Describing Services for a Metadata-driven Portal

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Abstract

This paper describes New Zealand E-government activities supporting the discovery of services through the use of Dublin Core-based New Zealand Government Locator Service (NZGLS) metadata. It notes the issues faced in collecting service metadata from agencies to populate a new whole-of-government portal. The paper then considers the adequacy of the metadata schema for service description, and identifies a difficulty in applying definitions which refer to the content of the resource to a process-like resource such as a service. Three approaches to this challenge are suggested: creating a surrogate description to provide a source of content; treating the information exchanged in conducting the service as the content; and using additional contextual metadata. The adequacy of the schema for covering all the users' needs for discovering and using a service is examined, and the need for metadata about specific service delivery points and conditions is noted. Finally, it is observed that future stages of e-government will require more sophisticated descriptions of services to support processes beyond discovery.

1. Introduction

In a paper to the DC-2001 Dublin Core conference[1], the treatment of services was identified as a critical area for the use of discovery metadata by the New Zealand E-government programme. Discussions in the DC-Government Working Group confirmed that E-government programmes worldwide are seeking to take a service-centric approach to representing government to the public. This paper explores the importance of service description for e-government, and a range of issues in applying Dublin Core-based metadata in this way. It draws on experiences of the New Zealand E-government programme in using the Dublin Core-based New Zealand Government Locator Service (NZGLS) schema in the development of a new whole-of-government portal which is both service-focused, and metadata-driven.

2. Background – NZGLS

Recognising the need for standardised metadata to support resource discovery across the whole of government, New Zealand Government officials developed the NZGLS discovery level metadata standard based on the Dublin Core Metadata Element Set and the Australian Government's extension of DC, the Australian Government Locator Service (AGLS). NZGLS includes the same four additional elements by which AGLS extends DC: function, availability, audience and mandate. Along with AGLS, the versions of NZGLS released to date have provided explicit guidance on the application to services. However, this is one of the least stable areas of the standard, as there is as yet no clear consensus on what precisely we mean by "a service", or how the public articulate their discovery needs for these resources.

In December 2001 the New Zealand Government formally adopted this local adaptation of DC as "the official New Zealand Government standard for creating discovery level metadata in the public service". The Cabinet decision directed public service departments to make NZGLS compliant metadata available "to ensure that *their services* and relevant information resources (both online and offline) can be discovered by the Portal search engine's metadata searching capability" (emphasis added). A new portal is scheduled for public launch in August 2002, and relies heavily on NZGLS service-metadata. A companion paper explores in more detail the practical experiences involved in the development and implementation of the Portal and the related metadata management facility[2].

3. Services in E-government

In the words of the UN Report *Benchmarking E-government: A Global Perspective*[3], "Services are the public face of government". That report is typical of e-government literature in linking the success of e-gov-

ernment with ICT-based service discovery and delivery. The report recognised the New Zealand Government's achievements in this area by ranking New Zealand third behind the US and Australia in its global E-Government index. However, no jurisdiction was ranked at the top stage of e-government development, "seamless" (described as total integration of e-functions and services across administrative and departmental boundaries). Significantly, the higher levels of e-government maturity are generally described as demonstrating an integration of service delivery with technology, building on technology-based tools for service location, discovery and description.

4. E-Services Project

To address the range of issues around services as part of effective e-government and in the first instance to gather structured information about services delivered by New Zealand public service agencies, an early project initiated by the New Zealand E-government Unit was its e-Services Project[4]. Phase One of this project was to compile an inventory of services, by getting all agencies to describe the services they provide. Emphasis was placed on the description of services from a customer perspective, as the information has been used initially for delivery of a new whole-of-government portal. Later phases look for additional opportunities to move service delivery on-line and to integrate delivery channels.

The service descriptions were produced using the NZGLS metadata standard, though the details of the elements were obscured from the users, and masked by more service-focused terms and a plain-language interface.

In part because of this business focus, the project targeted business analysts and communications staff to create the metadata records, rather than web masters or librarians. 55 agencies were included in the initial collection, and around a thousand services were identified and described. An assumption was that in the first instance, agencies are in the best position to identify and define their services.

Among the issues to emerge were:

- Consistency of service "size": some agencies identified a large number of low-level services, more akin to interactions, while others identified a small number of very broad services, more like functions.
- Consistency of description: where comparable services are delivered by several agencies, how can you ensure consistent descriptions. This is of particular importance in cases where the same responsibility is exercised by different organisations in different parts of the country.
- Multi-agency services: how to develop a single descriptive record for a service which, as thought of by the public end-user, comprises actions and decisions of multiple agencies working together.

The management of these issues is considered in more detail in the companion paper.

5. Services in Dublin Core

The DCMES is clear that it is intended to be applicable to descriptions of services: "For the purposes of Dublin Core metadata, a resource will typically be an information or service resource". Similarly, "Service" is a defined term in the DCMI-Type vocabulary, defined as "a system that provides one or more functions of value to the end-user. Examples include: a photocopying service, an authentication service, interlibrary loans, a Z39.50 or Web server". However, the use of the DCMES for true service description appears under-developed compared with its high profile for information resource discovery purposes. For example, no specific guidance on the use of the DCMES with service-type resources is included in the *Usage Guide*.

6. Describing Services

With services taking a central role for e-government, and practical experience through exercises such as the e-Services Project, the opportunity now presents for reflection on how well NZGLS (and DC) has handled the description of services, and to consider whether the issues that have emerged relate to the metadata model itself (core definitions and semantics), to the tool used to facilitate the collection and management of the metadata records, or to the training support and expertise of those creating the records.

What, then, actually are services? First we should be clear that we are not talking about services in the same sense that web service description initiatives (eg Web Service Description language, WSDL[5]) use the term. Services are ongoing, and they have an activity dimension to them, they represent ways of doing business. Services are by definition transformational – it is the provision of something of value to a user that is the essence of a service. The New Zealand e-Services Project defined a service as something that "provides value (tangible, experienced, or information) to a service user. The service may be provided directly or through a contracted supplier, and can be delivered via one or more transactions". Elsewhere, similar definitions have been used in other jurisdictions. In Australia, the Commonwealth Government considers "a service exists where a relationship is established between a business function of a government agency and the identified needs of an individual or group. Examples of government services are family allowance assistance, grants programs and the receipt of payments by government agencies such as the Australian Tax Office. The AGLS metadata obligations in the Government Online

Strategy require agencies to describe all services, regardless of mode of delivery"[6]. The Queensland State Government defines services as "the activities undertaken by an agency on a repetitive basis either to fulfil legislative requirements or to satisfy an external client need".[7]

The provision of information (a service) is qualitatively different from the piece of information provided (an information resource). Services are abstract, and exist in the eye of the beholder. Yet services are meaningful, indeed they represent a view of the world more directly related to the way citizens think about their dealings with government than models focused on organisational structure or information resources. The New Zealand experience suggests that the description of services will be an important aspect of e-government, but that our current understanding of how to apply metadata standards to this class of resources is not sufficiently robust to avoid risks of inconsistency.

In light of this, is it possible and useful to describe services directly and explicitly? There is a subtle difference between describing the service itself, and describing a document about a service. This distinction can, however, be critical. Think of the case where a web page outlines a service: the identifier or language would relate to the document, and are meaningless to locate or understand the service itself. The first issue to address in service description is clarity around the resource that is being described: is it the service itself (however defined) or a (related) document? This distinction is easily blurred when the documents themselves contain the information which will also feature in a metadata record for the service (eg a web page describing a service and its availability), or where the document is a necessary part of using the service (eg an application form). Similarly the distinction between the service and the service provider (ie the agency delivering the service) can be easily confused. Only when these distinctions are well understood can the best application of the elements and the possible refinement of their definitions be evaluated.
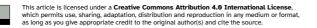
User feedback strongly indicates that public users like an interface which groups resources into topic clusters, an expectation perhaps shaped by experience with commercial directory-structured portals and search sites. It would be ideal to construct such groupings automatically from *Subject*, *Function*, and other elements of our metadata. These groupings should effectively be saved searches, built from queries that reflect the logic that users would employ in their discovery paths. In practice this has not proved to be fully possible for us on the basis of the metadata provided by agencies alone. This reflects in part the challenge of achieving sufficient consistency in a devolved metadata authoring environment. To ensure the discovery interface supports user needs, these groupings have been directly included in the *Subject* element from a controlled set of "Portal groups". That this has been necessary suggests that our existing metadata doesn't (yet) adequately reflect the goal of "what the user thinks the service is about". This aim may be made more difficult by inconsistent approaches to such questions by our users.

One of the issues in applying the canonical DCMES definitions is the concept of the content of the resource. Seven of the element definitions (*Creator*, *Subject*, *Description*, *Contributor*, *Type*, *Language*, *Coverage*) relate to the content of the resource, yet the very idea of the content of a service is problematic. Consider, for example, *Subject*. Which information should one consider to determine the subject of a service resource? As the service model is a user-driven representation, perhaps the most useful way of approaching this is to consider what the public user would think the service is about. In practice, this equates to describing the service, and using that description as the content-object which is analysed for a subject. A description of how the service is delivered and what it delivers to the user (the value the user obtains, to go back to our definition) would act as a surrogate piece of content. For the *Description* element at least this could become quite circular!

The above approach has limitations, and an alternative starts from the defining characteristic of services in providing value through interactions. Putting these interactions centre-stage suggests we should consider the information that flows between participants when the service is used. The content referred to in element definitions is then the content of the exchange, that is, the information handled by the service process. For some elements, this approach is appealing. In the case of *Language*, for example, the potential user wants to know in what language(s) they will be able to interact with the service – it is the language of the flow that is important. The subject then would be the subject of the conversations represented by the conduct of the service.

A third approach is to supplement the content analysis and content-oriented elements with contextual information. Rather than seeking a way of finding sufficient meaningful intrinsic content for description, this would focus on where the service delivery occurs within the extrinsic context environment of government activities and structures. This approach is based on the principle that the key for users is how to obtain service delivery. Service discovery then could be considered primarily about identification of delivery channels and points, rather than "content". This approach is likely to require additional elements. Building on the *Creator* and (particularly) *Publisher* elements, which relate the content to its environment, additional contextual elements such as *Function*, *Availability* and *Mandate* attempt to deal with the limitations of a content analysis model for services. *Function* relates the service to the reason for providing that service.

These ideas relate mainly to the application of existing definitions to service descriptions. The approaches should not be seen as competing models, from which one should be selected. Rather, the question is where each should be used in order to meet user needs. The above discussion relates to activity in the domain of the metadata creator. But discovery metadata is primarily about meeting the needs of the end user. Considering the matter from the other side then, how adequate is the framework for representing the important characteristics of services?

For the citizen, the critical factors are the ability to locate information about the service that meets the need they have, and to determine how they can access the service (where, when, at what cost). This goes beyond a narrow sense of discovery (confirming the existence of a resource) to a view of discovery that includes the full chain of search and evaluation behaviour through to use. Several of the DCMES elements relate to characteristics of an information resource which will enable a potential user to assess their ability to access and then use the resource. *Format* allows a judgement to be made in terms of the ability to extract meaningful content from a particular manifestation or medium, including hardware and software dependencies. *Publisher* covers the person or organisation which makes the resource available, but it appears to stretch the semantics of this element to use it to also cover details of how and where a service resource is delivered. *Format* can include the channels through which a service is delivered, but is better fitted to dealing with this in the general sense (eg delivery by counter service, by free phone etc) rather than as a means of setting out specific delivery points and service hours. NZGLS and AGLS include a specific *Availability* element to address this question.

These complexities highlight the importance of the relationships between resources, and of recognising the richness of those relationships. Simple metadata models capture flat representations of reality. Services are less easily forced into such models than information resources. The boundaries of individual services along a service chain may be difficult to distinguish. From different perspectives a wide range of different articulations of the extent of a given service (just which transactions comprise a single describable bundle) may be valid. These considerations make the *Relation* element crucial to the development of robust service description approaches. Similarly, this element provides space for linking service descriptions with metadata records for other types of entity (eg linking the service metadata to descriptions of necessary forms or procedural documents). The ongoing discussion about the representation of Agent details in Dublin Core metadata is relevant in this space. Sophisticated use of *Relation* enables considerable complexity to be represented within a comparatively simple metadata schema. Its potential to help address the issues of service description is still largely unrealised.

7. Relating the Service View to other Representations

The service view is only one way of describing government to the public. As well as traditional organisational models of government, more recently we have seen an emphasis in many jurisdictions on output-based models. The output model is similar in many ways to a service model, but is typically linked to financial accountability structures in an inward-looking way that sits uncomfortably with the more fully outward, citizen-focused view represented by the service model.

Description in service terms not only provides a tool for the public to understand and interact with government, but provides an additional tool for government itself to analyse its activity. Service descriptions created to aid discovery will be used to support other forms of evaluation. Is there duplication or overlap of services? Which services may be priority candidates for e-enablement? How can the model help with organisational design considerations? These questions will come into sharper focus as exercises like the New Zealand E-services project move into their later phases, and as governments move through the UN's e-government development levels. Many services share common underpinning business processes, such as registration, payment, or application lodgement. How do business processes intersect with service description and discovery? It is probable that metadata resources created initially for discovery purposes will then be challenged and pushed into service to support other aspects of the e-government agenda. It remains unclear what further service metadata elements may be needed in these future stages of e-government maturity. The New Zealand E-services project, for example, collected transaction volume data as part of its information gathering, but the long term value of this and other characteristics of services remains to be seen.

8. Evaluation of Public Response

A new New Zealand Government portal will be formally launched in August 2002, release having been delayed by the announcement of a general election which was held in late July. By the time of the Dublin Core Metadata Conference in October, it is expected that there will be preliminary user feedback, and evidence from web logs to enable some informed comment to be made about the public response to the portal, and about the usefulness of service metadata as used and presented in the portal.

9. Conclusion

Discovery metadata is inherently sensitive to the perspective of the end-user. Refinement to our meta-

data models may be required to provide the details need by users who are seeking to discover services rather than information resources. There is value in providing an integrated discovery framework for a range of resource types, including both services and documents. What is needed is refinement rather than comprehensive change, however the extent and nature of that refinement is as yet still open for discussion. A range of tactics exists for incorporating service metadata in existing models. These all show potential for sharpening our understanding of service description, and for addressing different aspects of the challenge of effectively representing services in a readily discoverable and meaningful manner. The approaches discussed in this paper are not mutually exclusive – the question is rather which to use where. Experience gained through implementation exercises such as the New Zealand Government portal will help inform and steer these developments.

[1] John Roberts, *Between a Rock and a Hard Place: Dealing With NZGLS Development Issues*, in *Proceedings of the International Conference on Dublin Core and Metadata Applications 2001*, (2001) <www.nii.ac.jp/dc2001/proceed ings/product/paper-42.pdf>.

[2] Sara Barham, *New Zealand Government Implementation of a DC-based Standard – Lessons Learned, Future Issues*.

[3] United Nations, Division for Public Economics and Public Administration, *Benchmarking E-Government: A Global Perspective*, (2002) <www.unpan.org/e-government/ Benchmarking%20E-gov%202001.pdf>.

[4] Further information at <http://www.e-government. govt.nz/e-services/index.asp>.

[5] The W3C Web services Description Working Group defines a web service "a software application identified by a URI [IETF RFC 2396], whose interfaces and binding are capable of being defined, described and discovered by XML artifacts and supports direct interactions with other software applications using XML based messages via internet-based protocols". Further information at <http://www.w3.org/ 2002/ws/desc/>.

[6] *Commonwealth Implementation Manual: Australian Government Locator Service (AGLS) Metadata* <http://www.naa.gov.au/recordkeeping/gov_online/agls/cim/ cim_introduction.html#1.5>.

[7] <http://www.iie.qld.gov.au/comminfo/download/is34.pdf>.