29 Public Administration Networked with Business: Towards Architectures for Interoperable and Retrievable Law

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Introduction

The organization of law and the updating and incorporating of new laws is part of existing rules is an information intensive and complex endeavor. The adoption of new or updated rules requires a translation from the abstract laws in order to apply them to practical situations. This translation requires often the interpretation by jurists. The implications of new or updated laws need to be communicated to legal departments in order for them to comply with these new or updated rules. We will denote the creation, implementation, execution, enforcement and maintenance of laws as *production cycle* in this paper. Governments are looking for ways to increase their efficiency, decrease the administrative burden and reduce the lead times for adopting new legislations. The consequences of new laws at production phase are often not clear before introducing them or upholding them. The translation to practical implications takes place at many local government bodies and it is often not possible to inform the businesses, who are affected by the new law, pro-actively, as no information is available. This whole process is supported by heterogeneous information systems of various parties involved.

It does not require extensive explanation to stress the need for smart public-private networks from a production perspective. Most of the ERP software components companies run on need to be updated quite frequently to be in, and keep being in accordance with small changes in administrative legislation. The same holds for Human Resources software, Time reporting software, Tax reporting software and, more indirectly, Logistics software. All have to be updated due to changes in legislations. One dominant driver that even further complicates this process, is the need to adapt legislation from the European Union. Nowadays businesses expect that government reduce the administrative burden of businesses. One as-

pect of creating a smart, service oriented, public administration therefore is to make legislation interoperable and contextual more understandable to the context of the business activity.

From the *demand* perspective, citizens and businesses find it very hard to find relevant legislation, local procedures and rules, policy documents etc. Governmental bodies are engaged in a flurry of policy and law making activities. Not only is this a complex myriad of legal issues, but the information is produced at different levels of public administration, including local, regional, national and European union. A requirement is that online state legislative information should be equally accessible to all (Fage & Fagan, 2004). As such governments are searching for ways to make their information accessible and retrievable. This involves issues regarding terminology, explaining the type of legislative document, understandable and easy-to-use search interfaces and accessing the official status of online documents.

In this paper, *smart public-private collaborations* are investigated that are aimed at the seamless integration of law updates between various kinds of public agencies, software vendors and businesses and the creation of retrievable legislation. Analysis of projects supporting the production and demand cycle can produce a wealth of valuable data for local and central government, their partners and suppliers, as well as those researching smart public-private networks.

Research Methodology

The combined research methodology of action research and case study was chosen to answer the goal of this research; the examination of the state-of-the-art of smart legislation networks and identification of feasible directions. Case study research can be characterized as qualitative and observatory, using predefined research questions (Yin, 1989). Action research or applied case study research is focused on "how to" questions (Checkland, 1981). Action research can be seen as a subset of case studies (Galliers, 1992). The amount of case studies should cover the demand-side of business, the perspective of legislation makers. Four case studies were selected satisfying the above criteria:

- Practical feasibility: the approach taken should be proven in practice, not just merely an idea;
- In depth data availability;
- Relevance for a large geographical area;

- Operating at both a national level and local level;
- Aiming at reducing administrative costs for businesses;

Hereafter a summary of the main characteristics of the case studies is given. The case studies are described in more detail below.

1. *IMRO*: This case deals with the retrieval of structured and unstructured spatial legislation and spatial policy documents and takes the perspective of businesses;
2. *ePower/Metalex*: This case study focuses on the creation of legislations and translating to maintainable format for participants in the network and using a structured approach based on object oriented technology;
3. *Overheid.nl*: This case study focuses on making unstructured legislation accessible by adding metatags and URL spider technology;
4. *OTP*: The OTP and other central registries is one of the many initiatives aimed at administrative process collaboration between governmental ministries and between agencies like the TAX office, the National bureau of statistics (CBS) and the chamber of commerce. This registry-effort has a history of more than a decade and is renewed for its impact on the collaboration between agencies and should therefore included in this research.

A Conceptual Framework

The OTP was investigated using interviews conducted with program manager, municipalities and departmental representatives. The other case studies were conducted using action research and structured interviews with end-users from businesses. The researchers were involved in the project as project managers or as participants in the project design. The case studies were analyzed using the conceptual framework that will be presented in the following section. Thereafter the case studies are described, discussed and evaluated

If smart legislation networks are the ideal, what specific conceptual framework can be used to evaluate current initiatives and guide developments? A large number of initiatives having different conceptual perspectives can be found, fuzzy searching mechanisms, object-oriented rules and more conventional methods like meta-data definitions. Which initiatives should be chosen and why?

Life-cycle, Architecture and Coordination Approach

The smart public private networks case studies we investigate aim to support the efficiency and time to adopt legislation or to find legislation. We do not consider the content of the laws and regulations, but the process for the businesses to comply to them in all their complexity and interacting influence. Since those businesses require access to the regulations and related public services and since those regulations change at all levels of government, it is justifiable to look at elements in the production, enforcement and maintenance of the laws throughout the whole life cycle at the four public administration layers: (1) Cross-national (European), (2) national, (3) regional and (4) local.

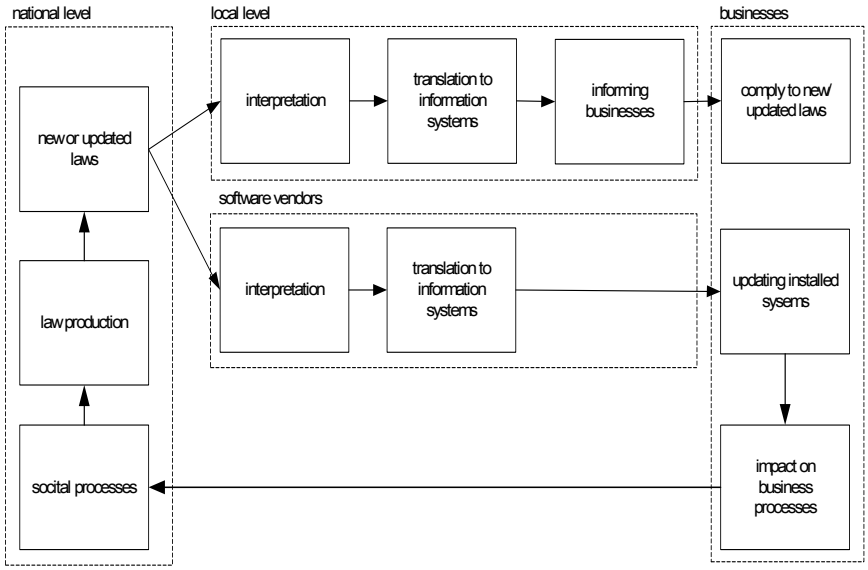

Fig. 29.1. Law cycle

When taking the perspective of the *production* life cycle the production of laws is performed at a cross-national or national level, whereas often the implementation (service provisioning) and enforcement of these laws is executed at a regional or local level. As a result of new or updated legislation, information systems of businesses might need to be changed or other measures need to be taken to comply to them. After laws are implemented and imbedded in business processes (for example law might influence the annual reports), the society might influence the politics at a national level

and new laws are made or existing laws are updated as shown schematically in Figure 29.1.

From a *demand* life cycle perspective, businesses have to cope with vast amounts of often interfering regulations. For businesses it is of vital importance to know which regulations are valid within particular geographical region. Businesses become only conscious of the implications of law after a permit request or renewal. Businesses also typically orient themselves at a larger geographically area than municipalities, whereas currently the information availability is often concentrated around local government bodies (municipality websites), so businesses are left to searching local level portals. The cases were assessed from a production and demand perspective, using evaluation criteria as proposed in the competing value approach of (Quinn and Rohrbaugh , 1983). The *production cycle* aims at the quick and efficient adaptation of laws. This also requires interoperability between information systems of various government organizations. As such the evaluation criteria from the production view are primarily based on the time and efficiency aspects as shown in Table 29.1. In contrast to the demand view, where non-expert should be able to search the legislation, government employs all kinds of judicial experts to translation of laws to implementation. The easiness of translation of the context will not be judged and considered outside the scope of this research.

Table 29.1. Evaluation criteria of legislation adaptation (production perspective)

Criteria	Description
Adaptation lead time business (software vendors)	Time to implement changes in legislations in information systems of businesses. In practice this means the time necessary for software vendors to update their system and install new versions of their systems.
Adaptation lead time government bodies	Time to implement changes in legislations in information systems of government organizations
Efficiency of adaptation	Resources needed by public bodies and businesses to implement changes/new legislations
Fairness of costs/benefits allocations	The perceived fairness of the interviewees about the division of the costs and benefits over the parties involved
Evolutionary balance	Any public private partnership faces stakeholders and conflicting interests. Initial investors need to have a long-term perspective on pay back and protection against “free riders”. New participants have to perceive the added value of the network in order to contribute.
Interoperability	The level of automation between the layers of government (organizations) involved in this case study
Maintainability	The smoothness of updating existing laws between the layers of government (organizations) involved in this case study

The *demand cycle* deals with making legislation retrievable. Precision and recall are two traditional effectiveness measures: precision means the proportion of relevant documents out of those returned, whereas recall that of returned documents out of the relevant ones (Buckland and Gey, 1994). Corresponding to the competing value theory, a tradeoff between recall and precision is almost unavoidable. If you retrieve one relevant document, the precision is 100% but recall is very low**.** If you retrieve all documents, recall is 100% but precision has dropped.

Recent research shows that search engines should not only be regarded in terms of precision and recall. The easy production of textual content and related sources in content managements systems and fast feed back loops based on user behavior is as relevant as the smartest search algorithm when searching for legislation. The evaluation criteria are depicted in Table 29.2.

Table 29.2. Evaluation criteria of information retrieval (demand perspective)

Criteria	Description
Precision	The number of relevant documents retrieved divided by the number of documents retrieved
Recall	The number of returned documents out of the relevant ones
Usability	The easiness of using the retrieval mechanism
Intuitive	The way queries can be entered (human speech language, keywords, categories)
Fast	The time necessary for businesses to find an answer on a question
Administrative costs business	The total costs of business to find an answer on the questions (e.g. to which location might our LPG gas station be moved?)

Case Studies

In this section four case studies are presented. In the following section these criteria will be evaluated and discussed using the conceptual model.

IMRO

The Information Model for Spatial Planning (IMRO) (www.ravi.nl) in The Netherlands is a standardized unique codification of all spatial purposes or functions attached to a piece of territory. It maps the country in terms of operational function per geographical object. Operational function refers to as the legally defined purpose the geographic location is dedicated to. The legal implications are most interesting because of the fact that law defines those operational functions. The combination of operational function and legal constraints together form a natural ontology of societal activities or

functions like housing, industry, parking, transportation, recreation, shopping, and so on. A map displaying the geographical objects now implicitly tells you what the spatial law dictates about that spot on earth in The Netherlands. By reversing the query it tells a business where some economic activities are allowed and where they are not.

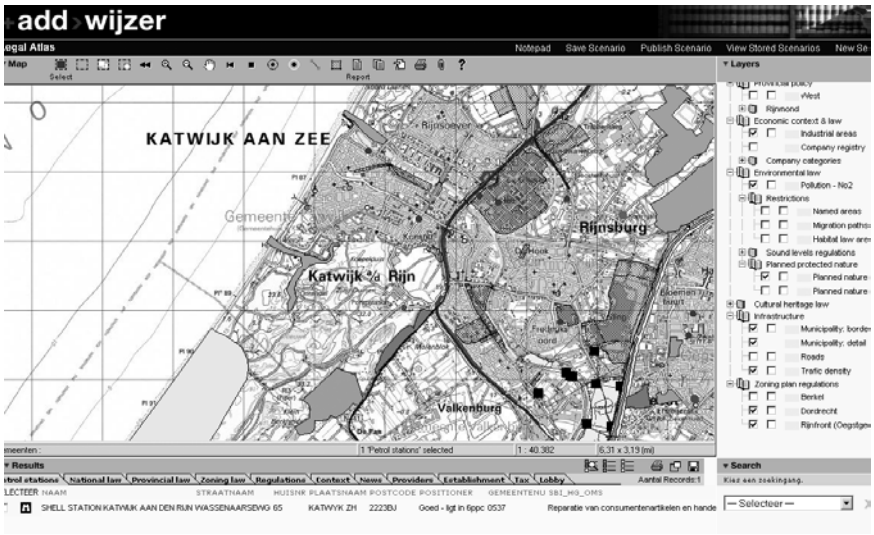

Fig. 29.2. Illustration of the navigation of legal constraints while relocating a tank station using IMRO

ePower/Metalex

It is only very recent that IT trained people have challenged the domain of law. A clash between law and IT trained people seems inevitable, as the constitutional law is the product of parliament and it is processed in a 2000 years old language only legal specialists are able to read. Given the fact that business back office processes are being linked more and more to government processes and given the fact that government is based on The Law, the old legal language is becoming legacy that needs to be accessed. It has been tried before to automate legal (contracting) procedures when EDI enabled some formal representation of rule-based systems (Bons, Lee & Tan, 1999). Most of those efforts were tedious and very time consuming. Today we see a number of efforts where the law is treated like a piece of machine-readable code, or at least attempts to cross the bridge between software and legal codification.

The first version of the “Metalex” legal XML standard developed by the University of Amsterdam during the last year (www.metalex.org). In combination with the Tax office an attempt was made to apply this standard to legal tax reporting procedures in the EC funded ePower project. Metalex covers the deontic legal constraints language which “jurisprudence” did for the last centuries. Only this time a machine can read it. The power project resulted in a method to create an ontology for a certain procedural domain. It has been applied successfully on tax deduction rule systems and pension calculation systems. It is now being tested in the area of the State Council (Raad v State). This important distinction is also visible in the usage of the term “taxonomy” and the term “ontology” (Boer, Engers and Winkels, 2003).A taxonomy as it is used in the context of XBRL (and other xml standards) is an agreement about the notification of a certain field in a message between two organizations or two machines. Ontology as it is used in the context of Metalex and lawis a standardized network of meaning and relations attached to the key concepts we want the government to regulate. A legal ontology expressed in machine-readable components is so important because of the impact the law has on other processes, it’s interoperability and maintainability.

Overheid.nl

The build of www.overheid.nl, version 3.0 (2002-2003), the National access portal for Dutch National law and government services provides the general entry point for citizens and businesses using a complicated URL management technology for 4000 websites of governmental agencies, a custom build search engine and a custom build retrievable XML structure for the whole of Dutch National Law. It has a considerable amount of users per day and it is well regarded by people within government to find laws and colleagues. It did not provide provincial law or local/municipality law and that was one of the main points of critique as was the crude characterization of the world into the profile “citizen” and “companies” as navigating user profiles. Currently the responsible Ministry is investigating the possibility to develop a new search engine on the one hand and a National metadata standard/infrastructure for ALL public (legal) information, standard services and unstructured content on the other. This approach may solve the mismatch between the demand side and the supply side of the chain because both perspectives are incorporated in the architecture of the whole process. eGIF eGMS in the UK is an eGovernment metadata standard based on Dublin Core and Warwick Framework and is now also used for the metadata standard initiative in The Netherlands

(http://www.govtalk.gov.uk/schemasstandards/gcl.asp). Such an international exchange is perhaps unusual for a National agency and probably very helpful for interoperability within Europe in the Future. The applicability of Metadata at National level for all other government agencies proved to be a difficult case. It is very hard to agree on a generally acceptable taxonomy, which is specifically still useful within one service domain. As a result the Aplaws project in the UK found that local governments had to adapt the metastandard for their needs into the Local standard (http://www.esd.org.uk/standards/lgcl). It remains the question if civil servants will actually use these in the long run.

ICTAL and OTP

A number of promising developments have been going on since EDIFACT was implemented in the early nineties. The Dutch Ministry of Internal affairs, The DutchTax office and the Dutch National bureau for statistics (CBS), adopted the XBRL (eXtensible Business report Language, www.xbrl.org) standard for financial record keeping and since 2003 the National Administration Transaction Portal (OTP) is taking shape (www.ictal.nl). The OTP is aimed at serving as the one-stop-shop for large amounts of structured data and transactions and it is relevant for our research because of the high level of standardization these automated processes require. The main point of criticism on Edifact used to be the costs and labor involved in the translation of processes in EDIFACT norms and messages. The OTP could well succeed in establishing a harmonized National business registry enabling electronic transaction for all governmental agencies. There is already resistance from a number of players to adopt the XBRL/XML technology to enable financial reporting to numerous government “shops” trough the OTP. Currently the main point of criticism seems to be the change from traditional Excel-reporting habits to more complicated reporting using XBRL given the costs involved of alternated processes. The strongest opposition at the moment resided with the lower level government agencies, which see little benefits for them and a lot of costs in creating a cross-agencies one stop-shop-chain. This project as a case still has to deal with the question of fair allocation of costs at the relevant government level.

Discussion and Evaluation

In Table 29.3 some of the distinguished characteristics are presented, based on which life cycle and which activities the case study aims to improve, the interactions between which kinds of actors, the structured ness of the legislation and the technology used in the case study. Only the IMRO case study focuses on both the production and demand cycle. The case studies are systematically evaluated using the criteria of our conceptual framework. Some of the criteria are not applicable to all cases.

Table 29.3. Overview of the characteristics of the case studies

Name case study	Life cycle	Interoperability between actors	Structure of legislation	Technology used
IMRO	Production cycle: interpretation/translation demand cycle: and retrieve information	Public-to-public Public-to-business	Structured and unstructured	Object oriented GIS and standardization
EPower/Metalex	Production cycle: interpretation and translation	Public-to-business	Structured	object oriented technology , XML deontic legal constraints language
overheid.nl	Demand cycle: retrieve information at various level	Public-to-business	Unstructured and structured	Metatags, XML and search
ICTAL	Production cycle: translate	Public-to-public	Highly structured	XML and XBRL

It should be mentioned that the scoring of case studies was found to be difficult and sometimes subjective. From the investigation and evaluation of the case studies a number of conclusions can be drawn which will be discussed hereafter. The Dutch national governmental portal site provides access to the national laws using a sophisticated hierarchy of XML tags. Adding the metadata using document type definitions (DTD) and XML-schema's slightly reduces the precision problem, while increasing the number of relevant documents retrieved. The retrieval problem is not completely solved however, since one still has to know the right keyword or jargon to find the relevant law for our business life event. The production of a document type description of the law based on the legal linguistic notification as it has been applied for hundreds of years may prove to be a fruitless effort for the purpose of automation and interoperability. Another issue is that XML schema's for more unstructured data are totally dependent on appropriate meta tags and the debate about the appropriate tags will

be endless without some link to the legal and economic fundaments of our society. The value of the content to the outside world remains invisible by means of normal navigation techniques like portals or search engines. Other case studies show that decomposing the law in objects and relations between objects is a viable approach.

Table 29.4. Overview evaluation case studies

	IMRO	**Epower/ Metalex**	**overheid.nl**	**ICTAL**
Production cycle				
Adaptation lead time business (software vendors)	good	excellent	-	excellent
Adaptation lead time government bodies	excellent	excellent	Good	good
Efficiency of adaptation	excellent	excellent	Good	excellent
Fairness of costs/benefits allocation	excellent	-	not good	not good
Evolution	good	not good	not good	unknown
Interoperability over layers off gov agencies	excellent	excellent	Good	good
Semi automated Maintainability	excellent	excellent	Not good/good	-
Demand cycle				
Precision	excellent	good	good	excellent
Recall	good	good	good	good
Usability	excellent	not good	good	-
Intuitive	excellent	not good	good	not good
Fast	good	good	good	excellent
Administrative costs business	excellent	excellent	good	excellent

Objectification of the law in the Netherlands was found in the IMRO case study and seems to be preferred over representing laws as texts using an (XML) hierarchy. Objectification enabled business to search among laws at various levels using queries. Spatial law is constructed from a much better user-centered perspective than the national law or the penal law. The retrieval mechanism there is based on the numeric codification of the zoning area. There is a much more transparent link between the life event or business goal of the end user and the triangle of zoning area, zoning regulation and zoning policy in comparison with national law. Businesses have more access to the practical terminology of locations and functions of that location in relation to what they want to achieve. A spatial orientation provides us with a solution for two problems: retrieval and representation. The layered data structure of GIS enables the user to open thematic maps in relation to a certain area. When combined with traditional SQL queries on the textual databases the application provides a powerful navigation tool. The user navigates information like he used to navigate real life for centu-

ries anyway: by using “maps”. The relevancy of a document is always anchored to the geographical coordinate and so are all objects like infrastructure, business, laws, maintenance schedules, ownership statues, environmental interests and so on. The need to retrieve information from many places at different levels of government organization is a resource-intensive job as shown in Figure 29.3.

Legislation production efforts are distributed over the European, State, Region and local level, and within each level many agencies of various types exist. Where most of the investigated case studies were aimed at improving production or retrieval using technology, only the IMRO case was focused on the restructuring of the public administration building blocks itself. It enabled businesses to query form the demand perspective: Instead of “what can I do here?”, the questions should be “where can I do this?” Although we did not investigate the structure of the public administration interoperaqbility in the Netherlands, it seems that investigating the restructuring of public administration to enhance the support the demand perspective would be a viable research directions.

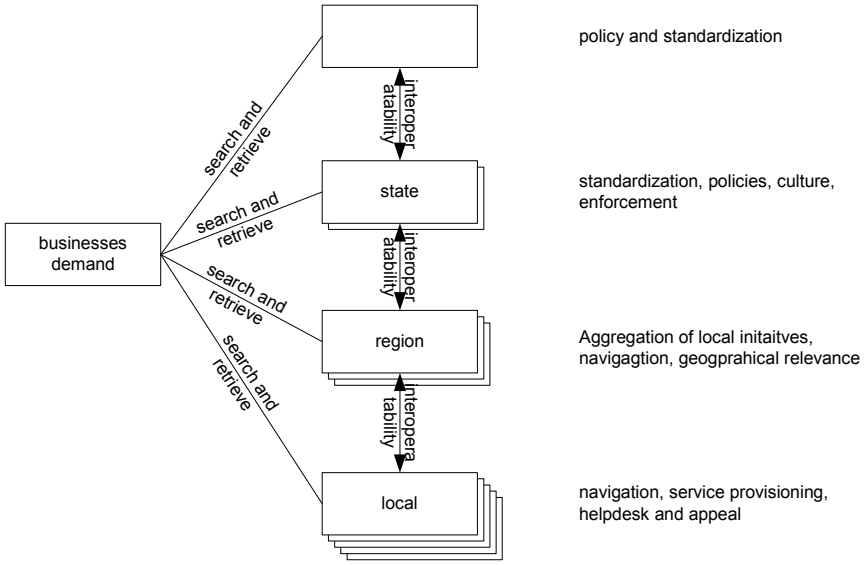

Fig. 29.3. Fragmented nature of public administration

Conclusions

Politicians and civil servants at a central level develop new legislation and procedures. The continuous updating of laws and rules and the enforcement is performed by governmental organizations at a decentralized level. Local governments have to translate the law to their local situation. Businesses and citizens have to comply to those regulations interacting at de-central level and at central level. These participants in the network use different applications, different ways to describe and incorporate laws in information systems, need different amount of resources and have various lead-times to comply to changes in law. A smart network is a network with more efficiency, lower risks and less costs, where the gap between policy makers, administrative organizations and businesses is bridged. It is vital that the architectural design fundaments of eGovernment services supporting economic activities are designed in consistency with (new) design principles for legal systems and the operational activities companies perform.

Object Oriented (legal) components which business software can process seem to be necessary to create a smart network. Those components need to be retrievable at the demand side of businesses. Retrieval requires usability and contextual relevance.

Geographical elements for retrieving localized legislator or jurisdiction is a feature necessary. This featured is gaining more importance, as legal systems need to be interoperable at a European scale. The combination of object oriented law and geographical systems combines finding relevant laws by easy navigation. The next generation of web services between government and businesses should be based on both (1) legal object oriented building blocks and (2) geographical relevance around the same ontology's. These can be taken as a starting point for creating interoperable and retrievable law.

References

Arendse (2003). *The OTP Architecture*. Report ICTAL, http://www.ictal.nl/.

Armour, F.J. Kaisler, S.H. and Liu, S.Y. (1999). A big-picture look at Enterprise Architectures, *IEEE IT Professional*, 1(1): 35-42.

Boer, A. Engers, T. van and R. Winkels (2003). Using Ontologies for Comparing and Harmonizing Legislation. In *Proceedings of the International Conference on Artificial Intelligence and Law (ICAIL)*, Edinburgh (UK), ACM Press.

Bons R., Ronald M.Lee and Tan, Yua-Hua, (1999). A Formal Specification of Automated Auditing of Trustworthy Trade Procedures for Open Electronic Commerce. *Hawaii International Conference on System Sciences (HICCS).*

Buckland and F. Gey (1994). The relationship between recall and precision. *Journal of the American Society for Information Science*, 45(1):12-19.

Checkland, P. (1981). *Systems Thinking, Systems Practice*. Wiley, Chichester.

Coase, R. (1937). The Nature of the Firm. *Economia*, 4: 386-405.

European Commission (2004). *Green paper on Public private partnerships and community law on public contracts and concessions*, European Commission, no. 327.

Fagan, J.C. & Fagan, B. (2004). An accessibility study of state legislative web sites. *Government Information Quarterly,* 21: 65-85.

Galliers, R.D. (1992). *Information Systems Research. Issues, methods and practical guidelines*. Alfred Waller, Fawley, England.

Jensen, M. and Meckling, W. (1976). Theory of the Firm: Managerial behavior, agency costs, and capital structure, *Journal of Financial Economics*, 5: 305-360.

Malone, T.W. & Crowston, K. (1994). The Interdisciplinary Study of Coordination. *ACM Computing Surveys*, vol. 26, no. 2, pp. 87-119.

Peters, Rob and Wilson, Frank (2003). Natural Language access to regional information sources: the PortofRotterdam case: *4th International Workshop on Image Analysis for Multimedia Interactive Services*, WIAMIS 2003.

Rohleder, S.J. et al. (2004). *eGovernment Leadership: High Performance, Maximum Value*. *Fifth Annual Accenture eGovernment Study*. Accenture Government Executive Studies, http://www.accenture.com/xdoc/en/industries/government/gove_egov_value.pdf

Quinn, R.E. and Rohrbaugh, J.W. (1983). A Spatial Model of Effectiveness criteria: Towards a competing values approach to organizational effectiveness. *Management Science* 29: 363-377.

Williamson, O.E. (1975). *Market and Hierarchies, Analysis and Antitrust Implications. A study in the economics of internal organization*. Macmillan, New York.

Yin, R.K. (1989). *Case Study Research: Design and methods*. Sage publications, Newbury Park, California.