Chapter 14
Re-Imagining Data Governance

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ABSTRACT

Contemporary business environments reflect the growing influence of data as a mission-critical resource of relevance across the enterprise, suggesting a need for robust infrastructures to enable good data management practice. This includes data governance, a particularly foundational infrastructure with a crucial role to play. Data governance models in common use however, reflecting traditional top-down, hierarchical structures, and relying on designated governance roles, are not equipped to effectively embed data accountability within dynamic business environments. In response, this chapter offers a new approach designed to foster accountability by cultivating data knowledge and promoting good data management behavior amongst all relevant staff. Drawing from an operational data governance framework developed for New Zealand government, the new model employs a core set of capabilities and a steady states model to map data flow. It provides a deliberately business-centric view of data accountability and offers a means of maturing data thinking to support improved integration across operating scales.

INTRODUCTION

Almost it seems while we weren't looking, the world around us has changed.

Far reaching developments in technology, transitioning for all intents and purposes from the stuff of lofty ideas to indispensable components of our daily lives, continue to emerge at a profoundly rapid rate, undermining our ability to leverage traditional means of informing our choices and values (Allenby, 2015). And all the while we accept this state of flux as something altogether normal.

Fuelling that accelerated pace of change and shaping our opinions about the possibilities of technological disruption, is a vast network of data, sometimes visible, often unseen. Driven by interactions between producers and consumers, directed by the gravitational forces of sources and sinks, coursing in a myriad of ways through a complex labyrinth of connections, data streams continuously through its channels as the lifeblood of our modern world. And much like the technological tools that we employ for everything from managing an investment portfolio to locating the closest cup of coffee, the underlying data that we leverage for our varied purposes has thoroughly permeated our personal lives.

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So too in business contexts, the proliferation of data and subsequent dependencies on it have recrafted operating environments, leading to a landscape of playing fields reflecting new sets of rules and novel realities, but also rife with possibility. Success in contemporary business environments is dependent more than ever before on the ability to harness and leverage the vast potential of data, on a willingness to adopt a sufficiently aspirational strategy that is nonetheless founded on solid data management principles and delivered through appropriate organisational infrastructure.

In response, this chapter presents a new approach to a particularly critical infrastructure, data governance, designed to better equip organisations to manage increasingly important data assets in the face of unconventional and rapidly changing operating environments.

Based on a Data Governance Framework developed for New Zealand government, the proposed model turns traditional governance on its head, to mature thinking beyond a longstanding bias that favours hierarchical and decidedly top-down execution. Emphasising instead elements of a bottom-up implementation that cultivates deeper levels of data knowledge and improved principles-based data management behaviours, it accentuates the role and relevance of governance within the operational contexts of line staff. This distinct shift in thinking about the purpose of governance addresses existing capability gaps and serves to embed data management good practice and accountability as an inherent, business-as-usual outcome across all parts of the enterprise.

BACKGROUND

Attitudes, Expectations and Opportunities

Notably, as more efficient and relevant technologies are adopted with increasing frequency, giving rise to a condition where a steady flow of new developments is the norm, the public hardly has time, or the inclination for that matter, to respond in a thoughtful manner. And this can have profound repercussions on how society operates. As Allenby (2015) explains, "The cycle time of technology innovations and the rapidity with which they ripple through society have become far faster than the institutions and mechanisms that we've traditionally relied on to inform and enforce our choices and values."

This shift in the traditional norms associated with technological choice extends to data as well. As the stuff that keeps their apps functioning, data is regarded by many consumers as something of a given, if acknowledged at all. It need not be thoughtfully considered because it is always there, always available and always in a format that is readily interpretable and consumable through familiar user interfaces. This engenders high levels of expectation amongst those consumers for data to deliver, to offer itself as intuitive information in response to any expressed need. And it better not make them wait.

A public that operates in an environment where data is a resource upon which it can unquestionably rely, where it is freed from the burden of choice, is also a user community with the opportunity to expand its thinking around the role of data. The idea of a so-called Age of Data has been around for some time, but based on recent advancements in the technology to collect, store and serve data, such an age may truly be upon us (Lohr, 2012). In a time when the collection of data is nothing if not efficient, where data is streamed continuously from sources across a wide range of contexts, users are increasingly well placed to consider how to glean more and truly meaningful value from that data.

The same opportunities exist within business operating environments, where data, imbued with an expanded sense of legitimacy, has the opportunity to lift itself out of the rather narrow and technical purview of information managers and analysts. Relevant now to a much broader and more diverse audience of interest, it has increasingly become a topic of consideration in the executive board room, amongst business process architects, for strategists and for those developing policy (Clarke, 2017; Kemp, 2013). In these and other ways, data is recognised for the ubiquitous resource it is, permeating essentially all parts of the enterprise with significant implications for productivity, competitiveness, strategic outcomes and ultimately long-term sustainability and success.

Implications

Having achieved an elevated level of consequence, data is in a position to drive change, transitioning from a by-product or characteristic of technology to a disruptive entity on its own merits, influencing the path of technological developments itself (Wessel, 2016).

Noteworthy in this regard is big data, that which is of sufficiently large volume and is collected, processed and made available at a significantly high enough rate and frequency to test the capacity of current data systems (Gandomi & Haider, 2015). As a disruptive phenomenon, big data has amongst other things challenged organisations to develop the means to integrate internal proprietary datasets with external, public and often unstructured data, across different types of systems, applications, and infrastructure. In much the same way, indications are that linked data, and in particular linked open data, may represent the next data disruption, similarly influencing the nature of organisational change (Harper, 2017).

The demands and opportunities stemming from the expanding role of data have translated into an explosive growth in the business of managing its proliferation. Interviewed by *The Economist*, Cukier (2010) noted even several years ago that IBM, Oracle, Microsoft and SAP had together spent more than $15 billion (US) on acquiring firms specialising in data management and analytics. Estimations at that time put the data management industry's worth at more than $100 billion (US), with annual growth at 10%, a rate twice that of the software industry as a whole.

These evolving characteristics of the data environment highlight the need for a shift in thinking about data and correspondingly, a reassessment of management models. The status quo approach, developed in a time when data occupied a position of lesser significance and was characterised by a reduced level of complexity, and when management requirements placed upon it were less stringent and of limited operational relevance, is no longer sufficient.

While the data ecosystem has expanded in scope and developed in numerous ways and with great rapidity, the models and frameworks for participation in it have not. Thinking has remained trapped in place, imprisoned by the constraints of familiarity and history. Far from being innocuous, this misalignment of approach and reality has resulted in actual degradation as obsolete frameworks have, in response to an increasingly complex operating environment, only become more unwieldy. Linked inexorably to highly structured organisational charts, traditional data governance frameworks are ill-equipped to respond to change and therefore pose a risk to agile, customer-oriented operating models.

Rather than continuing to move forward with modified versions of traditional models, this suggests a need to consider new approaches that are designed to treat data as the legitimate and profoundly valuable resource that it is. It speaks to the importance of promoting proper behaviours and a style of management practice that leverages a comprehensive and holistic level of understanding of the data assets so vital to the service of our respective needs.

GOVERNING DATA TRADITIONALLY

Governance is a critical and yet often underappreciated enabler for the promotion and perpetuation of appropriate data management behaviours. While in the general sense it represents a familiar concept that is thoroughly treated in the literature, it is important to characterise what is meant exactly by governance when applied to data.

Put into use across many different contexts, governance broadly refers to the practice established to formally organise operations in a way that encompasses strategic considerations, establishes an authority and provides a set of operating standards and norms (Institute of Directors in New Zealand, n.d.; Bevir, 2012). Data governance draws from many of the same conceptual foundations and delivers many of the same outcomes as governance generally, but as practice linked to an especially salient operating resource, it also offers benefits that are particularly relevant and meaningful. And as an organisation's data and its associated management becomes more integral to successful operations across the enterprise, the implementation of a considered governance approach, targeted to this aspect of the business, becomes correspondingly more important.

When established as a framework, data governance represents an effective means of encouraging and supporting accountability while supplying mechanisms and processes for outcomes like issue resolution. These frameworks serve as a set of established pathways for that which governance is meant to help deliver – namely decisions, conflict resolution and authoritative direction for ensuring good practice.

If an organisation decides to adopt an agile business model, to better respond for instance to a fluid market populated with ever more demanding customers, the need for structure provided by an underlying governance framework is paradoxically even more crucial. This is certainly the case for data governance in environments where data is increasingly open and accessible (Lämmerhirt, 2017).

Data assets in these less familiar operating environments will represent if anything an even more important component of the business strategy, integral to the solutions developed to serve a changing customer base, while helping to shape new types of relationships with key suppliers, stakeholders and competitors. Their contribution to the insights that inform business decisions, even more important in times of uncertainty, affirms the need for an appropriate level of management and governance oversight (Higson & Waltho, 2009).

Political Data Governance

Data governance has arguably been in existence in some form since there has been data, but can be considered a relatively modern manifestation of governance practice, its particular relevance coming to light with the growing influence of data in contemporary contexts. In his blog on the history of data governance, Chen (2010) suggests a series of eras since the 1960s, with data governance practice reflecting changing conditions and transitioning from an applications-based approach to one emphasising the role of enterprise repositories, and most recently one assuming a policy-centric view.

Though a fairly recent expression of governance, data governance has thus far drawn heavily from traditional implementations of governance models and frameworks employed in other contexts. The characteristics of the established approach are referred to in this chapter collectively as *political data governance*. The use of the term political suggests a strongly institutionalised and potentially bureaucratic approach to governing data assets, drawing from existing structures that reflect a decidedly hierarchical and roles-based view of organisation.

Political data governance frameworks are typically established in a top-down fashion as a ranked collection of governing bodies and roles, and are instituted in a way that either draws directly from or is otherwise closely linked to the staff organisational chart. Senior staff therefore are likewise given greater authority within the political data governance model to provide approvals or pass along binding decisions about organisational data assets. It is often a collection of these executive or senior roles that populate the governance bodies positioned at the apex of the hierarchy, leveraging the political governance structure to distribute their experience and insights down though the rest of the organisation.

Current State Challenges

While a data governance framework represents an important organisational infrastructure, it does not currently enjoy widespread acceptance nor exhibit a consistent record of ongoing success in those instances where it is implemented (Morgan, 2017; Sweden, 2008). The reasons for this less than admirable track record may in some cases be linked to organisation-specific factors, but it is argued here that it can be traced in particular to a perpetuation of historic governance models in environments where they are increasingly mismatched.

Retaining a natural bias for the familiar, those responsible for instituting and deploying data governance are inclined to incorporate organisational data assets under the umbrella of those governance frameworks with which they are most comfortable. But in doing so they are also preserving the inherent shortcomings of that style of infrastructure, made even more apparent in modern contexts that are characterised by increasingly agile business models. And they increasingly find themselves in opposition to a broader trend towards flatter organisational structures, instituted to facilitate innovation and support responsive business models (The Wharton School, 2003; Gotkin, 2012).

Top-Down Hierarchies

Because political data governance frameworks often closely reflect the organisation's personnel structure, they typically adopt a corresponding hierarchy. The existing staff-oriented structure provides a logical and familiar means of embedding governance and appears to supply a pre-established pathway for outcomes to move easily into and throughout the organisation.

Due to the highly structured and multi-layered nature of such frameworks, however, the options for communicating outcomes are generally inflexible and it is not unusual for outputs of high-level governance bodies to make their way to operational line staff in an indirect and at times convoluted fashion. Decisions emerging from such groups might be used for instance to inform a new policy, which in turn generates guidance materials that help shape operating models, that then serve as reference for the development and implementation of processes and procedures, which eventually get implemented as part of line staff workflow.

Furthermore, by the time these outcomes navigate the highly structured governance frame, moving from one committee to the next and awaiting a series of required senior staff level approvals to reach line staff, they can emerge as a trickle, a shadow of their former selves. Their relevance to operational staff, if it existed in the first place, is likely lost. The governing value is not what is delivered, but instead has likely been overwhelmed and replaced by something reflecting the layers of bureaucracy experienced along the way. And this failing only fuels opinions that governance and its outcomes are of little prac-

tical value, of bearing only occasionally and then for the most part only to that small group of senior leadership atop the org chart.

These challenges inherent to a traditional model of data governance are particularly prevalent in modern business contexts, which are more often as not subject to a steady diet of transformational change (Hutchins 2011; Rick, 2014). As the business model is transformed and the associated organisational structure reconfigured to accommodate adjusted strategic outcomes, the links to a closely aligned political governance model are broken. This necessitates a complete re-build of the political data governance framework to reflect the new organisational structure, a requirement that becomes less palatable as the frequency of re-structures increases.

A Roles-Based Approach

Political data governance models are often organised around the implementation of particular roles, including those of Data Custodian, Data Steward and Data Trustee (Dataversity, 2012). Established either as distinct positions, or more likely, as designations for a set of additional responsibilities assigned to existing staff, these roles are put in place to champion and administer good governance practice across the organisation.

The Data Custodian, Steward and Trustee roles often operate as something of one-stop data shops. Those occupying these positions are expected on some level to provide subject matter expertise for the organisation's data assets, in combination with a level of familiarity with data policies, procedures, compliance requirements and the relevant elements of the organisation's strategic agenda (Sweden, 2009).

If considered across the full range of scales at which data operates and the myriad of environments in which it requires governing, a key challenge associated with a designated roles-based approach is the lack of consistency. The literature on data governance is characterised by a high level of variability in role definitions, to the point where it can be difficult to find a consistent description between any two sources. Data Stewards as defined in one source might very well encapsulate the same responsibilities and perspectives associated with Data Custodians in another source and those linked to Data Trustees in a third.

Indicating more than just variation in position descriptions, this disparity in role responsibilities is important in that those roles reflect the organisation's view on data governance generally. This becomes significant as the lack of consistency manifests itself in many different situations - including interactions between organisations within a country or those between organisations in different countries - and becomes a barrier to data-based engagement across both business and political boundaries. In current business environments where increasingly sophisticated analytical models require integration of data from multiple sources, this level of governance inconsistency amongst data producers and consumers can pose a significant threat to successful outcomes.

Within the enterprise there are several difficulties associated with the use of a roles-based approach. If the responsibilities associated with these designations are layered on top of those in place for existing positions, which is often the case, the result can be a "Custodian's burden." These staff are expected to deliver to essentially two roles, with the obvious risk that when stretched in this manner they are likely to deliver at less than optimal levels for both the governance role and their substantive position.

Additionally, if distinct roles are created to look after data governance, there is the real possibility that other staff will cede the associated data accountability to individuals in those roles. Aware that there is a designated person looking after such matters, line staff, already busy and perhaps perceiving no

obvious connection to governance outcomes, are de-motivated to adopt associated good data management practice as part of their own jobs. The result is an organisation where desired data practices are consistently front of mind for a limited set of staff.

Organisations that adopt a roles-based approach are also likely to undermine their capacity to adjust to changes in operating environments, including transitioning when required to an agile and more flexible business model. The use of designated data governance roles, which incorporate expectations like comprehensive oversight for data assets across their lifecycle, tends to anchor organisations in historic and outdated thinking and impairs their ability to respond to changing environments. A continued reliance on these traditional roles, including an expectation that they continue to effectively deliver their responsibilities in new and unfamiliar environments, something they are not designed to do, creates operational and strategic risk.

Consequences of an Outdated Model

Though they might be based often in perceptions, the negative impressions that can arise from the shortcomings of a political data governance framework exert a powerful influence, and are not easily dismissed. As organisations attempt to remain relevant by adjusting business models to improve their responsiveness, these negative views on governance correspondingly take on new levels of significance.

Data governance can become a burden in that context, a barrier to the delivery of desired outcomes. Seen then as bureaucracy in the worst sense of the word, it is something that appears to impede efficient data flow, which itself is recognised as a critical component of responsive delivery. This effectively, if unintentionally, establishes data governance as something antithetical to the strategic direction.

In the end, applying an outdated model to govern the assets of an organisation functioning in a substantially new, highly dynamic and less certain business environment represents the root cause of political data governance failings. There is a corresponding need therefore to mature thinking in regard to governing data and in doing so, improve and future-proof the treatment of these critical assets.

A FRAMEWORK FOR CONTEMPORARY ENVIRONMENTS

The numerous challenges inherent to the use of traditional approaches to data governance, along with a recognition that a viable framework is needed more than ever in light of contemporary operating conditions, suggests the time is right for a reassessment, a re-imagining, of how data assets are best governed. This means that the learnings to be gleaned from testing new thinking in various business contexts have a good chance of generating value and organisations would be well advised to consider moving beyond their norms to explore and consider adopting a data governance framework offering greater potential.

New Zealand's Data Governance Framework

With this in mind, a behavioural capability-based framework for data governance has been developed in New Zealand for use across central government (Sweeney, 2017). Initiated as a recommended framework within Stats NZ, the country's national statistical agency, the new approach to data governance is being tested and refined for implementation as an all of government solution by a collaborative group of central government agencies.

While efforts continue to further validate it as an option that delivers effectively across different operating contexts, the New Zealand framework in its current state is substantially complete and available for consideration and to inform thinking. Its core components have been used to articulate the reconceptualisation of data governance proposed in this chapter.

Underlying Concepts

The proposed approach is predicated on a need to refresh basic thinking about data governance and achieve a level of clarity about what it truly means and how it can deliver genuine and persistent value. This implies a significant realignment, a shift to a new positon on the topic that involves revisiting the existing paradigm. If data governance frameworks are to deliver to their full potential, and continue to do so as operating contexts change, their design thinking needs to move beyond established views, allowing for a re-imagining of what those frameworks can provide. It is important therefore to understand the underlying concepts used to guide that new thinking.

Infrastructure's Infrastructure

As governance occupies a particularly constitutional position within any organisation, much like the foundation of a building, any work on that level requires a clearing away of significant material to reach the critical structural and load-bearing elements. This type of unpacking is necessary to return to a state that precedes the influence of subsequent governance approaches that have for numerous reasons become the norm and resulted in the model that dominates implementations today.

Achieving this requires clarity about what governance is meant to deliver. Though it can be perceived in some circumstances as a manifestation of bureaucracy and therefore an imposition, a properly implemented governance framework offers potential as a particularly powerful mechanism for improving efficiencies, promoting and embedding good practice, growing institutional knowledge, and in all of these ways, facilitating desired outcomes, both operational and strategic. This enabling characteristic suggests that governance frameworks, including those for data, have an important role to play as basic infrastructure.

Governance is infrastructure in its purest form – a powerfully supportive device linked closely with an organisation's very identity, and positioned at this level, offering the potential to permeate and influence all parts of the enterprise. In this role as essential infrastructure, governance frameworks lay the groundwork for the proper establishment of other infrastructures that facilitate things like good practice data management. As the infrastructure for infrastructure therefore, governance has a uniquely significant role to play as an enabler within the enterprise. If a data governance framework is to deliver to its full potential it must be seen in this light, emphasising its enabling potential as a core component of its value proposition for the organisation.

A Basis in Principles

Since governance as infrastructure is situated at such a foundational level, it can exert a profound influence on how well an organisation operates and realises its prospects for success. As such it is important that a data governance framework be grounded in a set of accepted principles that encourage sound data practice. The nature of these principles will vary to some extent, depending on the operating imperatives

of a given organisation, but should persist over time. As an example, the data governance principles initially established for New Zealand government (Sweeney, 2017) are included in *Appendix 1*.

Instilling Data Accountability

It is not unreasonable to treat accountability as a synonym for governance. At an elemental level, data governance frameworks can be considered in this way, infrastructure that is implemented for the express purpose of promoting and embedding accountability as a core element in the treatment of organisational data assets (Dataversity, 2012; Callahan, 2006). Data governance accountability is an important means of facilitating good data management behaviours, and supports data stewardship by encouraging a proactive and highly engaged level of responsibility amongst staff in their data-handling roles.

Reflecting the significance of accountability amongst data governance outcomes, the deficiencies of traditional data governance implementations can often be traced to a failure to embed a robust system of data asset accountability throughout an organisation.

There may be a host of reasons behind this failing, but a data governance framework meant to succeed in contemporary business environments should be designed in particular to address two significant and common defects: 1) poor data management behaviours, and 2) a deficient knowledge of data assets. Both shortcomings represent a gap in capability, either people or information, and both indicate an incomplete view of conduct, either that associated with staff in their data stewardship responsibilities or that of the data assets themselves moving within the context of the organisational business process model.

An organisation can confidently defend its claim to having delivered a successful data governance framework if that infrastructure can successfully support a system of data accountability across all relevant lines of business. It is more likely to achieve this if, as part of a business-focussed approach that emphasises asset management, it actively promotes and supports staff behaviours grounded in good data management practice, while it cultivates a comprehensive knowledge of its data assets, particularly in regards to data flow.

Bottom-Up and Business-Centric

While contributing value to the way an organisation administers its data assets, political data governance frameworks often fail to acknowledge or provide a means of mitigating negative perceptions that adversely influence staff engagement. These perceptions reflect the long-held tenets of a traditional governance model including the idea that it sits across, and by extension, above the organisation. Decisions rendered by governance boards populated by senior management consistently come down from above, in a decidedly top-down fashion.

A re-thinking of data governance, including in particular an acknowledgement of its purpose as enabler and its role as core infrastructure, suggests rather that it is best articulated as something deeply rooted in organisational identity. Its outcomes then have the opportunity to serve as foundations to build upon and surface within the enterprise in a distinctly bottom-up and more operationally-relevant fashion. This encourages an organic alignment between those governance outcomes and the familiar operating environments of staff, since the outcomes are manifest right at that level to begin with. That business scenario expands data governance relevance throughout the organisation, which supports improved engagement amongst line staff and increases the likelihood that well-considered governance outcomes achieve their goals.

Within public sector contexts particularly, there are additional advantages to embracing a more deliberately business-centric stance when developing the elements of a data governance model. The pressing need for organisations across all sectors to properly manage the significant escalation in volume and potential of data has highlighted the benefits of treating these resources as curated business assets. The increasing investment moreover that both public and private organisations are placing in the management of these assets to unleash and expand their potential as sources of significant value, lends further support to this position.

While there are challenges inherent in the wholesale idea that governments would operate more effectively if run like private businesses (Harvey, 2012), the likelihood of outcomes including the formal acknowledgement and treatment of data as a key operational asset are increased within public sector agencies assuming a more intentionally business-oriented view of their data holdings. From this perspective, data is the fuel that enables productivity and is therefore deserving of formal and thoughtful administration. This style of asset management approach supports the premise that data generates, accumulates and furnishes value as it manoeuvres (or likewise rests) along its lifecycle within the organisation's operating model, and as such should be carefully governed.

Data Flow

Effective interaction and communication between the lines of business within an organisation is a particularly important element in the realisation of a more highly responsive and agile operating model. Siloed operating frameworks, while potentially offering value for the delivery of certain project-specific outcomes, do little to enable a coordinated, enterprise-level response to changes in a highly dynamic business environment. And considering the increasing significance and reach of data as an enterprise commodity, they offer as common assets a particularly effective proxy for uncovering, improving, and monitoring the linkages between different parts of the organisation.

The characteristic of data flow provides especially meaningful insights into the role and significance of data assets as enablers of organisational goals and outcomes. Generating a clear and comprehensive picture of how data moves over the course of its lifecycle – how it enters the sphere of organisational influence, moves within lines of business and across business unit boundaries, and how it exits the organisation's ambit – is paramount for an organisation seeking to mature its data governance thinking beyond traditional approaches. It is only with this understanding of data movement that accountability can be appropriately mapped and a governance framework properly designed and successfully implemented within a particular organisational context.

Data assets in a flow model are envisioned as the fluid that moves along a system of channels corresponding to the network of organisational business processes. Much like the water in a stream, data assets are subject to a host of forces and influences, moving at different rates and with different volumes, exhibiting variable levels of quality, sometimes turning back on itself in eddies, and at times directed out of the main flow channel into storage reservoirs. And just as the measured condition of water can serve as an indicator of stream health, so too can the assessed quality condition of data assets indicate the effectiveness of the underlying business process model.

The broad, landscape-scale view resulting from a data flow model corresponds in the business sense to an enterprise perspective and encourages holistic thinking that extends across different parts of the organisation. This is important on two levels: 1) it facilitates a whole of lifecycle assessment of data as-

sets, which is critical if they are to be legitimately managed as organisational resources, and 2) it extends data asset management out of the situational or project domain to the holistic and enterprise, thereby increasing opportunities for data assets in support of strategic outcomes.

Practical Components

The practical execution of the approach to data governance proposed in this chapter manifests itself as an operational framework designed to reflect new thinking. The success of that framework rests ultimately with the extent that staff, particularly line staff, consider it germane and of value to their work. If staff cannot readily interact with the framework, assume a certain level of ownership in it, and comprehend clearly how it benefits them in their roles, they will most certainly circumvent it, choosing the familiarity of status quo over a change agenda that offers no obvious return on their investment. The framework in that case risks irrelevance and the fate of a solution offering little more than what might already be available from a political data governance model.

Emphasising practicality, the implementation of a new data governance framework should be designed in a manner that allows for its components to embed easily within existing workflow. This will help situate the concept of governance and related data accountability directly into the familiar and process-oriented context of individual line staff. Beyond assisting with staff engagement, this also helps establish a clear line of sight between daily routine and broader organisational goals concerned with data management good practice.

Good Data Management Behaviour

A data governance framework is given life by the actions of people and, as a means of instilling data accountability across the enterprise, specifically through the proper behaviours of those individuals in respect to data management. A framework established to deliver accountability outcomes in the face of poorly managed data makes little sense. It is also of limited strategic use to the organisation as it cannot contribute legitimate value to other business outcomes. Rather, a data governance framework should unambiguously acknowledge its basis in good data management practice, and through its function as an enabling infrastructure, provide a viable means of embedding that practice throughout the enterprise.

Data Governance Capabilities

To instil good data management practice across the enterprise, there needs to be an agreed understanding of the underlying set of data governance capabilities that, when put into practice, will facilitate consistent and persistent data accountability.

Encompassing the full set of structural elements – or business architecture "building blocks" – that make up and enable a functioning organisation, capabilities represent a viable means of organising operating models. In this regard, they represent the full suite of resources that contribute to organisational business capacity including people, process, information, and technology. The business value of a capability-based approach lies in the resultant clarity about what resources an organisation has at its disposal (or might be lacking) to deliver outcomes or goals within a given business context (Deleu & Clendon, 2015).

More than just a summary of skills, people capabilities capture how an organisation does its work and what it is good at; they can in that sense express the very identity of the organisation. An organisation operating with a well-defined and thoroughly integrated set of people capabilities can enjoy a host of beneficial outcomes, including positive performance assessments, higher market valuations and a competitive operating advantage (Smallwood & Ulrich, 2004).

As an example of what these might comprise, the data governance framework being implemented in New Zealand employs the following set of data governance people capabilities, to foster data accountability (Sweeney, 2017):

- Data point of contact
- Subject matter expertise
- Access control
- Risk management
- Internal relationship management
- External relationship management
- Quality Assurance (QA)/Quality Control (QC) management
- Data management
- Data champion
- Data innovation

A brief description of each of these capabilities can be found in *Appendix 2*.

The capabilities should comprise a list that accommodates all of the dimensions of good data management practice that are relevant to the organisation. These dimensions might include: technical and subject matter expertise, risk and data management, communications and engagement, and design and improvement. When used to organise the list of capabilities, these dimensions provide potential areas of development for staff with a direct line of sight to the organisation's strategic goals for data.

As is the case with the New Zealand examples, the capabilities themselves are best delineated to a degree of specificity that draws out any nuanced characteristics of each. This provides two levels of benefits: each capability is detailed enough to inform appropriately targeted discussions with staff regarding their current job responsibilities and growth areas, while considered as a collection, the capabilities provide a comprehensive view of data governance expectations across the organisation as a whole.

Human Resource System Integration

An inventory of capabilities in and of itself provides no measurable data governance benefit without a viable option to implement them amongst staff with data responsibilities. Indeed, it is this focus on the operationalisation of conceptual governance outcomes that distinguishes the proposed data governance framework from its traditional counterparts.

If the capabilities are successfully adopted, it paves the way for good data practice to become standard and accepted behaviour, and assuming accountability for data assets under their care a matter of course for all staff. In this scenario, good data management practice becomes integrated within a familiar workflow environment and is well positioned to foster a sense of ownership and improved engagement with the organisation's data assets. For line staff, it is just another element of their normal duties.

The corporate Human Resource department is well equipped to facilitate this embedding of data governance capabilities. As data governance stakeholders, Human Resource staff are likely to intrinsically understand how a well-crafted set of people capabilities can exert wide-reaching influence, inform external engagement, and positively impact the delivery of strategic outcomes. People capabilities themselves are a particularly familiar concept from a human resources perspective, meaning that data governance characterised in this fashion can leverage that inherent level of comfort to resonate with a corporate function offering extensive reach throughout the enterprise.

Drawing from a capability framework (People Measures, n.d.), Human Resource departments can provide numerous mechanisms for guiding the adoption of data governance capabilities throughout the organisation's systems and culture. They will have at their disposal established structures that enable them to adopt these capabilities and promote their value, which can itself represent a positive selling point for the organisation. In this way data governance capability documentation can be absorbed into recruitment tools and materials, learning and development approaches, and succession planning and performance management systems, thereby insuring the capabilities exert a much stronger and persistent influence on staff behaviours than they might otherwise.

Cultivated Data Knowledge

In addition to enabling an environment of good data management practice, a re-imagined data governance framework will promote the development and cultivation of a thorough knowledge base, applicable at all scales across the enterprise, for organisational data assets. Without a comprehensive understanding of relevant data assets, staff with data responsibilities are disadvantaged in their ability to help realise the full potential of those assets. Lacking a complete picture, they will in some cases certainly not know what they don't know, and this gap in knowledge will influence how effectively their lines of business operate internally and in conjunction with one another to support organisational strategic outcomes.

Steady States

An important element of a data asset knowledge base is a comprehensive model of organisational data flow, including the mapping of data assets within and across lines of business. As noted earlier, data flow provides an effective means of facilitating a strategic view, where the roles of various business units are properly situated within the broader landscape of the organisation as a whole. This then encourages a decidedly holistic perspective which serves not only better management of organisational data assets but also improved data engagement with entities external to the organisation. A modelling approach that offers particular promise in this regard is that of steady states.

The concept of a steady state has been applied across a wide range of fields including chemistry, engineering, and economics, but has a particular relevance as an analysis tool in the manufacturing industry. In a general sense and as the name suggests, a steady states references a point within a process that is unchanging over time. In the manufacturing context, steady states have been employed to delineate and map production systems as a means of improving productivity (Ajeeli, 2016).

This idea of capturing a detailed, steady state view of manufacturing process flow was subsequently adapted for use within statistical data environments by Statistics Netherlands (Braaksma & Zeelenberg, 2014). In the Dutch case, a steady states model was applied to characterise organisational data flow and improve levels of understanding about statistical production process models (Struijs, Camstra, Renssen,

& Braaksma, 2013). The significance of this seminal work by Statistics Netherlands lies in its publication of an effective method for mapping macro patterns of data flow within a process network, and a means of establishing a set of points along that network to enable targeted monitoring of data lifecycle milestones.

Data Value Chain

Steady state models make use of basic value chains, where production consists of a series of inputs subjected to value-adding transformations that result in new output states, themselves available to serve as inputs, until an end state is achieved.

Within a value chain view, data begins its journey in something of a raw state and through a series of defined processes involving amongst other things cleaning, formatting, transformation, and analysis – all of which require investment by the organisation – transitions and evolves during the course of its lifecycle, until it contributes to a product or some other form of final output.

If data is managed as a business asset, each process transformation should result in the addition of value, or in this context, in an improvement of quality, which can be monitored and which accumulates across the data lifecycle. Steady states as a flow model delineates the most significant steps along the value chain where data (and associated metadata) achieves a predefined quality level and is maintained (Braaksma & Zeelenberg, 2014). This last point is important as it provides the link between an asset management approach based in data – where use of a value chain is expressed through steady states with criteria based on measures of quality – and traditional uses of value chain models, based in process and incorporating measures that capture changes in product value.

A straightforward implementation of a steady states model, and one developed successfully in the data context by the Australian Bureau of Statistics, is that of quality gates. Quality gates represent a "systematic approach for assessing…quality…at specific points in the process, such that the overall quality of outputs are fit for their intended purposes" (Pink, 2010, p. vi). The value proposition of quality gates suggests that through quality monitoring of data at numerous junctures along its lifecycle, production process errors can be detected and mitigated close to their source. This offers an easier, less expensive management pathway involving reduced exposure to reputational risk than error discovery and resolution that happens after product release.

Quality Criteria

Since a steady states model provides points along the data lifecycle where a predefined level of quality has been achieved, it necessitates a set of criteria and associated measures or tolerances to characterise and test quality at each of those lifecycle points. Organisations are free to employ whatever set of steady state quality criteria best serves their needs, though they must be agreed and employed consistently across the enterprise. This speaks to the inherent scalability and portability of this approach. Because steady states criteria can be as simple or as complex as required, the model offers a valid approach for organisations exhibiting a wide range of data governance maturity.

Once established as practice, the use of steady states quality criteria provides advantages both internally, in terms of encouraging an enterprise view and facilitating staff buy-in, and externally, as a means of system-level engagement. The key to realising this range of benefits lies in the proper structuring and delineation of quality criteria to accommodate their relevance at multiple scales.

At their most generalised, and serving purely as an engagement mechanism to encourage a consistent approach to data flow modelling at the system level, steady states criteria would consist of easily consumed quality dimensions. The use of broadly defined and relatively generic criteria – like timeliness, accuracy, and accessibility – supports uptake across a spectrum of organisations operating in different contexts while providing them a means of communicating across boundaries that might otherwise hinder such transactions.

Positioned below these engagement-oriented quality dimensions and functioning at the organisational level would be a set of enterprise quality criteria. Exhibiting more granularity than the system engagement criteria, but applicable across all business units within a given organisation, these criteria would be designed to promote and measure good practice in areas like data management, processing or methodology. Data management criteria might cover proper data storage and preservation, efficient discovery and access, persistence of supporting documentation, and design for re-use. Various measures are available for such criteria, but most certainly would include things like verification of metadata maintenance and the use of accepted data standards.

Lastly at an operational level, situated below the enterprise criteria, would be those quality measures of relevance and potentially unique to a particular line of business. These are likely to technical in nature, requiring a certain level of subject matter expertise, and exhibiting the greatest variability, both in terms of the criteria themselves and the measures associated with them. Each business unit is free to establish however many criteria and of whatever type it wants, to support its needs. A key advantage of including business unit specific criteria is that they facilitate a sense of ownership. While enterprise criteria might be construed by line staff as an external imposition into their part of the operation, the line of business criteria are their own and will exhibit a unique and meaningful applicability to their jobs.

Data Flow Mapping

When employed as part of a re-imagined data governance framework, a primary output of a steady states model is a set of organisational data flow maps. The library of maps would include one for each line of business that handles data assets and an aggregated enterprise map, based on the intersections of line of business maps. This documentation offers the potential for a host of valuable data lifecycle insights into how and at what entry points data assets arrive at the organisation, operate within it, and ultimately exit an organisation's sphere of influence. The resultant comprehensive view of data flow, available for presentation in a highly intuitive manner at both line of business and enterprise scales, is indispensable from a governance perspective.

It is important to recognise that the framework proposed here emphasises an integral connection between a data flow map and the organisational business process model or process map. While there is merit in analysing data assets for their own sake, as is the case with information supply chain or value chain analysis applications, that view is ultimately limiting. The role of data assets as the fuel for processes suggests there is more meaningful benefit in considering them within a broader business context as well.

And in that regard the two perspectives – data and process – are intertwined and highly interdependent. Without a network of defined processes to properly direct it to where it is needed and can generate value, data cannot deliver anywhere near to its potential, and without data as content to leverage, a process network is stuck in a conceptual space, an empty shell also likely to deliver little to the organisation.

In the proposed data governance approach, the mapping of data flow involves the placement of steady state markers directly onto a business process map. The business process model therefore forms the foundation onto which a view of the data lifecycle is superimposed. This not only supports an authentic view of the relationship between data and process, but offers a relatively straightforward and intuitive method for developing a data flow map.

The reasoning that dictates the placement of data flow steady states will likely be influenced by the corresponding positioning of process milestones. So for instance if data is cleaned as part of the process to move it into an enterprise data store, it will have achieved a new measure of quality and a steady state therefore is called for at the data store exit point. But beyond these obvious locations, steady states can also be positioned at points where they provide additional business value, including closer monitoring of data quality or the verification of good practice at processing stages where it is not currently scrutinised. As such the steady states model helps promote a level of data asset mindfulness while illustrating the inherent and complimentary value of a data perspective to staff who are predominantly process-oriented.

For administrative purposes it is recommended that steady states in the line of business or enterprise flow map be sequentially numbered from the point at which data first enters the relevant sphere of influence – referenced as steady state zero (SS_0) – through to the final steady state before it exists outside that business unit's or the organisation's influence. The number of steady states designated in total (SS_n) will vary, effected by amongst other factors, the relative complexity of the underlying process model.

The level of granularity to which steady states are mapped is a decision to be made as part of a value proposition analysis. The ideal level will be specific enough to enable a sufficiently detailed level of insight into data behaviours across the line of business or enterprise lifecycle, but not too detailed to the point where the information it provides is overwhelming and of little practical value. For the purposes of manageability, it is suggested that steady states correspond to major process milestones and not reflect all of the specific sub-processes that fall between them (Braaksma & Zeelenberg, 2014), but that decision is ultimately based on a business unit's or the organisation's agreed governance needs.

Beyond providing a logical starting point for a sequential numbering of steady states, the use of a zero steady state also offers a mechanism for extending the view of data flow outside of the organisation's sphere of influence. Points on the flow map upstream of the SS_0 entry point, representing for instance assets existing within the influence of external data suppliers, can be mapped and designated with increasingly negative numbers (SS_{-1}, SS_{-2}, … SS_{-n}) as distance from SS_0 increases. This provides an opportunity to conceptually continue the data flow map beyond the physical boundaries of the organisation and into the operational environment of a different organisation.

Considering trends that suggest continued potential for the use of administrative data, particularly in census and other statistical contexts (Statistics New Zealand, 2014; Nordbotten, 2010), this capacity of the steady state model represents a particularly valuable benefit. While providing numerous advantages as a means of data collection (Connelly, Playford, Gayle, & Dibben, 2016; Statistics Canada, 2009), the persistent challenge with administrative data involves its efficient use in operating environments potentially very different from those in which it was originally collected. This reliance on data not inherently fit for purpose often translates into a significant data preparation burden – up to 80% of an analyst's time, per DalleMule and Davenport (2017) – before it can be used to generate value.

Since the form and quality of data as it arrives at an organisation's SS_0 entry point directly influences the level of work required to prepare it for subsequent use, the ability to shape the characteristics of that data prior to arrival is especially beneficial. In lieu of a consistent data flow model, the engagement required to influence data suppliers to reassess their data provision regime can represent a challenging

and time-consuming prospect. But with the use of steady states, particularly if the supplier organisation is employing a similar mapping of their data lifecycles, a communication mechanism is available to facilitate productive discussions. In that case decisions about where in its business process model a supplier should release data, not only for its own benefit but for that of a downstream consumer as well, can be considered and communicated in terms of a mutually understood frame of reference.

This suggests that the view of data assets resulting from steady states flow mapping is quite naturally extensible across a broader ecosystem landscape, enabling a unified perspective on data and how it interacts throughout various macro-scale environments. It is here that the idea of flow demonstrates its unique potential as a means of managing and leveraging data asset value. The joining up of data perspectives in this way is a critical component of successful cross-organisational and cross-sector integration and offers significant potential to support holistic data approaches and to inform thinking on a global scale.

A Business View of Data Accountability

Steady states as a data flow modelling solution has its genesis in addressing the needs of a manufacturing production environment, and as such maintain a close association with basic value chain analysis. As the examples in the Netherlands and Australia demonstrate, the resultant emphasis on the tracking of accumulating value, when applied to data asset quality monitoring, is a worthwhile exercise, contributing to the perpetuation of good data management practice (Struijs, Camstra, Renssen, & Braaksma, 2013; Pink, 2010). But as noted previously, that style of analysis also runs the risk of perpetuating an isolated view of data assets, where they are not inherently linked to a business perspective as they should be. This dissociation of data assets, even if subtlety expressed, weakens the benefit proposition of considering data flow as something intricately linked with the organisational business process model.

Steady States as Business Decisions

The mapping of steady states directly onto a business process map effectively communicates the inherently close relationship between data and process, but there is the opportunity to further evolve the idea of a steady state to emphasise this close affiliation even more. Within the data governance approach proposed in this chapter, steady states are re-cast as business decisions. More than a simple representation of the data asset itself exhibiting the results of value transformations, steady states in this new rendition reflects staff with responsibilities for data assets determining if a new data lifecycle state has been achieved.

This re-characterisation of steady states represents a maturation in thinking about an important organisational asset, moving it from within a purely data-centric perspective to one where it is actively participating in and influenced by the operational realities of the organisation. Data in that sense becomes a resource situated firmly within business practice and its administration therefore more clearly positioned within the realm of asset management.

The evolution in thinking about a steady states model reveals additional means of characterising the value proposition, opens new avenues of benefit realisation, and provides for a meaningful consideration of asset management behaviours as a critical component of a data governance framework. When thought of as a business decision, a steady state becomes a nexus for a host of operational elements – including published guidance, reference structures, computer applications, and tools – that support and otherwise facilitate a business outcome.

Linking Data Behaviours and Data Knowledge

To progress the decision event associated with a steady state, staff will draw on some combination of the data governance capabilities delineated as part of the proposed data governance framework. It might require for instance tapping into a combination of subject matter expertise, risk management and external relationship management skills to deliver a successful outcome for an external client or stakeholder. This seemingly minor occurrence, repeated numerous times during the course of a business day, represents the point of connection between the two foundational outcomes – staff demonstrating improved data behaviours and an increased level of data knowledge – that shape this new approach to data governance.

Decisions of any type are made based on the consideration of criteria and it is no different in the case of a steady state. In this instance, staff reference an agreed set of quality criteria, published for their use as a combination of enterprise and line of business specific quality measures. As they test the measures associated with the relevant set of criteria and act upon the results of that analysis, they are conducting good data management practice while supporting the goals of their particular business unit.

Moreover, in their ownership of this decision process, staff are also taking accountability for the data assets under their care and thereby delivering a data governance outcome. If the testing of steady state criteria is properly documented, these staff are furthermore contributing to organisational assurance and risk mitigation by perpetuating operational transparency.

When designed properly and incorporated into established workflow, these significant governance results can be facilitated as a business-as-usual activity. From the perspective of staff, they are simply performing their standard duties. Their added responsibility as good stewards of data assets under their care happens as a matter of course.

Providing Data Assurance and Inspiring Trust

Data accountability as covered thus far in this chapter has focussed on the actions of those staff with responsibilities for managing data assets under their care. But accountability in this regard also involves an external dimension, where it serves as an important contributor to customer or constituent assurance.

A user of data or of a product or service based on the data managed by a trusted source can reasonably expect to have their inquiries about that data addressed to their satisfaction. In the proposed governance framework, this type of assurance arises from the embedding of capabilities that promote good data management practice across all staff positions with direct or indirect interests in organisational data assets. It is also supported by the transparency built into the steady states decision process and through the use of a set of informed and unambiguous guidance materials by staff responsible for those decisions.

In contrast, it is unrealistic to expect that those occupying a designated governance role typical of a political data governance model will possess the proper level of insight to provide a comprehensive understanding of data assets and their complex, highly dynamic and increasingly ad hoc patterns of flow across the enterprise.

The desired perspective can, however, emerge from a data governance model designed to facilitate the installation of proper data accountability across all relevant staff positions, in effect seeding an assurance mechanism broadly throughout the enterprise. While still delivered by people, the various capabilities

required of good data governance and accountability are now linked more directly with the organisation's data assets themselves as they move and interact in complex ways during their lifecycles. In that regard good data management behaviours can legitimately be touted as part of the organisational "DNA," a condition that can be leveraged successfully to engender high levels of customer or constituent trust.

Line of Business Data Accountability

Though data accountabilities are situated at the level of individual staff, proper access to data knowledge is best initiated at the business unit level and with reference to the enterprise data flow map. While it is possible in some cases that this mapping could be generated from a single and decidedly top-down exercise, taking into account all steady states at once, the associated complexity for most organisations would likely be prohibitive. A more realistic option, which leverages native process knowledge at the line of business level, is to develop a library of business unit flow maps which can then be overlain and merged to create an enterprise view.

The properly aligned layering of business unit flow maps will support the creation of a separate enterprise data flow map, providing an organisational view of data flow while maintaining views within the constituent lines of business. One method posits enterprise steady states positioned wherever there is at least one instance of a business unit steady state below. An alternative approach, designed to limit the number of enterprise steady states, would involve the aggregation of multiple underlying business unit steady states. Regardless, because all business unit steady states are used to form an enterprise map, there should be no gaps – that is, no orphan steady states and process pathways between them that fall outside the responsibility of at least one line of business.

The integration of line of business flow maps will almost certainly present steady states that when considered from the enterprise perspective are associated with or fall under the responsibility of multiple lines of business. This is a reflection of actual practice where data is used simultaneously by different parts of the enterprise. When these shared steady states are viewed from the perspective of the constituent lines of business, they will likely assume different relative positions along their respective flow maps.

So for instance SS_{A1}, representing an early lifecycle steady state of business unit A data flow, might align from an enterprise perspective with SS_{C7}, a relatively late lifecycle position within business unit C data flow. This view of relative steady state positioning is valuable knowledge that can support a meaningful investigative opportunity into how business units interact from a data perspective and how they engage generally across the enterprise. This understanding becomes increasingly important as the complexity of the business operating environment increases.

The line of business perspective built into an organisation's data flow maps provides a means of using inherent data complexity as a path towards improved business insights. It is quite possible for instance that prior to data flow mapping an organisation would not be able to claim widespread or readily available understanding of the full contingent of business units responsible for and interested in data assets at any given point in their lifecycle. And once those responsibilities in all of their complexity are properly mapped and documented, the resultant knowledge base only strengthens the organisation's ability to respond efficiently and confidently to customer inquiries, contributing positively over time to strengthened levels of assurance.

Steady States as Monitoring Stations

If data is the water flowing through a stream network of an organisational business process model, steady states are the monitoring stations established throughout that network. While such stations are primarily put in place as output nodes, employing sensors to collect and transmit various types of stream condition data over time, they can also serve as input points, providing external intervention access to the network.

Quality gates represent a simple manifestation of a steady states model with a function in this sense as network output nodes, providing a means of collecting and reviewing regular measures of quality as data makes its journey through its lifecycle (Pink, 2010). Leveraging these gate nodes to test measures at various points throughout the process network, an organisation can keep an eye on data health over time. Based on the inherently close relationship between data and the business process model, the results of these data quality tests can also be used to inform an assessment of existing processes and workflow and support targeted and timely issue mitigation.

While it represents a conceptually unassuming model, the capacity of steady states to monitor the health of both data assets and the underlying process network makes it a powerful one. Steady states in this regard provide a level of infrastructure established strategically and comprehensively across the enterprise and which can be called upon at any time to help inform thinking and decision-making. As an enabling mechanism data flow mapping serves a vital role, insuring an organisation is well equipped to respond to changing operating conditions.

Steady states as nodes on the network, however, can also be used to inject good practice into the organisation. This would primarily be achieved through the design of quality criteria, which are available to help the organisation consider data variables its feels are worth measuring. The use of enterprise criteria could certainly serve this purpose, representing measures of relevance to business units across the organisation that can be "hard-coded" into the criteria list visible to all staff. The particular value of steady states in this regard is linked with the ability, via pre-established and well-distributed quality criteria, to establish good practice triggers simultaneously across the enterprise and directly into staff workflows.

These opportunities also speak to the portability of a steady states model and its value to an organisation as a future-proofed implementation of the proposed data governance framework. Once work is done to establish steady states and map them onto the business process model, they become components of an easily accessed enabling infrastructure, providing a means of extracting new insights or inserting new thinking or guidance. This flexible and readily available means of curating data knowledge is of particular value in a highly dynamic business environment.

The need to implement a new set of inputs or extract a new type of output might arise from a host of common circumstances including a change in leadership, a structural reorganisation, a refresh of strategy, or the advent of a new set of compliance parameters. A steady states implementation positions the organisation to more easily absorb the change that results and quickly distribute a managed response to it across the enterprise.

CONCLUSION

The conditions that characterise contemporary operating environments present a new set of circumstances for organisations operating across all sectors and include a much more prominent role for data. This has resulted in an increasing level of understanding that data represents a mission-critical business asset and the subsequent spread of that awareness to parts of the organisation where previously such things would have enjoyed little visibility.

To support this broadened appreciation of data in a way that translates to increased value realisation, its consideration and treatment also needs to move from the exclusive control of those operating in information management environments and beyond analysis practices where it is treated as an isolated entity. More than ever data is the business and as such it needs to be treated appropriately as a business asset. An organisation's data management practice should align closely with its business process models and staff behaviours in regard to data should likewise transition to those more common to asset managers. Data governance frameworks, as a particularly foundational and inherently enabling infrastructure, represent a good place to start.

Unfortunately, frameworks commonly employed for data governance are hindered in this regard by an adherence to traditional thinking and approaches established in a time of very different operating conditions. Significant amongst these approaches is the reliance on a top-down, hierarchical form, drawing heavily from the structure of the staff organisational chart. While easy to implement, the reach and influence of governance outcomes within such a politically-oriented framework do not readily extend into the operational contexts of line staff, an area of the business where arguably it is needed most. The reliance moreover by these traditional frameworks on a small set of designated roles like Data Custodian or Data Steward also tends to concentrate data accountability within a limited business context rather than thoroughly embedding it as a standard in the form of good practice data management amongst all staff.

The data governance framework proposed in this chapter, drawing from a model being developed for New Zealand government, reflects a significant change in thinking about the role of governance generally, so that it can better respond to current conditions, address the shortcomings of traditional approaches and deliver improved outcomes. It demonstrates how a realignment of the data business paradigm can help establish basic infrastructure that is better positioned to influence behaviours and enable a deeper level of knowledge about data assets within contemporary contexts. Its adoption offers the opportunity for a refreshed view of governance, establishes the foundation for a maturation of thinking about data generally, and can help organisations evolve beyond data management practices that require regular investment but are not delivering to their potential.

While the adoption of the proposed framework offers an organisation numerous benefits, its potential extends more widely to a system context as well. A consistent approach to data flow based on a steady states model for instance, if expanded appropriately across organisational boundaries, can contribute to a congruent data system, where communication and integration is well facilitated and there is increased potential to achieve the evidence-based and collaborative policy goals of projects like Actionable Intelligence for Social Policy (AISP, n.d.).

Recognising the inevitability and potential of increasingly global operating environments, the Actionable Intelligence for Social Policy initiative relies upon an Integrated Data Systems (IDS) model (Fantuzzo & Culhane, 2015), which itself requires an infrastructure that readily enables the acquisition and integration of different types of data from a host of relevant if disparate sources. Understanding how data flows, at both the organisation and system level, and having access to a consistent and easily adopted model for charting that flow across engagement scales is paramount, and represents an important contribution of the proposed data governance framework to this broader vision.

In light of the conditions that characterise current operating environments, there is a growing realisation that the challenges we face are increasingly global in scale and the implications of how we address them something that we must all own. The solutions we choose to enact therefore necessitate thinking across boundaries, be they political, organisational, or otherwise, and require data likewise free from unnecessary constraints, easily assimilated, and readily integrated to inform our decisions. An important step in this direction is agreement on a common organising or governance model for our collective data resources. Once established, this type of data governance framework is available to help enable the other infrastructures required to deliver the harmonious global data system to which we aspire.

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KEY TERMS AND DEFINITIONS

Accountability: Assuming a transparent and appropriate level of responsibility for data assets that are under one's care, which includes honoring obligations associated with good practice.

Administrative Data: Data collected as a matter of course by an organization for the purposes of supporting the normal business operations for which it is responsible. It contrasts with survey or research data which is gathered to answer a particular question or need.

Asset: A business resource with strategic, economic, or intrinsic value that an organization manages with the expectation that it will provide future benefit.

Capability: A measurable capacity to use resources that an organization needs to deliver to its strategy and achieve its agreed outcomes. It includes elements of people, process, information, and technology.

Data Flow: The lifecycle movement and storage of data assets along business process networks, including creation and collection from external sources, movement within and between internal business units, and departure through disposal, archiving, or as products or other outputs.

Data Lifecycle: The complete set of development stages from creation to disposal, each with its own characteristics and management responsibilities, through which organizational data assets pass.

Data Management: The full lifecycle care of organizational data assets, through the implementation of accepted good practice, to develop and maintain their value.

Governance: The framework of rules, norms, and accepted practice established as an organizational infrastructure to enable strategic outcomes, accountability, transparency, oversight, and the management of data, risk, and relationships.

Steady States: Those stages in the value chain where the output of a process satisfies a set of pre-agreed quality indicators. In a business context, data asset decision points where an agreed set of quality criteria are satisfied.

Value Chain: A business management concept or analytical model where production is viewed as a sequence of inputs, transformation processes, and outputs. Each transformation process adds value, which accumulates to the final product.

APPENDIX 1

Data governance principles from the data governance framework developed for New Zealand government (Sweeney, 2017).

- **Transparency:** A well-established data governance framework will enhance existing levels of transparency or help instil transparency where it is lacking. It does this by promoting and facilitating good practice data management behaviours which themselves result in increased levels of standardised documentation, encourage openness and improve communication in regards to data assets, across the enterprise. The results provide levels of assurance that strengthen trust amongst customers or constituents.
- **Business Process Alignment:** If organisations are to leverage meaningful insights from the plethora of data at their disposal, respond appropriately to the sea-change in the relative significance of data as a resource, a deliberate shift to a more intrinsically business-oriented consideration of data as asset is of value. This serves to expand the purview of data beyond purely technical considerations, which amongst other benefits, facilitates an alignment of data management approaches with business process models, inciting improved outcomes from both.
- **Holistic/Enterprise:** Data as an asset can be managed at many different scales and has the potential to deliver value across all of them, right down to its role as a component of a specific piece of work situated deep within a particular business unit. But leveraging data assets to their full strategic potential requires a holistic view distributed across the enterprise. It is only at this scale that a complete view of how data operates in the organisational context, including significantly how it flows through and between lines of business, is possible. A view developed at this scale is then positioned to provide valuable guidance in both directions, internally within the organisation and more widely across the contextual system.
- **Pragmatism:** A key shortcoming of traditional data governance models has been their failure to deliver meaningful value and relevancy throughout the organisation, and in particular to line staff. In contrast and considering the potential of an effective data governance framework, a practical execution based on a deliberately bottom-up implementation stands to deliver significant benefits throughout the enterprise, and directly into its operational environments. When incorporated within workflow and functioning as a matter of course, operational data governance is positioned to improve efficiency, while equipping line staff to deliver to strategic data imperatives like good practice data management.

APPENDIX 2

Data governance people capabilities from the data governance framework developed for New Zealand government (Sweeney, 2017).

1. **Data Point of Contact:** Delivery of this data governance capability on a practical level involves acting as the primary point of contact for those data assets within one's particular area of responsibility. This includes serving as the designated "go-to" person for internally and externally sourced questions, issues, or information requests about the data, and providing resolution or alternatively, coordinating escalation or delegation of matters appropriately.
2. **Subject Matter Expertise:** The proper management and fully realised business use of a data asset requires a level of expertise in either the data itself, the processes used to manipulate it, the part(s) of the business where that data is critically utilised, or a combination of all of these. If not providing a level of de facto expertise themselves, the individual delivering this capability would know how to secure such knowledge and the most efficient means of drawing from such resources when required.
3. **Access Control:** Aligned with the responsibilities of a data point of contact, this capability further involves the administration of and accountability for proper access to relevant data assets, thereby promoting good practice data security. Drawing on the proper level of implicit or delegated authority to make decisions in this regard, the person delivering this capability ensures that data assets designated as sensitive are only accessed by individuals with the proper authority, clearance and permissions to do so.
4. **Risk Management:** Those responsible for delivering to this capability will be well positioned to provide oversight for data assets under their responsibility such that potential risk to the organisation is identified, managed, and mitigated. In coordination with other parts of the business and drawing from organisational risk registers, provision of this capability would ideally involve the publication and maintenance of data asset risk profiles. This promotes good practice data management within the source line of business and helps inform other parts of the enterprise operating with data dependencies or concerned with risk management generally.
5. **Internal Relationship Management:** Properly managing the linkages between and across the parts of the enterprise where data exchanges hands is paramount to ensuring that data consistently contributes value as an operational asset. Drawing on point of contact and subject matter expertise capabilities, delivery of this capability includes the management of internal relationships to make sure a particular portion of the data asset lifecycle is connected to and aligned with those preceding and those following it, helping to maintain data flows and data asset positioning to deliver value.
6. **External Relationship Management:** If an enterprise is organised around a simple linear business process model, the ability to manage productive relationships with outside agents will be of particular significance at either end of the data lifecycle, where data is sourced from outside the organisation and again where fully processed data or derived products are disseminated to customers or stakeholders. If the organisation operates an open model, where data assets can be called upon to provide value at any point in their lifecycle, external relationship management is a capability requirement throughout the lifecycle and the charge of all staff with organisational data asset responsibilities.

7. **Quality Assurance/Quality Control Management:** A properly implemented data governance framework will supply an organisational infrastructure that provides a set of administrative entry points to enterprise data assets, representing opportunities to influence how those assets contribute to and themselves satisfy organisational quality requirements. Depending on the needs of the organisation, the manifestation of this data governance capability might fall at different points along a quality management spectrum, from providing a hands on, quality control focus, to maintaining oversight with more of an assurance-based perspective. In either case successful delivery of this data governance capability provides the enterprise with an acceptable level of confidence that the data assets and derivative products within a particular area of the business satisfy organisational quality requirements.
8. **Data Management:** Working closely and regularly with data assets means that in order to satisfy the responsibilities of their role, those tasked with a data management capability retain a sufficient familiarity with relevant data and information management policy, legislation, and guidance, and are confident in their ability to apply this knowledge. In those cases where they do not have or are not able to secure sufficient knowledge themselves, they will know how to readily access it or escalate issues to an enterprise governance body for resolution. In this capacity they serve as data management representatives throughout the enterprise, promoting good practice, and helping embed it within business activities like the negotiation of data agreements and the delivery of change management programmes.
9. **Data Champion:** Those with this data governance responsibility will actively promote the proper management and use of the data assets under their care, to realise value from those assets. Value realisation may be defined differently in different situations, but at its core it is generated through the successful use of those assets or derived outputs, by customers. There exists an associated championing capability therefore to serve as a consistent voice promoting this perspective across the organisation and ensuring it remains top of mind amongst staff performing their duties. This capability involves coordinating and delivering communications and providing education in good data and information management practice.
10. **Data Innovation:** The implementation of a data governance framework supports a culture of continuous improvement in regards to the oversight and management of enterprise data assets, expressed through a capability for innovative thinking. With a view across both the day to day operational and long-term strategic management of those assets, those delivering this capability can help stimulate innovation through an inherent openness to and recognition of better ways of doing things. They will also exercise a penchant for nurturing new ideas and presenting them in a meaningful way to the organisation for consideration. As a line of business contact for an enterprise data governance body, those delivering this capability are positioned to escalate innovative thinking to senior leadership for consideration and further action.