Barriers, incentives and disincentives to participation in the national Spatial Data Infrastructure

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Purpose

1. This report was commissioned by the New Zealand Geospatial Office (NZGO) to understand why the national Spatial Data Infrastructure (SDI) is developing more slowly than expected and why organisations appear reluctant to take on formal steward and custodian roles under the Steward and Custodian Framework.

2. The consultation included 21 organisations incorporating Public Service departments, State Sector agencies (including State Owned Enterprises) and local government representatives. Most are actual or potential stewards or custodians of the draft fundamental themes and datasets (as at 23 January 2014). In addition, representatives from the Local Government Geospatial Alliance and the private sector geospatial industry were interviewed.[1]

3. Information was gathered by way of open-ended discussions using set questions. Interviewees had scope to amend the questions where appropriate.

4. This report weights the findings based on close analysis of the responses. It incorporates a degree of interpretation to provide a consensus "picture" of the views expressed. Suggestions for change as put forward by interviewees are mostly presented as expressed and not critiqued.[2]

5. Roger Fitzgerald is an independent contractor with experience in programme design and review for the housing, energy efficiency, Maori development, community and local government sectors.

[1] Appendix 1 has a full list of organisations met with.
[2] The report assumes a high level of understanding of the nature and purpose of an SDI, which is defined as "the technology, policies, standards, and human resources necessary to acquire, process, store, distribute and improve the usability of geospatial data." (http://www.linz.govt.nz/geospatial-office/about/projects-and-news/spatial-data-infrastructure)

Executive summary

6. The aims and overall approach of the Geospatial Strategy and the SDI are generally supported.

7. The main incentives for organisations are the operational benefits arising from better data and information management, and the alignment with organisational strategies and the direction of all-of-government programmes.

8. Engaged CEOs wish to show their commitment to best practice. Profit-driven organisations seek commercial returns from their investment in geospatial data.

9. Most organisations are experiencing barriers to participation. Only four expressly declared there are no barriers.

10. The most significant barriers are lack of understanding within organisations and lack of resources for geospatial work.

11. The specific Cabinet Minute which mandates the SDI has relatively weak influence, particularly for organisations outside of the core Public Service.

12. Estimating and realising benefits from the investment in geospatial data is challenging, especially where they do not directly accrue to the investor e.g. release of data for the public good, to promote economic innovation or to improve efficiency across the public sector.

13. Local government engagement in the development of the SDI is fragmented. There are several councils pursuing innovative uses of data, but the sector lacks a coordinated approach to data management, release and use.

14. In general, more clarity is needed around the requirements of the Steward and Custodian Framework, especially the obligations and costs these roles place on organisations.

15. There is a desire to move from theory to practice, with more definition required around what a “complete” SDI looks like and how to track progress towards it.

16. Suggestions made by organisations for increasing participation were to:

    - strengthen the mandate and for NZGO to provide more leadership and advocacy;
    - find more ways to demonstrate the value of the SDI and geospatial investments;
    - improve the advice and guidance provided to organisations by NZGO;
    - centralise the development of the SDI to test the Frameworks in practice.

Key findings

Incentives

17. Generally, organisations are interested in how an SDI can help them address the everyday business needs around their datasets and wider information requirements.

18. Ministries and core departments perceive an alignment between their own strategic objectives and the Geospatial Strategy. Ministerial interest in matters geospatial (in some quarters) reinforces these connections.

19. Central government departments recognise the obligations imposed by the original Cabinet minute; however, many also cite other all-of-government programmes as a reason for engaging, and the wider national interest served by an SDI.

20. Senior Managers become more engaged when they can see an alignment with their organisations' strategic direction or when they become aware of the implications for organisational performance. Participation by CEOs in the Geospatial Executives' Group has a high correlation with organisations' level of commitment and is sought after by those which are currently excluded.

21. The more engaged organisations are aware that a national SDI represents the next stage of evolution for location information and the only way to extract full value from geospatial data.

22. Crown Research Institutes (CRIs) are the most committed and technically proficient in the sector. They can foresee the potential benefits from having access to a wide range of datasets.

Barriers and disincentives

23. Organisations cited lack of understanding of SDI concepts and lack of resources for geospatial work as the most common barriers to participation.

24. Organisations reveal shortfalls in understanding at all levels, but particularly in relation to making geospatial investment decisions and designing new IT systems. The concepts and language of an SDI are highly technical, which increases the challenge when drafting and presenting business cases to support geospatial work or capital investment.

25. Within the State sector, organisations are unsure how to identify and weigh up the costs and benefits from participating in the SDI. The benefits from releasing geospatial data are often difficult to define and measure beyond the immediate efficiency gains e.g. public good or innovative commercial re-use. Organisations with commercial objectives must be able to generate profits from their activities and this can mean a low priority for the non-commercial work on the SDI.

26. NZGO lacks a strong mandate to compel organisations to participate in the SDI. The Cabinet minute from 2010 [EGI Min (10) 30/14 refers] has had a relatively minor influence on

agencies.[3] For around half the organisations owning fundamental datasets, it has no relevance at all, as they operate outside of the core public service.

27. Within the core public service, there are multiple strategies and cross-agency programmes competing for the attention of managers. Ministers' expectations are important, but few are directing their departments (or the private sector entities in which they hold an interest) to comply with the Minute.

28. Local government participation is fragmented, reflecting the variation across the sector in terms of resources and expertise, as well as the lack of a shared approach. Councils often cannot see what value an SDI can provide for ratepayers.

29. The Steward and Custodian Framework seeks to create a "virtual" organisational structure which sits across the top of the public, State and private sectors. However, it is unclear to many organisations how steward and custodian roles fit into everyday business and what time and cost commitments are involved.

30. There are also financial implications from steward and custodian decisions which create uncertainty for organisations, for example, around liability and licencing. Whilst these matters are capable of resolution, they present a risk element that makes organisations wary of taking on these roles.

31. Apart from some specific projects around core datasets, organisations are not specifically funded to contribute to the development of the SDI or provide datasets to it.

32. There is a shortage of qualified expertise in the market and high turnover of experienced staff.

Improving participation

33. Organisations are more likely to play their part if NZGO can "make it easy" for them. Guidance documents need to be understood by non-technical readers and address the interests of the reader (strategic, administrative and technical). Clearer statements of methodology, with more worked examples, are required.

34. Organisations would like NZGO to advise them on how to apply the various frameworks in their own context, especially around:

    - initial engagement with Senior Leadership Teams and the wider organisation;
    - developing business cases and realising benefits;
    - identifying options for funding geospatial activities.

35. A stronger mandate is needed for the Geospatial Strategy to compete with other major cross-agency initiatives in the State sector.

36. Where fundamental data is held by State Owned Enterprises, shareholding Ministers need to reiterate the importance of the SDI to the relevant entities through their Letters of Expectation.[4]

[3] Appendix 2 summarises the relevant directives in the Minute.

[4] The Minister of Finance's recent expression of "zero tolerance for any public organisation sitting on public information or data" will hopefully move geospatial data up in priority for central government and its semi-

37. More clarity is needed around the steward and leadership custodian roles, especially their authority to make decisions and enforce policies around the management of datasets. The concept of a "System Steward" has been proposed, perhaps with formal powers to decide on policy issues around datasets, as a way of providing legitimacy to theme stewards.

38. Organisations are looking for a centralised approach to the development of the SDI, at least in the interim until a "prototype" SDI has been developed. NZGO is expected to lead this exercise and demonstrate how the various frameworks it has developed should work in practice. This could build on the experience of the Canterbury SDI (and others), but with a focus on how cross-agency interests are addressed at a national level.

Other observations

39. Whilst the costs of geospatial work are commonly cited as a barrier, there is little awareness that data are assets that require management and can generate benefits well beyond the cost of that management.

40. Many organisations are still focused on how to manage their datasets for their own business purposes. It is difficult for them to relate their practices to a common cause, as the national SDI and the governing policy frameworks demand. There is little recognition of what benefits could be realised by enabling open access to the fundamental datasets, as much for organisations themselves as everyone else, despite the various case studies available (the Canterbury SDI for one).

41. The analysis using the SSC All-of-Government Coordination Framework[5] indicates the governance approach and underlying frameworks have succeeded in introducing a new set of (geospatial) concepts to the wider State sector. The "agile" approach enables participants to define, test, and learn as they go.

42. The Framework also shows that there is a wide variation in organisations' knowledge of, and commitment to, a truly national SDI; it is still in an immature phase, though some sectors are more advanced than others. There is some distance to go before a common "SDI culture" is instilled in all the organisations which hold fundamental data.

43. Some organisations consider all geospatial work should be done by NZGO and an SDI "provided to organisations complete and ready to go". Aside from the fact that the SDI is not an artefact, these expectations are unrealistic and it would be impractical to attempt to meet them.

44. There was also a certain level of conflation of the strategic work of NZGO with the operational history of Land Information New Zealand (LINZ). Where there have been historical differences between an agency and LINZ, NZGO is taken to be complicit in LINZ's decisions and its work discounted as a result.

45. The fact that NZGO is a small business unit within LINZ may also be affecting stakeholder views about its mandate. LINZ has a land registry and land information focus with its own business objectives. NZGO has a much wider brief that informs the work of LINZ and many

privatised entities (refer http://www.statisphere.govt.nz/seminars-training-forums/2014-oss-forum-proceedings.aspx).

[5] Refer to Appendix 3.

organisations across many sectors and beyond land information. It may be that NZGO requires a higher profile in its own right along with legislative backing to gain full traction with the national SDI. It may also be that the realisation of the LINZ 10 Year Vision will give both LINZ and NZGO more prominence as leaders in the wider geospatial sector.

Part A: Introduction

46. LINZ, through NZGO, is leading the development and implementation of an SDI for New Zealand, through the New Zealand Geospatial Strategy, and as mandated by Cabinet.[6]

47. A core objective of an SDI is to ensure geospatial data is discoverable, accessible and interoperable.[7] By participating, organisations are committing to:

    - making their data easy to find for any potential (re)users;
    - facilitating the provision of the data to those users; and
    - presenting the data in ways which allow for it be combined with other data without substantial re-work.

48. Achieving these objectives depends on organisations working together to identify and agree common standards and practices for the creation, management and release of data.[8] They must then incorporate those standards and practices into their own policies and practices.

49. Realising the national SDI involves an ongoing process of engagement with NZGO and other players in the sector to:

    - set ground rules;
    - implement those rules through organisational changes;
    - invest in the creation, maintenance, release and retirement of data; and
    - ensure the new approach to data eventually becomes business as usual.

50. Many organisations are contributing to the development of the national SDI. The Cabinet minute of December 2010 identified the wide range of organisations holding location-based information and endorsed the need for collaboration with those from outside the core public service. Since then, NZGO has focused its efforts on identifying and working with organisations which hold or have an interest in datasets deemed fundamental i.e. "nationally-significant data that are critical to the effective running of New Zealand, and work together to help support growth in the economy".[9]

51. NZGO is aware that there is potential for greater engagement by these organisations and commissioned this report to consider three separate but overlapping matters:

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[6] Capturing Economic Benefits from Location-based Information [EGI Min (10) 30/14], dated 8 December 2010. Relevant clauses are provided in Appendix 5.

[7] http://www.linz.govt.nz/sites/default/files/docs/geospatial-office/fundamental_datasets_and_themes_opt.pdf

[8] As well as geospatial data, under the Declaration on Open and Transparent Government, State sector organisations must work to release high value public data for re-use. The SDI is a vehicle for realising this objective (refer to http://ict.govt.nz/guidance-and-resources/open-government/declaration-open-and-transparent-government/).

[9] http://www.linz.govt.nz/geospatial-office/fundamental-geospatial-data

- the factors that contribute to successful integration of SDI principles and practices into the design and management of geospatial datasets;

- the barriers organisations face in taking on steward and custodianship (both leadership and delivery) roles for their datasets; and

- the incentives or disincentives which would assist in overcoming barriers to greater participation in the national SDI.

52. Methodology and communication documents are attached in Appendices 4, 5 and 6.

53. Direct quotes from notes taken in interviews with organisations are shown in quotation marks.

54. Parts B to E which follow represent the views of organisations spoken to, as synthesised from the interviews; they are distinct from those of NZGO.

Part B: Incentives

Why organisations participate

55. The most commonly cited reasons for participating fall under the broad heading of "**operational benefits**", specifically to:

- enable better management of core datasets;
- improve their ability to generate or gain access to new data;
- clarify and define accountability for datasets;
- improve their overall management of information.

56. Engaged organisations recognise the importance of geospatial data. Relevant terms used include "potentially fundamental", "critical" and "operationally imperative".

57. Existing policies and practices are increasingly outmoded, putting organisations at risk of redundancy and being unable to meet stakeholder expectations. A national SDI provides the tools to realise best practice and thereby improve decision-making. "Instant access to reliable and up-to-date data" is needed to meet "end user interests". A national SDI brings "structure and quality control" and is a "natural progression from the current state". A truly national SDI would "provide consistency not only between datasets but also, ideally, consistency across themes".

58. Ministries and departments in particular are very aware of their **public service obligations** and participate simply because they consider they are obliged to. These obligations include:

- the Cabinet minute;
- mandatory reporting requirements;
- compliance with the *Declaration on Open and Transparent Government in New Zealand*, which commits the Government to actively release high value public data;
- application of the New Zealand Data and Information Management Principles, which state that data and information must be open, trusted and authoritative, well managed, readily available, without charge where possible and re-usable; [10]
- whole of government programmes such as Better Public Services e.g. Result 9 Roadmap includes actions around use of geographical data for business customers.

59. Organisations also see the SDI as a way of **realising strategic goals**. For some, there is an extremely close alignment of objectives and the concept sells itself. Others are already custodians of core datasets and can see that the SDI is essential to realising the full potential of those datasets e.g. achieving national coverage by way of interoperability. CRIs in particular understand the potential benefits to their businesses from free access to other organisations' existing and future datasets.

[10] Also that personal and classified information must be protected.

What factors influenced executives to support SDI work?

60. The reasons given for organisations participating are also factors which influence senior managers. However, as might be expected, executives are influenced more by strategic considerations than operational concerns, though these still rank as the second most common consideration.

61. Ministries and departments see the **SDI aligning with their major strategies**. The "federal" elements of stewardship and leadership custodianship sit well with the perspective of policy ministries charged with cross-sector responsibilities.

62. Being able to positively influence a sector to improve data quality is important e.g.:

- "retain control over quality and consequences"
- "advance common data publication policies"
- "achieve long term benefits… by realising increased efficiencies from (a) maximum number of users and reciprocal sharing of their data"
- "want to get control of data to address quality".

63. **Ministerial interest** in and support for geospatial activities is a driver for Ministries and departments. There is a push for better information to support policy, and awareness that geospatial information can help tie things together and make unexpected connections.

64. **Cultural** factors drive some. For core public sector departments, participation is simply part of being a "good Government citizen". For CRIs, it is to "retain the cooperative outlook" (between CRIs).

65. Participation in a national SDI is seen to provide an **operational advantage** from standard practices and shared ways of working. It will make business easier, "enable tools to be developed which cannot be envisaged at present", save money through the production of location data with fewer errors and provide better evidence for decision-making.

66. **NZGO-driven activities** have been persuasive in some organisations. Attendance at Geospatial Senior Officials Group (GSOG) and Geospatial Executives Group (GEG) meetings and participation in working parties increased commitment to the SDI cause.

67. Another agency cited the Geospatial Maturity Model and Modelling Framework ("GM3") assessment as being the turning point for gaining executive support.[11] The assessment process raised awareness and the profile of the SDI. Most importantly, it gave an external and therefore "more valid" reason for the Executive to take notice, especially the ranking provided.

[11] The GM3 Framework is currently being revised and will be made available in late 2014.

Part C: Barriers & disincentives

What stops organisations from participating?

68. Committing to do SDI work (whether time or funds) is hampered by a **lack of understanding** by managers and staff. Geospatial considerations are not a standard item in business case frameworks and data requirements are often overlooked.

69. Even many IT Managers place low priority on geospatial requirements. For example, Rule 60 of the IT Procurement Rules, requiring departments to refer tender documents involving geospatial data to NZGO for review, is primarily observed in the breach. Tenders are issued without review by NZGO and either fail to properly address geospatial requirements or exclude them altogether. (NZGO estimates that no more than a handful of tenders have been referred to it over the past five years.)[12]

70. One Ministry was aware that many contract IT staff it engages are not aware of the current requirements around data.[13] They continue to design systems that capture personal, financial, social and environmental data, but not geospatial elements.

71. Where there is no formal support for geospatial work, staff can end up pursuing one of two options:

    a. "slipping it into business-as-usual" by way of subterfuge i.e. recognising there is no formal support for the work but that it offers benefits that make it worth while pursuing;

    b. getting their manager to agree the work be done as part of business-as-usual, on the mistaken assumption (by the manager) that the commitment is only minimal.

72. A corollary of b. is a belief in some managers that geospatial work can be "done by anybody" rather than something that requires a certain minimum level of skill and experience to do properly.

73. The lack of understanding is partially due to the **complexity of SDI language**. Many staff, including those who work in complex disciplines "don't get the concepts and jargon of the SDI" and so have very little awareness of data management disciplines and practices; this results in a lack of accountability and missed business development opportunities.

74. Lack of understanding results in lack of support from management and, consequentially, staff. Occasionally, the culture is hostile and convincing management of the benefits of the SDI requires a major marketing exercise; the Geospatial Strategy must be "sold upstairs".

75. The lack of understanding is not helped by a **lack of resources for undertaking geospatial work**.

[12] NZGO considers that even adherence to Rule 60 will not necessarily achieve the aim of including good quality geospatial requirements, as by the time tenders are issued most projects have already been specified in detail and it is too late to properly build in the geospatial element.

[13] The GEA-NZ Standards Reference Document recommends use of the ANZLIC Meta Data Profile, specifically Metadata Standard AS/NZS ISO 19115:2005, for creating metadata records of spatial information (refer to http://ict.govt.nz/assets/Uploads/Documents/GEA-NZ-Standards-Reference-Document-Appendix.pdf).

76. There are three kinds of activities required to fully participate in an SDI:

    a. Designing and collecting data: This activity is typically a direct result of business as usual - a normal output resulting from the organisation's fulfilling its mission or purpose. This is not an incremental cost, but rather a normal expense incurred in the course of doing business. It includes keeping data up-to-date, complete and accurate.

    b. Contributing datasets to the SDI: These activities include revising internal policies and procedures (including those that govern data design and collection); making data ready for release and re-use ("data transformation"); acquiring new technologies; administering the ongoing release of data; sharing the data; paying licence fees (where applicable); negotiating amendments to licence terms (where necessary).

    c. Developing the SDI: Being involved in working parties on shared policies, standards, protocols, etc.

77. Doing this work can be compromised by a lack of dedicated staff, turnover of knowledgeable staff and a lack of dedicated budget. Comments made by organisations included:

    - "lack a dedicated FTE"
    - "organisations must have knowledgeable staff and these keep leaving"
    - "capacity and capability constraints"
    - "build it into BAU projects because there is no actual funding"
    - "don't currently have sufficient resources to manage data properly"
    - "can only commit on a year-by-year basis due to the constant need to justify the cost".

78. Resource constraints are more acute for organisations with commercial drivers. Investments must generate demonstrable returns within fixed budgets and annual time frames. CRIs point out that databases often benefit the research sector as a whole (i.e. including competitors) and may only make a return after five years.

79. The many strategies and priorities influencing management in the Government sector means **the Geospatial Strategy has to compete for visibility and influence**. One department observed that officials are unable to identify the comparative priority of the Geospatial Strategy c.f. with other strategies, and that the Strategy lacked "tangibility." As a result, there is no mention of the SDI in any organisation-wide documents. Another cited a "lack of headspace for the leadership team" to consider SDI matters alongside everything else.

80. Whilst participation in the SDI is mandated by Cabinet for the core public sector, **the Cabinet decision carries only minor weight for many** of these and its importance is negligible for SOEs, CRIs, local authorities and private businesses. Additionally, whilst State sector agencies are expected to collaborate on the SDI's development (recommendation 5), they are only required to comply with it once developed (recommendation 8) and may seek to be exempted from compliance (recommendation 9).

81. Organisations which function as peak bodies, e.g. Crown agents with oversight of specific sectors, may be subject to the Cabinet minute, but the industry itself is not. In these cases,

the mandate for data to be collected is the collective consent of the data providers. Consent is unlikely to be given if there any costs involved or release might otherwise compromise other business objectives - unless those providers are specifically directed by Government. Challenges also arise if other entities own the data and not all want to share.

82. The lack of formal authority results in "social inertia" due to **risk aversion**; there are always reasons to avoid acting or committing to concrete action e.g.

- publicly released data may be wrong or incomplete;
- users may take data and replicate it inaccurately;
- security may be compromised.

83. At the individual agency level, "it is not difficult to release data but who has the authority?"; with no certainty others will play the game, "the more you federate, the more points of failure are built into the system…, making it difficult to sign up to Service Level Agreements with acceptable minimum standards of delivery".

84. Four organisations had **no barriers** to note.

Barriers and disincentives for local government

85. The size of the local government sector made it impossible to obtain a comprehensive view. However, representatives from the Local Government Geospatial Alliance and Wellington City Council were interviewed. The essence of their responses (which took different perspectives) is summarised below.

86. The SDI has little resonance with councils, which find it hard to understand why they should get involved as they cannot see how an SDI might add value to ratepayers; the Canterbury SDI is a viewed as a one-off scenario that is not replicable across other jurisdictions, as it arose in response to a crisis and thereby over-rode competing priorities which remain in place in other jurisdictions.

87. Local government participates voluntarily in the SDI. Each council makes its own decision to become involved and to implement geospatial practices. The more engaged councils support the Local Government Geospatial Alliance, but this forum does not (currently) have the authority to make decisions on behalf of its members. No wider conversation is happening around coordination of datasets held by councils, which makes it difficult to conceptualise how national custodian roles could work: How can they all come together to create a national picture?

88. The level of understanding of the SDI is very low. Similarly, for many, the SDI Cookbook[14] is difficult to understand. Some councils have no geospatial expertise; there is relatively low attendance at meetings of the Association of Local Government Information Managers (ALGIM) and messages around GIS don't get passed on to the practitioners.

[14] The SDI Cookbook was published by NZGO in November 2011. It provides guidance for the early stages of implementing a national SDI, based on current knowledge and guided by developments and experiences in jurisdictions internationally.

Part D: Improving participation

NZGO's current approach

89. Before considering organisations' suggestions for change, it is necessary to present or reiterate the things that NZGO does already that they expressly support:

- NZGO is making progress on the SDI, many of the frameworks are in place or underway and accessibility is improving.
- Applying approaches and standards shared by other jurisdictions is strongly supported, as the ability to exchange data across borders is critical to participating in a global economy and supporting international relationships.
- The Geospatial Executives Group provides a crucial coordination function that gets buy-in from organisations even if "a bit crowded" (i.e. has too many members).
- The current direction of the Geospatial Senior Officials Group should be continued.
- It is important that progress be driven by stewards and custodians, forming their own "community of users".
- Informal leadership by NZGO representatives of working groups, such as the Natural Resources Sector Leaders Group, is helpful for establishing agreed approaches to dataset management within sectors.
- The wider implementation of the Geospatial Maturity Model and Monitoring (GM3) Framework is supported.

Main themes

90. There was a high degree of consensus on how to improve participation. The main themes were:

i. Strengthen the mandate and provide more leadership and advocacy.
ii. Find more ways to demonstrate the value of the SDI and geospatial investments.
iii. Improve advice and guidance.
iv. Centralise the development of the SDI.

Strengthen the mandate and provide more leadership

91. There was a consistent message that **the Cabinet directive of 2010, by itself, is not providing enough of a justification** for organisations to divert time and resources into SDI activities.

92. Suggested ways to strengthen the mandate included:

- having the Government Chief Information Officer (GCIO) issue a requirement for departments and State Sector agencies to reference geospatial requirements when designing new systems;

- require the Auditor-General to report on compliance with SDI and Open Data activities;
- making geospatial objectives a requisite in Statements of Intent;
- requiring SOEs and CRIs to support the programme through their funding agreements;
- advocating at CEO-CEO/Board/Minister level to bring about a longer term, national level System Steward role[15]; and
- providing a formal mandate for theme stewards.

93. Organisations consider **NZGO needs to take a more active and direct approach** to advocating for the Strategy and driving the development of the SDI. NZGO is encouraged to get on the front foot and "make it happen" e.g.:

- "provide leadership and a vehicle for getting it done"
- "get agencies on board and working in concert"
- "set down the roadmap and cite the mandate".

94. There is **a desire for external validation of organisations' activities** in the geospatial arena. NZGO has standing as the authority on the SDI and its views lend credence to proposals for change. It can help organisations clarify the benefits of the SDI, identify priorities and how to line up behind them. Decisions made by GEG can add weight to the case and should be translated into organisations' work programmes as much as possible.

Demonstrate the value of the SDI and geospatial investments

95. NZGO needs to **more clearly explain what a national SDI is and what value it represents**, as well as what the cost of participation is likely to be.

96. When considering their position and degree of investment, organisations want to know:

- the cost and resource requirements of participation in the SDI (bureaucratic and technical);
- if and how costs can be funded if not part of baseline;
- how to manage any potential liability arising from flawed data released under rules set by the steward.

97. On the benefits side, it was suggested that organisations would be more receptive if they knew how an SDI can enable them to:

- save money on the collection of data;
- have the "agility" to generate answers to many questions;

[15] This would be different to the current Geospatial Custodian role, which is viewed as confusing technical and bureaucratic functions.

- generate savings in budgets through efficiency gains;
- generate increases in economic activity;
- support all-of-government strategies such as the Open Data programme.

98. Suggested strategies for "selling the value proposition" of a national SDI included:

- showing how to link organisations' business to the Geospatial Strategy and also the ICT Strategy;
- helping organisations build their internal geospatial strategies by showing how historical issues can now be resolved using geospatial data - this will "impress" policy and management;
- showing the advantages of building geospatial infrastructure in advance as opposed to when the crisis has already happened and the demand for quality information is urgent;
- publicly promoting and celebrating successes and benefits via case studies (note: this is already being done but some organisations are clearly not aware of it).

99. One stratagem that generated a lot of commentary and suggestions was the need for more **guidance from NZGO on developing business cases** for specific geospatial investments. Some suggestions, in addition to those quoted above, included:

- understand the end users of data - who they are, how many there are and what currency the data will have;
- show how datasets created or improved will meet end user expectations (both in their initial selection[16] and then in the quality of what is eventually released for re-use);
- identify the interdependencies and impacts on other themes and datasets;
- provide advice to organisations where business decisions have national implications and require major financial investment - how to decide whether a new system is preferable to an upgrade of an existing system or some middle way;
- provide linkages to the overarching strategies (ICT, Open Data) as well as sector strategies (e.g. the Natural Resources Sector).[17]

Improve guidance and advice

100. Organisations identified a general desire for more and **more easily understood advice** from NZGO:

- the Strategy and Frameworks need to be broken down into smaller chunks e.g. "limit guidance to 2-3 pages so that agencies can comprehend it easier";

[16] This relates to the nature of the fundamental datasets, which are "weighted towards information in the physical infrastructure and agriculture domains". These are not necessarily the datasets with the most value for, or highest demand from, potential re-users.

[17] Note: NZGO funded a geospatial business case development workshop in November 2011.

- use plain English terminology throughout the documentation e.g. "build trust in the evidence base" instead of "define and implement reliable metadata";
- provide a "direct line to advice" e.g. an 0800 number to NZGO;
- provide web-based guidance which is easy to navigate;
- specify which standards have been approved and which are currently in development;
- provide external access to the NZGO (and, where relevant, LINZ) work programme where there are implications for the Government geospatial sector;
- make the issues, problems, responses and decisions transparent;
- provide another forum for organisations to engage with the work going on under the Strategy (assuming that the membership of GSOG and GEG are at full capacity);
- set up a technical and strategic email group.

Centralise the development of the SDI

101. With so many organisations identifying a lack of understanding of what an SDI is as a barrier, it is not surprising that there were many suggestions on what a national SDI should look like and how it could be developed. This represents an attempt to resolve the many questions organisations have but which are still some way from being answered under the current approach. The comments below should therefore be viewed as a statement of "what I would do if I was designing the SDI".

102. In terms of an **overall approach**, organisations were generally agreed they wished to "develop a common architecture of how to set up an SDI", which "applies the same disciplines and skills across domains". They are looking for an "end-to-end design" of the solution with a focus on how to "enable access to data".

103. Identifying **what datasets should be focused on** in the SDI was a question considered by several organisations. Datasets should be those with **the highest priority for departments, agencies and other major users** and then narrowed down according to the degrees of:

- relative simplicity i.e. start with "easy" datasets (those most easily used/perfected);
- readiness i.e. the work is supported by Senior Management (funding for development may be already approved);
- expected benefits likely to be realised;
- individual enthusiasm of those involved.

104. The intention would be to **develop a prototype SDI** using one of the easier groups of datasets and build from there into more difficult domains. Techniques for addressing both the technical and administrative challenges could be trialled and reviewed and the lessons learned fed back into the NZGO guidance and out to the wider pool.

105. The **scope of a national SDI** is still to be determined but was variously suggested as, potentially:

- a "budget (inexpensive) model providing raw data and no support";
- a central web site that catalogues datasets - "a data brokerage service like Koordinates";
- a central infrastructure "to gather catalogues and vocabularies together";
- an "extension of the LDS - building on the LINZ datasets".

106. SDIs need to consider

- the relationship to archiving requirements for data;
- legal obligations around storage;
- incorporating a feedback mechanism from users;
- a "recovery service" function to ensure the integrity of published data can be protected at all times.

107. Even with all these ideas flowing, there are still **mixed notions of how the process should unfold**. There are organisations that are keen to take a lead and get things done, but these expectations may not be aligned with those facing barriers to full participation, particularly where the latter have proprietary interests in datasets and a desire to retain some control over their management. So the general desire to fast-track the development and decision-making process still runs the risk of leaving others behind and creating disharmony.

Improving local government participation

108. Local authorities all manage the same classes of assets and face similar problems funding their maintenance and replacement. Councils are all geographically adjacent and often manage the same assets e.g. roads, the three waters. Collectively, they comprise a nationwide network of assets and overlapping interests, albeit in a context of wide variation in size, capacity and capability.

109. Proposals for the local government sector tacitly acknowledged that **progress is most likely to be made more incrementally than in other sectors**. The benefits have to be sold more directly than to central government departments, focusing on the savings which can accrue to ratepayers rather than the increased in GDP from private sector innovation or the public good inherent in open data.

110. Some of the biggest costs for councils are the operation, upgrade and replacement of their physical infrastructure. The economic benefits from using assets with the location element as a primary key helps to rationalise council's infrastructure work so that they "don't dig up the road unnecessarily".[18] Quality data also allow council to run risk scenarios for infrastructure maintenance and replacement that can identify substantial cost savings. Asset models developed by Wellington City Council which utilise geospatial data are being shared across the sector and are now generating interest from CEOs in a way that has not previously occurred.

[18] The Canterbury SDI experience with the Forward Works Viewer indicates that cost savings extend to other infrastructure owners like utilities and generate wider economic benefits (such as from reduced travel times for road users).

111. Work should **focus on innovators and early adopters**, with a view to creating a local government version of the LINZ Data Service for all local government data. Once some successes have been realised then smaller and more constrained councils can be assisted to participate. This will then make it easier for other aspects of the SDI to be developed.

112. Even more so than central government, NZGO will need to **make it easy for councils** to participate in the national SDI. An end-to-end guide is required, with tools that non-technical people can use. Simple, pre-populated templates are necessary, for example, business case templates that show how to state the cost/benefit from projects.

113. While GIS is widely utilised across councils, there is no consistency of approach or any common standards. A **broad-based communications strategy and a bottom-up approach** will be needed to instil the disciplines of an SDI.

Part E: Taking on steward & custodian roles

What is already being done by organisations

114. Many organisations considered they are already applying custodianship principles in the management of their datasets. A number expressed interest in taking up formal Custodian roles.

115. Tasks already under way include:

- administering a Leadership Forum and working groups;
- considering security requirements for all government-held data in the sector;
- overseeing release of data;
- working collaboratively across the sector and exploring other datasets;
- looking to improve the data so that organisations can reduce their dependence on private sector maintenance providers;
- developing a governance group for data alongside related matters such as a Knowledge Management framework and data management policy;
- utilising creative commons licences;
- collecting data from disparate in-house systems and combining into one.

Barriers to taking up steward and custodian roles

116. There is **uncertainty around the pathway to stewardship and custodianship** and what the implications are for those taking them on. Some of the issues raised were:

- how to engage with NZGO;
- what the obligations are around securing funding;
- what the time commitment is expected to be.

117. The **lack of explicit or implied authority for leadership functions** under the Steward and Custodian Framework is a disincentive. One department noted there are different definitions of steward and custodian used across Government which conflict with the NZGO definitions. An SOE does not see itself as a leadership custodian if that implies an "enforcer" role, which is "more appropriate for a department like LINZ".

How NZGO can assist agencies more

118. Steward and leadership custodian roles need **a mandate to lead**, to "avoid conflict over differing priorities and areas of interest". "Formal mandates for the communities of interest to work from" were proposed, though it is not clear that NZGO has the authority to create these. It could be that the proposed System Steward function might, if the concept is

followed through on, include an authority to approve SDI-related proposals submitted by theme stewards and leadership custodians.

119. As noted previously, there are moves afoot to implement geospatially-enabled asset management planning across local authorities. NZGO could support this process by providing access for councils to **business case frameworks** (including geospatial elements) for their asset management activities, and that this understanding could then be carried over to other datasets administered by councils.

120. **Individuals have to be educated** on the importance of data and proper structure and allocated formal responsibilities for data. NZGO could provide collateral to support this.

121. NZGO can **help organisations to identify which datasets they use which are fundamental**, what data they hold which might be fundamental to other domains, and where steward/custodian roles might be appropriate. The Office can also **help identify who to engage with** in other organisations.[19]

122. **Specific guidance was sought on what stewardship involves**: The costs and what funding might come with the role. "Who carries the liability if things go wrong for a third party using data released according to the rules set by the steward?" In this regard, lessons learned by LINZ stewards would be valuable (see below).

123. Given the uncertainty of what the stewardship role involves, one organisation suggested a trial period of a year to generate some results and enable a review of direction. This suggests that **organisations need to develop their readiness for a role before making that commitment formal**.

124. For some organisations, basic business needs must be addressed before they can consider becoming a formal custodian; **not all agencies have GIS teams** as yet.

Reflections from LINZ stewards

125. LINZ took on the steward roles in part as a logical extension of existing duties, in part due to its legislative obligations for some datasets, and to show leadership in the geospatial sector.

126. While stewardship is a "whole of agency" role, there are practical limitations on how many individuals within organisations would be willing, able and available to take on the actual work. Other organisations may not be as well-placed as LINZ so stewardship for them represents a new challenge and set of obligations. Ideally, **the point-of-contact** (responsible individual) in a stewarding organisation **should be a fully-funded role integrated into business-as-usual**.

127. NZGO's diagrams explaining the SDI are difficult to understand, though it is a complex concept to convey, almost "mystical". No-one knows what the SDI will look like when we get there and what each steward will contribute to it. This could be one reason for organisations' reluctance to get involved. LINZ therefore has an opportunity and responsibility to lead the way and **build confidence in the method**.

128. How to enforce the direction within a theme is unclear, as performance of stewardship duties is not measured and there are no report back requirements. To address this, NZGO could

[19] Note: Much of this already happens within NZGO but organisations making these comments may not have been engaged enough with NZGO to know.

specify and promulgate standard stewardship responsibilities for inclusion in performance agreements. (However, in practice, the roles of steward and lead custodian may be more blended than assumed under the Framework. A high level of technical expertise is required in combination with the ability to coordinate parties with divergent interests.)

129. Given the number of factors to address, stewards must be careful to prioritise the challenges and keep the job manageable.

130. Business case parameters need to be well defined to avoid creating different expectations around the required level of return for a project to proceed. The depth and complexity of **business cases should be appropriate to the scale of the investment** sought; given the substantial operational implications and costs of the work, there is a certain level of sunk cost associated with any change, with a long lead time to benefit realisation.

131. Given the differences in expectations between organisations, and the need to experiment, **agile approaches to project plans are preferred** over traditional plans. Assumptions about the outcomes sought have to be agreed at the start, but on the proviso that **things may change as a project evolves** and results emerge. Being realistic and pragmatic is likely to make organisations more willing to fund the development work.

132. At the macro level, the focus of the Framework on a relatively small set of fundamental datasets may not achieve the outcomes sought when there is so much data to be released and re-used. Consideration should be given to **how to reach across related, though non-fundamental datasets**.

133. There is a need to **take the Big Picture and coordinate direction across themes**. This implies the need for a function like the System Steward, previously mentioned (though the role was proposed in the context of strengthening the NZGO mandate).

Part F: Conclusions

134. Organisations tend to participate in the national SDI for their own ends rather than because Cabinet has directed them to, or to deliver a public good. Only the Ministries and larger departments cited the original Cabinet minute as a reason for participating, though always in conjunction with related strategies, particularly the Open Government Information and Data Programme.

135. Around half of the organisations canvassed are not subject to the minute and participate, or not, for entirely different reasons. Those with a commercial focus (CRIs, SOEs, utilities) must be able to demonstrate how a national SDI will generate a financial return on the costs of participation. The challenge is that SDI work depends on annual funding decisions to deliver long term benefits, and those benefits will accrue to a wide range of interests (including competitors).

136. Many organisations are primarily interested in how SDI disciplines can help address issues with their own datasets, as this has a tangible impact on the achievement of their business objectives and, where commercially-focused, on their bottom line. Economic and public good benefits are much harder to justify. Umbrella agencies which oversee sectors are constrained in their activities by the fact that they do not have proprietorial rights over data of potentially national importance.

137. Local authorities are important providers of a number of datasets and major data users as well. The size and scope of the sector makes it difficult to summarise their overall position, though it appears that the lead is being taken by the major councils; their focus is primarily on delivering operational efficiencies and value for ratepayers. Achieving coordination across councils is proving a challenge and this probably requires a strategic approach with support from key stakeholders.

138. Managers are interested in the alignment of the SDI with their strategic goals, though only if they have first been convinced of the merits of the programme. Few organisations cited the longer term value to themselves from having access to other fundamental datasets. Those which can see the opportunities tend to be the most experienced operators who also see the challenges of devising a system that relies on mutual buy-in to succeed.

139. Representatives from many organisations find the SDI concept difficult to understand let alone explain to others, making it difficult for them to convince management to invest time or money in it. There is a consistent call for more transparent education material and user friendly tools, especially on the cost/benefit aspects and how to construct sound business cases.[20]

140. There is clearly a wide range of ability to undertake SDI work. Some organisations are constrained by problems with staff turnover and lack of resources (including IT and IS practitioners who understand how to manage spatial information) and need to get their "houses in order" before committing to formal engagement e.g. as custodians. Others are already operating local or sector SDIs and are fully conversant with the concepts.

[20] At the same time, those organisations which do grasp the concepts want more sophisticated guidance; the SDI Cookbook is currently being reviewed in response to requests from advanced users for a more "meaty" reference source.

141. Whatever the level of ability, many organisations want specific guidance from NZGO on the pathway to follow under the Steward and Custodian Framework, so as to be able to size the commitment and know they are doing what is expected. This indicates that the relatively slow rate at which organisations are committing to the roles reflects a desire to understand them first, rather than rejection of the concept.

142. The difference in levels of engagement and understanding was noted by those organisations which are not represented on GEG and GSOG; these were more unsure of what the SDI was trying to achieve and found it more difficult to relate to their work. There was a perception that organisations need to be part of GEG or GSOG to be up with the play and to have influence. Given the practicalities, there may be a need to set up a third set of inter-agency groups to keep people connected.

143. Most organisations support the Geospatial Strategy and the direction of the work on the SDI. Inevitably, given the relative newness and complexity of the concepts (and the number of organisations involved), there is some debate over the best way to deliver it. There is a feeling that the "exploratory" phase is now over and that it is time to push ahead with some concrete initiatives. NZGO is expected to apply as many levers as it can to move the work along.

144. Coupled with this is a general call for more clarity on the state of progress with the Geospatial Strategy and the SDI, with identifiable measures towards a defined "end game".[21] Given that a national SDI is yet to be fully realised by *any* government, the system changes which flow from a mature SDI will be unique to New Zealand. Its final shape will only become apparent by virtue of the effort which goes into its design and use.

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[21] Note that an SDI is never "finished"; it is an organic system that continually evolves in response to changes in technology, datasets and user practices.

Appendix 1: Organisations interviewed

Public service & Non- Public Service departments	Crown agencies & Crown Research Institutes	State Owned Enterprises	Local government sector	Private sector companies
Department of Conservation Land Information NZ Ministry of Business, Innovation & Employment Ministry for the Environment Ministry of Primary Industries Ministry of Transport Statistics NZ NZ Defence Force NZ Police	Maritime NZ Electricity Authority NZ Fire Service Commission Civil Aviation Authority GNS* Landcare NZ* NIWA*	Transpower* Airways Corporation* NZ Post*	Local Government Geospatial Alliance* Wellington City Council*	Geographx* Critchlow & Associates* Koordinates* Powerco*

Note: An '*' denotes an agency or organisation not listed in Annex 2 of Cabinet minute EGI Min (10) 30/14.

Appendix 2: Cabinet Minute EGI Min (10) 30/14

The following decisions express the scope of the LINZ/NZGO mandate:

On 8 December 2010, the Cabinet Economic Growth and Infrastructure Committee:

Leadership and governance

5 **endorsed** Land Information New Zealand (LINZ) as the lead agency to develop a more formalised spatial data infrastructure, in collaboration with other significant holders of location-based information, including local government, Crown agents, academia and the private sector, on their involvement in a spatial data infrastructure;

Spatial data infrastructure

8 **directed** the heads of State sector agencies with location-based information (listed in Annex 2 to the paper under EGI (10) 300) to comply with the spatial data infrastructure framework (once developed) unless there is a compelling reason not to, and to consult with NZGO for guidance on compliance;

11 **authorised** LINZ to lead a process to create a shared resources model for fundamental datasets to maximise the value for money of these datasets to New Zealand;

12 **directed** agencies intending to tender for or purchase new location-based information or services to consult with NZGO to ensure consistency with the spatial data infrastructure requirements and the possible involvement of other agencies, provided that the approach meets the purchasing agency's needs;

13 **invited** each Minister responsible for a Crown agent listed in Annex 2 to the paper under EGI (10) 300 to include in their annual letter of expectations an expectation that the Crown agent will comply with the new requirements for location-based information;

14 …

Appendix 3: Analysis using the SSC Framework for All-of-Government Coordination

Introduction

1. The State Services Commission (SSC) has prepared a "Factors for Successful Coordination Framework", which is designed to help agencies plan coordinated activity. The framework groups nine success factors according to the three dimensions of mandate, systems and behaviours. Ensuring these factors are in place over time will "help agencies coordinate more effectively and achieve success together". The main focus of the document is on coordination between agencies in the State Services but it can also be applied to initiatives between government and non-government organisations.

2. This section discusses the feedback from agencies in the context of the framework.[22]

Summary of framework

3. The framework is summarised below.

Mandate

- leaders must emphasise the importance of effective coordination and commit to making it work by prioritising the coordinated activity within an all-of-government context;
- Ministers and other stakeholders need to buy into the coordinated approach; and
- State servants must agree on clearly-defined joint outcomes to focus effort.

Systems

- appropriate governance and accountability frameworks must be in place and the roles, responsibilities and contributions of each agency documented – for instance through a memorandum of understanding;
- sufficient and appropriate resources must be available to deliver the required tasks; and
- an effective process to measure performance from established baselines must be in place, with remedial action being taken when necessary.

Behaviours

- the right agencies must be represented by State servants with the appropriate authority, and the right skills and competencies to work collaboratively;
- there must be clear leadership among the group; and

[22] The term "agency" rather than "organisation" is used throughout this section in keeping with the original guidance. The analysis has attempted to capture the situation for the full range of entities participating in the SDI.

- each agency's organisational culture must support coordination so that, over time, those State servants involved in the coordinated activity come to share common culture, language and values.

Mandate

Leadership commitment

4. Specific behaviours are sought from leaders in a successful all-of-government strategy and are manifested by Senior Public leaders in the development of the SDI.

Expected behaviour	**Does this happen?**
a. Seeking out opportunities to work with others	Very limited and usually driven by staff rather than Senior Managers.
b. Incentivising and recognising staff involved in coordinated work	No. Focus in GIS units is on operational issues specific to the business.
c. Ensuring that resources and time are available for the team	As in b. above.
d. Managing external and political pressures so that coordination can occur	Does not appear to be an issue.
e. Support of a senior level champion	Promoted by NZGO but not mentioned as a factor in interviews (possibly because those interviewed *were* the champions).
f. Ensuring the joint activity is given sufficient priority	A few agencies cite geospatial objectives in their Statements of Intent. Many agencies cited competing strategies contending for priority as a reason for a low level of engagement.
g. Integrated into a wider system of performance management	No.
h. Linked to budgetary allocations and sufficiently tangible to be translated into departments' operational priorities and outputs	Rarely. Usually in relation to specific projects around operational data rather than ongoing development of an SDI.

Ministers' and stakeholders' buy in

5. The extent to which Ministers, decision-makers and key stakeholders support the development of the SDI.

Expected activities	**Does this happen?**
a. Ensuring Ministers, decision-makers and key stakeholders support the coordinated activity	Yes. The Cabinet minute is a clear expression of Ministerial support for the Geospatial Strategy and the national SDI. The incorporation of geospatial elements into other cross-government programmes shows that the concept is gaining wider recognition and "top down" acceptance. Individual Ministers are showing keen interest.
b. Engaging with stakeholders to check that the outcomes are realistic or will meet their requirements	The GEG is made up of Senior Executives who oversee the Strategy and the overall work programme. GSOG addresses specific sub-programmes of technical work. There are working parties addressing specific issues. However, many agencies are excluded from these groups and the feedback suggests quite a "disconnect" from the Strategy and the SDI. Open data objectives, for example, run counter to their organisations' objectives and business models. Ability to participate may also depend on their place in the supply chain and their relationship to the data suppliers.
c. Monitoring the climate among stakeholders and managing any shifts in priorities	As in b. above.

Defined and agreed joint outcomes

6. In a sound all-of-government programme, all participants need to be working towards clearly-defined and mutually-agreed joint outcomes.

Expected activities	**Does this happen?**
a. Participants have a clear understanding of both the goals and agreed timeframes towards which they are working	No. Agencies sent consistent messages that they are unclear of the expectations placed on them from participation in the SDI.
b. Joint outcomes and results have been identified	At this stage, all the outcomes are joint outcomes. The end results have not been identified to the level of specification that agencies can relate to.
c. The outcome that the group is seeking needs to be greater than the individual outcomes of each of the contributing agencies	Yes. The ability and willingness of each agency to release, access and exchange Government geospatial data will generate benefits across the public and private sectors.
d. Participants feel the outcomes sought are attainable	Unclear due to responses in a. and b. above. Agencies have varying levels of commitment to the joint outcome sought under c.
e. Outcomes achieved for the group and participants are measured	Partially. NZGO is monitoring progress across the Sector and reporting results to GEG and GSOG members. Many non-members are not aware of the rate of progress.

Systems

Appropriate and documented governance and accountability frameworks

7. All participants need to clearly understand and agree their own and others' roles, responsibilities and accountabilities and how to carry them out, recognising that circumstances can change frequently in joint agency initiatives.

Requisite features	**Are these present?**
a. Role definitions should not be so rigid that they inhibit flexibility as the initiative develops	Yes. The Steward and Custodianship Framework sets broad criteria for agencies to meet for appointment and provides a flexible set of expectations for undertaking the roles.
b. Care should be taken that developing a formal plan does not obscure the need to explore and clarify the nature of the working relationship - not just what people will do but how they will go about it	Yes, as in a. above.
c. In projects with long timeframes, patience in allowing clarity to emerge is valuable to garner long term commitment to the objectives	Yes, as in a. above.
d. All Ministers with connections to the initiative are regularly briefed	Don't know. Not mentioned by agencies.
e. Clear outcomes, governance and accountability structures and deliverables create a solid basis from which to negotiate both with Ministers and those within agencies	Unclear.
f. Mechanisms should be in place to help participants resolve any conflict that arises from the competing demands placed on them as employees and as inter-agency group members	Some individuals feel compromised due to lack of management support and have to undertake SDI tasks in addition to business-as-usual.

g. A single lead agency is identified, with supporting agencies' roles and accountabilities clearly documented and defined	Yes. The governance arrangements for the Strategy and the national SDI are strongly supported by core State agencies and the CRIs.

Sufficient and appropriate resources

8. Resources are critical if a coordinated initiative is to be sustainable and provide value for money.

Resources required	**Are these present?**
a. A dedicated budget	For NZGO, yes. Participating agencies must fund their own activities and many do not have any dedicated funding for SDI-related work or capital investment.
b. A working pace that can sustain progress without overwhelming the group	N/A.
c. Sufficient time to establish working relationships, achieve outcomes and nurture the required behaviours	N/A.

Process to measure performance from established baselines

9. Progress should be monitored and action taken if performance is unsatisfactory.

Requisite features	**Are these present?**
a. Agreed action plans, responsibilities and timeframes for each party	For NZGO and GSOG, yes. Negotiated on a case-by-case basis for stewards and leadership custodians. No for all other agencies.
b. Reliable performance measures to track progress	No. Measures are very high level and agencies cannot identify an endpoint for the SDI.
c. Systems of measurement that serve the project and its outcomes, not replace them	Unclear.

d. Mechanisms for ensuring that early wins can be identified, made visible and widely recognised	Yes, case studies are captured and reported. However, many agencies were unaware of this and requested case studies to inform their understanding.
e. Measures of the means as well as the ends (e.g. information sharing or the development of new ideas)	No. Many agencies reported a lack of understanding of how to go about participating in the SDI and what was involved in becoming a steward or custodian.

The Behaviours Dimension

Right representation, skills and team leadership

10. Successful coordinated initiatives require team members who have authority to represent their agency, as well as the right mix of agencies. Having the right skills and competencies on the team is critical to the success of the coordinated initiative.

Requisite features	**Are these present?**
a. Participants represent a cross-section of agencies, the involvement of which is necessary for the coordinated initiative to succeed	Yes, there are representatives from central and local government and the private sector, all of whom have interests in the use and re-use of fundamental data.
b. Participants continually monitor whether new stakeholders have emerged, who need to fully participate in the initiative rather than only be consulted or kept informed	No. The SDI is not yet mature enough for this function to have evolved.
c. Each participant must be able to speak for the entire unit or function that they represent	Inconsistent. Some agencies are represented by individuals who understand the need to participate but are not mandated to make commitments.
d. When major decisions are made, there is enough time allocated for the participants to take information back to their organisations to confer with colleagues about what the decision should be	Unclear.

e. There are measures of the means as well as the ends (e.g. information sharing or the development of new ideas)	No formal measures, but innovation is recognised and circulated by way of case studies.

Organisational cultures that support coordination

11. Individuals taking part in a coordinated initiative can often find it difficult to balance the outcomes and priorities of the initiative with those of their own organisation. The table below summarises how well organisations are supporting individual efforts to achieve the initiative's outcomes.

Requisite features	**Are these present?**
a. The sense of purpose built into the initiative's objectives is translated into the work programmes of the individual agencies	Occasionally. SDI work is not regarded as high priority in most agencies.
b. Senior leaders model and purposely invest in building collaboration	Sector-dependent. Most agencies are still at the stage of addressing internal issues with their own datasets.
c. Support for informal community-building	As in b. above. Self-driven by individuals and facilitated by NZGO through sector-based working groups.

Shared culture, language and values

12. Shared culture is important if members are to develop a sense of joint ownership of the way the group works and of the results it produces. Developing trust between participants is key to creating a working environment where the concerns of individual agencies can be entrusted to the group.

Requisite features	**Are these present?**
a. A shared culture has been developed by bringing existing cultures together and developing a subsidiary working culture	No, the SDI is not yet at this level of maturity. However, sector-level working groups are working in this way.
b. Joint working arrangements begin with modest or low-risk activities before targeting more ambitious outcomes	Unclear. There is work going on across a range of sectors, on matters of varying complexity. The Canterbury SDI is/was ambitious but responded to external factors rather than being a deliberate strategy.
c. People work together almost as if they were employed by the same organisation	No.
d. A deep and shared understanding of key expressions and concepts has been developed	Experienced practitioners have achieved this, but many agencies are struggling with the concepts and terminology.

Appendix 4: Methodology

A list of organisations to approach was compiled, based on their being identified as actual or potential stewards or custodians of one or more of the draft fundamental themes or datasets (as at 23 January 2014).

This list overlaps with but is different to the original list of organisations identified in the 2010 Cabinet minute (18 appear in both). The original list was not used because:

- many of those organisations listed have since been disestablished, renamed or merged;
- the datasets held by may of those organisations are not in themselves fundamental (though they may be derived using fundamental data);
- by focusing on core State agencies only, it omits a number of other types of organisation which hold fundamental datasets, such as Crown Research Institutes, State Owned Enterprises and some private companies.

There is a relatively small private sector geospatial industry which provides datasets, data delivery software, data-based products and consultancy services to a range of customers. These discussions were loosely structured and focused mainly on what activities they undertake and their views on "the perfect national SDI".

The proposed methodology and core questions were reviewed by an Internal Reference Group from across LINZ. Questions were amended to reflect the specific interests of each agency.

All meetings involved Roger Fitzgerald (the contracted researcher) and at least one representative from NZGO.

Appendix 5: Introductory email

Land Information New Zealand, through the New Zealand Geospatial Office (NZGO), is leading the development and implementation of a spatial data infrastructure for New Zealand, through the New Zealand Geospatial Strategy, and mandated by Cabinet in December 2010 [EGI Min (10) 30/14 refers].

A core component of a spatial data infrastructure is the discovery, access and interoperability of geospatial information through fundamental geospatial datasets (see http://www.linz.govt.nz/sites/default/files/docs/geospatial-office/fundamental_datasets_and_themes_opt.pdf).

We have made significant progress over the last couple of years in progressing a spatial data infrastructure, and there is noticeable increase in participation of organisations and agencies. However, we are also noticing that agencies and organisations are finding there are barriers in the system that prevent optimal participation.

In order to better understand and articulate what these barriers are, we are undertaking a piece of work to identify the following:

- What are the factors that contribute to successful integration of SDI principles and practices into the design and management of geospatial datasets;
- What are the barriers organisations or agencies face in taking on custodianship roles for their datasets (both leadership and delivery); and
- What incentives or disincentives would assist in overcoming barriers to greater participation in the national SDI.

We believe you will be able to provide some valuable insight into this work through your role, and would like to meet with you to discuss this further. We estimate that about an hour of your time will suffice. If there is someone else in your agency who you feel is better placed to contribute to this work, please feel free to forward this to them and let us know.

Appendix 6: Topics covered in interviews

Agency awareness of the Geospatial Strategy, SDI and Steward and Custodian Framework

Reasons for becoming a steward/custodian

Factors which help an agency's executive support the role

Understanding of the pathway to becoming a steward/custodian

Barriers faced and how overcome

Barriers remaining

Implications of steward or leadership custodian duties for an agency

Managing cross-agency leadership obligations

Implications of delivery custodian duties for an agency

Level of integration of SDI work into agency business

What more NZGO can do