

Information Governance as a basis for cross-sector e-services in public administration

Terje Grimstad
Karde AS
Oslo, Norway
terje.grimstad@karde.no

Per Myrseth
Det Norske Veritas
Hovik, Norway
per.myrseth@dnv.com

Abstract: Information governance and systematic work with metadata and semantics are important elements of the implementation of an open, transparent, accessible, accountable, user-friendly and service-oriented public sector. Top management commitment is crucial in order to achieve necessary attention and sufficient budgets. Management needs to be aware of metadata and semantics as important enablers for the goals set forth in strategies and requirements from ministries. Documentation of economic potential and cost savings will help to get attention among decision makers, but today, few trustworthy sources are available. The development of cross-sector services and the demand for reuse of public service information, both in the public sector itself, but also for commercial services, underpins the importance of well-defined information. Participation in cross-sector e-Services demands the establishment of metadata repositories and ontologies as obligatory parts of the public sector information governance regimes.

Keywords-component; information governance, metadata strategies, cross-sector services, public sector

INTRODUCTION

Metadata and semantics are important and necessary elements of the implementation of a collaborative, effective and efficient e-Government. One problem, however, is that these topics, and the necessity to handle them in a structured and systematic way, are scarcely understood by top management with decisive power. Top management commitment becomes a crucial success factor. There is a need to convey a convincing, trustworthy and understandable vision and mission statements in order to get the necessary management attention and financial support for metadata and semantic exercises. The effects of systematic use of metadata across the public sector must be expressed in a language that is understood by top management, with qualitative and quantitative measures. The effects, which are both internal and external to the public organizations, have to be clearly documented and communicated.

The semantics are often hidden in source code, in systems, in laws and regulations, in the organizational structures and in the tacit knowledge of collaborating colleagues. Therefore, semantic problems have traditionally been satisfactorily dealt with by bi-lateral agreements between the ICT-staffs of the collaborating parties.

In most countries it is an important goal to provide an open, transparent, accessible, accountable, user-friendly and service-

oriented public sector. A crucial requirement to obtain this is better collaboration between public entities, and more seamless solutions between businesses, citizens and the public sector. As a consequence, more information exchange becomes necessary. Bi-lateral agreements become unmanageable when the number of collaborative cross-sector efforts increases. A new paradigm is called for.

Metadata and semantics are crucial building bricks in an information governance regime. Also, they constitute instruments to obtain better collaboration both within public organisations, between public organisations and between the public sector and its users.

The main objective of this paper is to show that information governance and adequate metadata strategies are important issues for the implementation of an open, transparent, accessible, accountable, user-friendly and service-oriented public sector. Other objectives are to provide guidelines for the content of the metadata strategy and elements of a “selling story”, based on best practices and experiences from interoperability research in the Norwegian public sector. The selling story is aimed at top management and meant to increase their understanding of the role of metadata and semantics in the development of eGovernment.

STATE OF THE ART AND BEST PRACTICES

Norway has a well-organized public sector with several infrastructure services already in place, or under development. The following initiatives and activities have been used as background and inspiration for this paper:

1. Altinn (www.altinn.no/en) is a service through which citizens and businesses can report information to public authorities. MyPage (www.norge.no/minside) is a portal through which services from different public bodies are made available to the citizens.
2. SERES is a service in development run by the Bronnoy-sund Register Centre, the goal of which is to provide a national metadata register and repository. SERES is treated in some detail in the next subchapter.
3. eDialogues is a concept for the implementation of cross-sector services to citizens and businesses.
4. Statistics Norway has for several years worked systematically with metadata and obtained several gains.

Top management adopted a metadata strategy in early 2005 [1].

5. An ongoing work to define a national metadata strategy.

A. *Metadata and metadata strategies*

Initiatives for describing metadata are not new. Attempts to describe semantics in data exchange have traditionally had many flavours. In the following some examples are given.

B. *UN/CEFACT*

UN/CEFACT [2] defines international electronic exchange formats and semantics for orders, invoices, custom declarations etc.

C. *Health Level 7*

In the health sector, the non-profit organisation HL7 was established in 1987. It provides a framework and related standards for the exchange, integration, sharing, and retrieval of electronic health information [3]. An alternative terminology for the same domain is SNOMED CT [4].

D. *National and international statistics*

Eurostat [5] and OECE [6] are examples of international organization asking their member states to supply well-defined statistics.

The above mentioned initiatives all use metadata strategies to secure success. They all have one or more international standardisation/best practice activities to ensure the establishment of (i) terms and their meaning; (ii) exchange models of data; (iii) process models describing sequences of data flow, error handling; and (iv) technical protocols for sending, receiving, security mechanisms, message envelope design etc.

All the standards and recommendations are tailored nationally to comply with national legislation, the installed base of e-Government services and the departments' internal solutions and needs. A challenge, though, is that the national data sources or registers often were established before the international standard effort was finished and they were based on the current national legislation. Because of this, EU is in a situation where the national registers are only partially interoperable when it comes to (i) legislation, (ii) content in the registers and (iii) information governance regime for the registers. This is a common challenge in eGovernment service interoperability at both a national and international level, where services are established and funded for one purpose, but later in their lifespan broaden their purpose and have to adapt to new legislation or other services' needs.

E. *SERES*

The Semantic Register for Electronic Services [7] is a Norwegian cross sector e-Government service and repository for metadata.

F. *Process and information models*

One of the findings in a study by Hellman [8] on barriers to interoperability is that interoperability must be based on good

understanding of business processes and information, and models of these.

Information governance is a key success factor for effective and efficient government. Based on challenges in the public sector, we assert that the principles presented by Khatri and Brown in "Designing Data Governance" [9] are relevant to the public sector. Khatri and Brown divide information governance in five sub-domains: 1) Information principles – clarifying the role of information as an asset; 2) Information quality – establishing the requirements of intended use of data; 3) Metadata – establishing the semantics or "content" of information so that it is interpretable by the users; 4) Information access – specifying access requirements of information; and 5) Information lifecycle – determining the definition, production, retention and retirement of information.

The public sector can be regarded as an organism which is managed by laws and regulations, and which operates on information. There is a dependency triangle between the (i) legal context in which an enterprise operates, (ii) the actual operations and type of business performed and (iii) the information assets that an enterprise utilizes to perform these operations. This triangle is based on our findings in our cases studies and in the reports "Compliance Work Package" [10] covering legal compliance in information governance in EU and "Semantic Technologies in Information Governance" [11].

DEVELOPMENTS

A. *Information governance and metadata strategies*

As stated above, the public sector can be regarded as an organism. Therefore, there is a need to enhance the sub-domains from Khatri and Brown [9] with a sixth domain, namely Information Compliance in the context of laws and regulations.

A metadata strategy should address all the six domains suggested above, and act as the guideline for information governance. As a result of the implementation of the strategy, several effects, both internal and external to the public organisation, will become visible. These effects are described in the next chapter.

Information governance focuses on who holds the decision rights on which topics, while management is about implementing the decisions. There is no complete list of which topics to decide upon, but the dependency triangle may help. The dependency triangle mentioned earlier illustrates the dependency between (i) legal context, (ii) the actual operations and (iii) the information assets.

B. *Different uses of metadata*

In this article we use the term metadata meaning "data about other data" or "data about data", as it is defined in the Reference Model for an Open Archival Information System (OAIS) [12] and in ISO 11179 [13]. Metadata and ontologies may serve many purposes, but we limit our focus to metadata with the purpose of identifying and defining the meaning of data in cross sector e-Government services.

There is a need for methodologies and tools to formalize the metadata into an asset that can be maintained and governed. When the metadata is formalized, maintainable and shareable new ways of utilizing metadata arise.

Internal to a department metadata will help to get an overview of the current situation when it comes to available data and the meaning of the data. Well defined metadata makes it easier to maintain a portfolio of interconnected internal systems. A metadata repository containing several departments' metadata will be of great help when metadata harmonisation processes are carried out. Information exchange that crosses system or juridical boundaries uses metadata and exchange models as a contract for the exchange protocol. In order to measure data quality there is a need to measure actual data according to some rules. The metadata can be the main part of the rules. For Business Intelligence and statistics, metadata is used as a description of the meaning and the identifiers used. Open public data/ linked open data uses metadata as a description of the meaning and the identifiers used. For the development of legislation, the metadata repository gives an overview of existing terms and their usage. This knowledge is very important when designing new or checking the consistency of existing legislation. Well-designed metadata can help simulate the impact of changes of regulation, e.g. the effect of changes in tax regulation.

C. *The importance of public sector strategies and letters of instruction*

In order to obtain necessary management attention and commitment, experiences from our research indicate strongly that information governance and metadata strategies have to be bound to public sector strategies and goals set by the ministries when the yearly budget for the public organisation is allocated and formulated in a so-called “letter of instruction”.

Strategies often contain statements regarding different characteristics of the public sector. Some examples are:

- About **Openness**: The organisation should be the preferred source for information and protect privacy.
- About **Innovation**: The organisation should provide Better services for citizens and businesses.
- About a **User friendly public sector**: The organisation must take the initiative and participate in cross-sector service development and should contribute to service developments in other sectors.
- About **Quality culture**: The organisation should improve existing services and act more effectively and efficiently.
- About **Competence culture**: The organisation should develop competence in a systematic way, it should transform individual knowledge to common knowledge and build, use and share knowledge.

In the letter of instruction from the ministries to the different organisations, the organisations are asked to position themselves according to development trends in the society. E.g.:

- It must provide accountable and efficient governance of a large amount of information.
- It must provide better communication with users as a result of new ICT.
- It must position itself to support increased demand and need for collaboration with other public entities.
- It must position itself to increased quality demands on services and products.
- It must position itself to increased demand on competence and management.
- It must position itself to increased demand and requirements for rules developments.

These requirements all ask for a high level of semantic consciousness, information governance and a metadata strategy. The communication towards top management could be based on pictures like the one in figure 1.

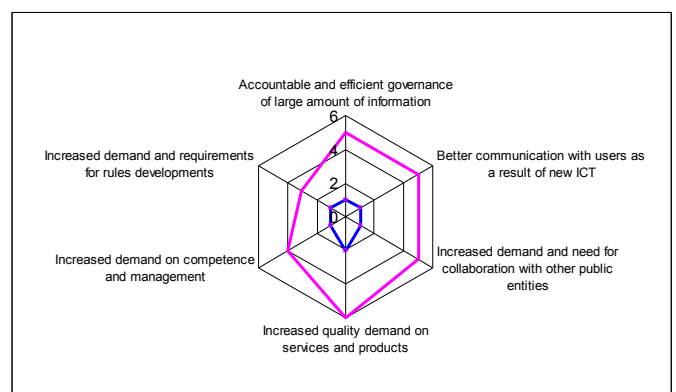


Figure 1: Gap between challenges and present situation

The idea of this visualisation is to show the relative importance of semantic consciousness for each of the requirements. The outer circle indicates the level which can be obtained if the organisation works systematically with semantic issues. The assessment of the level values are based on both qualitative and quantitative considerations. E.g. for “accountable and efficient governance of large amounts of data”, the importance of systematic work with semantics is assessed to a level 5 out of 6. The inner circle indicates the level of semantic support provided by the present methodologies and system portfolio. The figure shows that there is a gap to close in order to fulfill both strategies and demands from the ministry. To close the gap, which is a necessity because the organisation is measured on the degree of fulfillment, requires management commitment, budget and competence development. Other measures are also necessary in order to reach level 6, e.g. enterprise models, efficient and effective business processes, systems support, project management. Semantics is not everything.

EFFECTS OF INFORMATION GOVERNANCE AND METADATA STRATEGIES

Statistics Norway has published several internal effects of their metadata strategy [1]. They claim that the metadata

strategy is a cornerstone in their ICT-strategy. Some of the effects are better quality statistics, avoidance of double work in the production, increased reuse, increased ability to cooperate between departments, identification of incompatible definitions of the same term, more robustness in relation to change of personnel, reduced demand for user support and an increased ability in the organisation to change.

Our research has identified additional effects. We classify these effects as internal or external to the organisation. Internal effects can be summarised as:

- By working with Information governance in a structured manner, business becomes deeply involved in the definition of concepts. This in turn leads to better alignment between the business processes and the ICT-solutions and the ability for businesses to develop services with lower degree of ICT.
- Individual knowledge is transformed to common knowledge. This is due to better documentation, i.e., overview of information, systems and processes. Due to better documentation, the organization becomes more independent of specific resources and more robust to the exchange of personnel.
- Less production errors, and as a side effect, less negative attention in the media.
- More efficient service development, more efficient systems development and maintenance, easier adaptation of systems to new rules and legal constraints.
- As a consequence of all effects, the competence and capacity of the staff increases without employing more people. The ability for innovation increases.

External effects can be summarised as:

- The publication of own information in such ways that it can be reused both for cross-sector services and for commercial services.
- Avoidance of double reporting obligations for citizens and businesses.
- More effective and efficient cross-sector service development.
- Improved implementation of rule of law principles and improved interoperability.

EFFECTS OF INFORMATION GOVERNANCE AND METADATA STRATEGIES

In this paper we have presented arguments for the importance of information governance in the public sector and the role of metadata and semantics. Our observation is that management attention and comprehension is crucial for the implementation of a sufficient information governance regime. Management needs to be aware of metadata and semantics as a crucial enabler for the goals set forth in strategies and requirements from ministries. Furthermore, other effects are also of value and must be communicated.

Further work is needed on quantitative effects of good use of metadata. What is the cost of double reporting? To what degree will double reporting be reduced? What is the cost of production errors? What is the cost of training a new employee? What is the cost of negative press? To what degree can system development and maintenance costs be reduced? To what degree will service development costs be reduced? For internal services, for cross sector services?

Recommendations for the public sector could be summarized as follows: There is a need to increase the understanding of national and international metadata strategies. Important elements of information governance and metadata strategies should be visualized so that they are understood by top management. The importance of information governance should be visualized for the re-use of Public Sector Information, e.g. Review of Directive 2003/98/EC – [14], which claims that PSI has the potential for an immense commercial value. Effects of systematic work with metadata and semantics should be predicted. The necessity of information governance for the development of cross-sector services should be visualized. The need for a new or existing public agency with the role of operating a national metadata service with a clear mandate from the ministries should also be visualized.

ACKNOWLEDGMENT

This research was partially funded by the Semicolon-project [15], supported by the Norwegian Research Council.

REFERENCES

- [1] Metadata strategy in Statistics Norway. June 2005. SSB report 8/2005.
- [2] URL: http://en.wikipedia.org/wiki/UN_CEFAC_TBG5#History_of_EDIFACT_and_UN_CEFAC_TBG5
- [3] URL: http://en.wikipedia.org/wiki/Health_Level_7
- [4] URL: <http://www.ihtsdo.org/snomed-ct/>
- [5] URL: <http://ec.europa.eu/eurostat>
- [6] URL: <http://www.oecd.org>
- [7] SERES, Semantic Register for electronic Services. URL: www.brreg.no/samordning/semantikk/index.html
- [8] Organizational Barriers to Interoperability. By R. Hellman. Norwegian Case Study. H. J. Scholl, M. Janssen, R. Traunmüller, M. A. Wimmer (Eds.): Electronic Government: Proceedings of ongoing research and projects of EGOV 09. 8th International Conference, EGOV 2009. Trauner Druck: Linz, Schriftenreihe Informatik # 30, 2009. Pp. 182-189
- [9] Vijay Khatri and Carol V. Brown, Designing Data Governance, Communications of the ACM, January 2010, Vol. 53, No. 1, pp 148-152
- [10] Compliance work package, State-of-the-Art. Longrec report, Hannelore Dekeyser, September 2008. URL: http://www.longrec.com/Intranet/ResearchResults/StateOfTheArt/LongRecCompliance_StateOfTheArt_2008.pdf
- [11] Semantic Technologies in Information Governance. Longrec Understand Research Report, April 2010. Veronika Haderlein, Per Myrseth and Olga Cerrato.
- [12] Reference Model for an Open Archival Information System (OAIS). Januar 2002, Consultative Committee for Space Data Systems.
- [13] ISO 11179, Information technology Metadata Registries
- [14] COMMISSION STAFF WORKING DOCUMENT, Brussels, 7.5.2009, on the re-use of Public Sector Information. Review of Directive 2003/98/EC. URL: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0212:FIN:EN:HTML>
- [15] Semicolon project. URL: www.semicolon.no