector that provides better results and improved services with an on-going focus on value-for-money and innovation (Priority 1). Within the sector, government agencies work more closely together, organising themselves around results that make a difference to New Zealand. The agencies share functions and services, purchase goods and services, and develop systems together. A greater use of technology and a shift to digital channels will see New Zealanders more easily able to access government services and government agencies better able to measure and report on performance. The aim is greater responsiveness within the public sector to the needs and expectations of New Zealanders, and a commitment to continuous improvement.

Two of the priorities within the Better Public Services programme focus on improving interaction with government over the next five years and directly affect Statistics NZ's future operating model. Firstly, New Zealand businesses will have a one-stop online shop for all government advice and support they need to run and grow their business. Secondly, New Zealanders will be able to complete their transactions with the Government easily in a digital environment. There are clear links and opportunities between the organisation's priorities around standardisation, increased use of administrative data, and strategic oversight of the OSS, and the government's service transformation programme outcomes.

A survey measuring public trust in official statistics is one of the mechanisms used to monitor stakeholder confidence in official statistics (Priority 3). The survey has been run annually for the last three years allowing us to understand the differences between the needs of public users and government users.

In response to priorities 3 and 4, the organisation is raising the level of engagement with key customers for economic and social statistics. Statistics NZ is leading several initiatives across government including: the development of a domain plan for environment statistics that will address gaps, overlaps and deficiencies in environmental data; coordinating an approach to confidentiality and privacy including providing a suite of best-practice guidelines for government agencies; launching Te Kupenga – designed to provide an overall picture of the social, cultural and economic well-being of Maori in New Zealand; and coordinating a more integrated approach towards existing frameworks, measures and information for social, economic and environmental reporting.

In relation to priority 5, investigative work is underway to develop a strategic direction and timeline for the transformation of the New Zealand Census of Population and Dwellings. The strategy has a short term focus on modernizing the current census model to achieve efficiencies and reduce costs, and, longer term, aims to develop a new census model based on the use of formal registers or existing administrative data sources (Bycroft, 2012).

Each of the five priority areas presents different challenges. The next sections discuss the main methodological and technological challenges and describe some recent changes in governance structures and in the organisation's culture.

## **2. Methodological challenges**

Standardisation of concepts, methods, processes and systems has been underway for some time within Statistics New Zealand. All the methods and tools used in statistical production in the agency are catalogued in a toolbox that includes information about the status of the method or tool. Current projects include evaluating a suite of dissemination tools developed by the Australian Bureau of Statistics and evaluating methods and tools to better measure product quality.

When the toolbox was first established many of the methods and tools used in production processes were considered to be outdated and needed to be replaced. Over time, the focus has changed from identifying and replacing outdated or non-standard methods and tools, to exploring opportunities for developing new methods and tools, particularly in the area of administrative data.

A key driver for changes in methods and tools is the increasing availability of administrative data and the NZ Government imperative to make more and better use of government-held data. A particular focus is the development of quality measures in cases where administrative data is used, and, with the increasing use of model-based approaches over the more traditional design-based approaches to inference, an increased focus on modeling (developing, testing and assessing models) and Bayesian methods.

Modernising the current census model and investigating alternative ways of producing small area population and socio-demographic statistics are other key drivers for the transformation of methods. Options being explored include a five- and ten-yearly census, rolling census and an administrative census. Five broad options for an administrative census are being developed in more detail: a population register based on a unique identifier, a statistical population list sourced from a single main administrative source, a statistical population list sourced from multiple linked administrative sources, an aggregate statistical model and commercial and social media “big data” sources (Bycroft, 2012).

The Integrated Data Infrastructure (IDI), is an integrated dataset with person-level data from multiple sources. The IDI contains longitudinal micro-data about individuals, households and firms. While the IDI is not a population register, it is able to be used to answer research questions about particular populations that are well represented in the linked dataset, for example students. By bringing together many datasets into one infrastructure, the IDI allows for longitudinal analysis across education, employment, migration, welfare, and business, with plans for further datasets to be added in future. This helps Statistics NZ meet demand for new information, and allows more efficient responses to changes in existing data sources. The prototype IDI is used as a research database by both government and academic researchers. The agency is beginning to share standards and guidelines with other agencies across the official statistics system, particularly in the areas of data linking, quality assurance, privacy and confidentiality. The IDI is an example of a resource that is created and maintained by Statistics NZ but shared with other agencies.

### **3. Technological challenges**

Over recent years, the New Zealand government has invested significantly in developing modern processing systems, and Statistics NZ has actively pursued a strategy of standardisation of business and information concepts, methods, processes, and technology. The latest processing platforms use standard tools for common methods and processes. These platforms make it possible to process data quickly and easily. Unlike traditional processing systems, the new platforms are also highly

configurable. Analysts can update existing processing systems or create new production systems by choosing from a selection of standard tools that perform processes such as editing data, imputing for erroneous data or non-response, and applying confidentiality rules.

Statistics NZ promotes a 'shared services' enterprise architecture model: systems are designed and built by connecting standard business capability, where the process elements are mostly implemented as common services. The services are reusable software which may be developed in-house, or sourced from other statistical agencies or private companies. Business logic is extracted from applications and formalised as configuration rules which chain together processes and services into meaningful business workflows. Data and metadata are defined and managed using standards-based formats aligned with the generic statistical information model reference framework which is currently being developed. Processes and services are implemented in a standard way to collect performance and quality metrics to allow continuous improvement (Seyb, Zabala, Cochran & Seymour, 2012).

Currently, five platforms cover all aspects of statistical production: data collection, economic outputs processing, social and household outputs processing, National Accounts processing and data dissemination. The platforms are at various stages of development, ranging from the first generation collection platform to the Micro-economic platform which will have eight regular outputs by the end of 2013. Good progress has been made on a standard data dissemination platform, which includes a web browser that provides access to data stored on the dissemination platform and an SDMX gateway that provides a machine-to-machine data exchange service. A key area for development at present is expanding the collection platform to include electronic collection, moving away from expensive paper-based collection of information. A key element of the platforms is the use of SAS for statistical processing and analysis. The SAS runtime environment is highly scalable and easily able to process large volumes of data.

The organisation has experience in collecting, processing and analyzing survey and administrative data and is seeking to share this across the OSS via documentation such as standards and guidelines, by sharing standard tools, and by offering services such as consultancy and training courses. A programme of work is underway to increase the number and range of tools that we can share. Examples of projects that are in progress include providing a geocoding Webservice and developing an add-on to Excel that publishes standard reports to a Website.

The agency has typically collected data and produced statistics in-house, storing the data used. This is true even when we are combining data from multiple sources. The only exception currently is electronic card transactions data that is supplied already aggregated for our purposes. It is foreseeable that, in future, the organisation will need to be able to produce statistics from data it does not hold in-house. In the event that government-held data is stored in a single repository, the agency could expect to play a leading role.

#### **4. Management challenges**

The governance framework for the oversight of the Statistics 2020 programme consists of a set of functional responsibilities that have been developed for project management, governance, and project assurance. The governance framework is additional to the existing organisational governance model and is intended specifically to support the delivery of the change programme. The model has evolved over time,

developing from multiple governance bodies aligned to clusters of outputs to a single governance body monitoring benefit realisation and designed to ensure decisions about spending are made across the whole of Statistics NZ's products and services and are independent of the usual line management structure and considerations.

Personnel are managed using a matrix-management model: line managers are responsible for the day-to-day performance and development of their staff, and project managers are responsible for the project management aspects of staff assigned to projects. To achieve its goals the organisation needs staff who are affiliative, supportive, constructive and open to influence in dealing with others. Statistics NZ's future operating model involves leading the New Zealand OSS so staff are expected to think system-wide when developing solutions, to be able to form effective partnerships across government and to be self-actualising.

However, Seyb, McKenzie and Skerret (2013) note that providing staff with generic highly-automated production systems isn't enough to change an organisation's culture. It has not been easy to move from a culture focussed on collecting and processing data to a more creative, innovative culture and Statistics NZ is still in the early stages of achieving this transformation. The organisation has developed a strategy to help teams understand and explore what the new environment means for them. The strategy has been broken down into two areas of work: a workforce programme, which focuses on building on people's skills and capabilities, and makes sure systems are in place to attract, develop, and appropriately reward people, and a culture and change leadership programme, which focuses on supporting people through change, developing strong leaders, and building a performance culture.

## **5. Conclusion**

Statistics NZ aims to produce statistics that are fit for purpose in a cost efficient and sustainable way. The current environment is not conducive to the agency continuing to function in isolation from its customers and in isolation from other statistical agencies. Referring to the UK Census of Population and Dwellings, Nolan (2011) noted that it is "criticized as being expensive, intrusive, and the quality is questioned" – these words could also apply to Statistics NZ's traditional model of censuses and surveys.

The new paradigm is based around the use of administrative data, methods that are model-based and technology that is flexible and makes substantial use of standard tools and processes. Particular challenges of this new paradigm are determining what quality of data is required and explaining to users solutions that will necessarily be more complex and difficult to understand. But the organisation is focussed on putting its customers at the centre of what we are doing, and putting the organisation at the centre of New Zealand official statistics.

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