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AGILE: From Source of Law to Business Process Specification

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Abstract. The knowledge management problems involved in managing the consequences of organizational change processes triggered by changes in the law, for instance for business processes, services, databases, fielded applications, forms and documents, and internal education, make a good case for application of some state-of-the-art concepts in legal knowledge representation.

The recently started AGILE project addresses the legal dimension of management of organizational change processes. This paper introduces the AGILE project, and presents an initial overview of relevant relations between sources of law and the business processes and services of the administrative organization, based on concepts familiar in legal theory and legal knowledge representation. It also proposes the application of change-oriented features of the MetaLex XML standard to organizational change.

1 Introduction

Driven by the increasing legal convergence and legal complexity, an increasing pace of organizational change in public administration, and increased use of IT and web services, the interest in legal knowledge representation in public administrations is gradually increasing but also changing in nature.

Initially interest was focused on the utility of fielding computer systems built using a knowledge engineering approach; More recently the focus shifted to the potential utility of knowledge representation for comparative and for maintenance purposes, and for increasing the efficiency of the organizational change process itself.

Compared to the standards set by knowledge engineering research, fielded systems in public administration and elsewhere that use explicit knowledge representation to support decision making processes are technically and theoretically straightforward. The required transparency, and the great challenge real world knowledge representation poses for the people implementing such systems, act as a natural limit to the complexity of these decision support systems. The required functionality rarely by itself justifies state-of-the-art legal knowledge representation.

As we will argue in section 1.1, however, the knowledge management problems involved in managing the consequences of organizational change

processes triggered by changes in the law, for business processes, services, databases, fielded applications, forms and documents, internal education, etc, make a considerably better case for some state-of-the-art concepts in legal knowledge representation.

The recently started AGILE project, introduced in section 2, addresses management of institutional change, sometimes driven by changing legislation and sometimes by environmental factors.

Section 3 presents an initial overview of relevant relations between sources of law and the business processes and services of the administrative organization, based on concepts familiar in legal theory and legal knowledge representation. This account is a first, tentative step towards a design method that should help organizations to adapt to new or changing legislation.

1.1 Background

Inside public administrations, and on the interfaces between them, ICT and Internet have a large impact. Some decision making processes are nowadays assisted by computer applications, and others are more or less autonomously performed by the computer.

At the same time, service-oriented architectures are becoming the prominent paradigm for building enterprise information systems, also in administrative agencies. Service-orientation leads to new network arrangements between administrative agencies for sharing data, etc. This development in itself leads to attention for the adaptability and accountability issues that arise (cf. [9]).

The services in question are in an administrative setting often implementations of public legal acts, performed by public legal personalities, based in formal legislation. Legislation gives administrative organizations public personality, defines what the core functions of public organizations are, and what services they provide. It guides how the organization subdivides itself into administrative units, how it organizes business processes inside the organization, and eventually how the functions of the organization are realized by civil servants and computer systems.

Business process design and design of specialized computer systems are both usually based on explicit *models* in various modeling languages of what the business process or computer application should achieve. These models are supposedly used as a specification of the objectives of an organizational change process or application development process. When legislation changes, these models are updated, and the organization's structures and computer programs have to be changed to conform to the models.

In the past these changes were conceived of as temporary interruptions of long periods of everything staying the same. This was certainly the case when the adaptation of existing systems was still considered a frightening prospect: things did change but the changes where carefully orchestrated to not impact existing procedures, network arrangements with other organizations, and computer systems. But as the perceived capacity of organizations to organize change processes increases, and the number of

fielded computer applications increases, so does the pace of change in legislation directly affecting existing computer applications.

Tax legislation is for instance changed every year, leading to continuous adaptation of relevant computer applications for next year and the years after that, while the legislation of the present year and previous years is still being applied. In the business process design literature, awareness of this phenomenon has led to a new conception of the organization as an entity that is constantly in the process of changing: the organization is constantly conceptualizing and comparing what it is and what it is becoming.

Attention for *knowledge representation* of sources of law is very often triggered by such administrative change processes driven by new legislation and other sources of law, such as case law and internal written policies.

The change processes triggered by the legal system are increasingly expensive, especially if they involve changes in ICT infrastructure. Knowledge representation is seen as a means to potentially reduce costs and increase efficiency through increased control over the knowledge dimension of the change process. Our past work for the Dutch Tax and Customs Administration (DTCA; cf. for instance [4]) was for instance clearly related to the huge *change process* triggered by the complete overhaul of the Dutch income tax law in 2001. The *Juridisch Loket* (cf. [15]) project on *pro bono* legal assistance, and the *DURP* project on spatial planning (cf. [3]) were for instance also driven by an overhaul of legislation.

These trends have led to the AGILE project, described in the next section of this paper.

2   The AGILE Project

In the AGILE project (acronym for Advanced Governance of Information services through Legal Engineering) we aim at developing a design method, distributed service architecture and supporting tools that enable organizations – administrative and otherwise – to orchestrate their legal information services in a networked environment.

At issue is the adaptivity of ICT infrastructure, of business processes, and of data and knowledge within the organization, given changing legal demands and constraints.

The AGILE project started in the second half of 2008 and will last for four years. The project will use knowledge representation technology developed within the semantic web community, OWL DL, as a starting point, but will extend it where necessary with elements specific for the legal domain or the objectives of the project.

The primary purpose of modeling implementation of legislation in OWL is to account for that implementation, to validate it, and to simulate new service arrangements. Deployment of OWL-based services is not intended: actual technical implementation has to take into account the existing technical infrastructure of an organization, and modernizing infrastructure is not the focus of the project.

Complex Adaptive Systems Based on complex adaptive systems (CAS) theory, the project will develop a service modeling and design method that should help organizations to adapt to new or changing legislation. The essence of CAS theory is the study of systems built of individual agents (being persons, business units, or organizations) that are capable of adapting as they interact with each other and with an environment, in order to understand how the individual affects system-level responses.

The proposed method should take the resilience of existing systems, dependencies on the environment, and the unpredictability of change processes explicitly into account (cf. generally [9]). The objective of this part of the project is to improve the adaptability of ICT infrastructure, of business processes, and of knowledge in the organization.

The underlying premise is that simply determining future needs and requirements is not the right approach, due to the inherent unpredictability of a complex environment and the fact that there are already many working (social and information) systems in place which can not and should not be ignored.

The simulation architecture and tools are out of scope of this paper.

Pilot studies Results from the research tracks discussed will be tested in the context of two actual business cases. One at the Dutch Immigration and Naturalisation Service (IND) and one at the Dutch Tax and Customs Administration (DTCA).

In both organizations, timely and efficient adaptation to changing legislation, case law, and patterns of behaviour accommodating or evading law in the relevant environment is seen as an important organizational objective, whose realization is causing problems.

3   Legal Concepts in Agile

Of specific relevance to a world dominated by written declarations and decisions, databases, web services, and changing sources of law is an account of formal acts, and of the act of providing evidence for a legally relevant proposition. In this account the concepts developed in the MetaLex standardization effort, presented next, play an important role.

Formal legal acts are characterized by 1) the requirement that one intends to bring about a certain institutional change, and 2) that this intent is communicated in writing, i.e. the institutional change is *represented*. Both the act of legislating and the various paper or software-based acts of adminstrative organizations have this nature.

The relation between sources of law and the business processes and services of the administrative organization will be explained in terms of the institutionalization and formalization of normative order (cf. [10, 2]). The notion of services – which usually has no direct counterpart in the relevant sources of law – will be explained in terms of Hohfeld's directed jural relationships (cf. [8]). Both the constitutive rule (cf. generally [11]) and Hohfeld's categories (cf. for instance [12]) are mainstays in legal knowledge representation and legal philosophical logic.

MetaLex To implement traceability from knowledge representation to sources of law, the AGILE project will build on the results of our work on MetaLex XML (cf. for instance [6, 5, 2]).

MetaLex serves as a common document format, processing model, and metadata set for software development. In addition, the MetaLex CEN committee defines a single jurisdiction-neutral and transparent uniform resource identifier (URI) based open, persistent, globally unique, memorizable, meaningful, even to some extent "guessable" naming convention for legislative resources, that can be used productively in OWL modeling. MetaLex and the MetaLex naming convention strictly distinguish the source of law as a published work from its set of expressions over time, and the expression from its various manifestations, and the various locatable items that exemplify these manifestations, as recommended by the Functional Requirements for Bibliographic Records (FRBR; cf. [13]). MetaLex extends the FRBR with a detailed but jurisdiction-independent model of the lifecycle of sources of law, that models the source of law as a succession of consolidated versions in force, and optionally *ex tunc* consolidations to capture the possibility of correction (errata corrige) or annulment after the fact of modifications by a constitutional court.

In the MetaLex metadata set, represented in an OWL ontology, the `realizes` property between expressions and works represents the connection between the two ontological levels at which documents exist that are of relevance to their real world use. The source of law on the expression level for instance *cites* other rules on the work level, while the legal rules we represent are necessarily identified by their *representation* in expressions. A citation *(text fragment) w applies to (concept) C* should for instance be read as *each legal rule that is represented by an expression-level text fragment that* `realizes` *work fragment w applies to C*. This representation technique, an implementation of the idea of ontological stratification (cf. [**?**]), will play an important role in the AGILE project. In current organizational practice the management of changing sources of law (particularly at the levels below *formal* law) is a notable weak point, and *ex tunc* change is often never heard of.

Institutions and Rules The primary purpose of legal knowledge representation for the administrative organization is to keep track of how it implements law in its organizational structure, business processes, data structures, business rules, and resource allocation practices. On the other hand the administrative organization has a number of good reasons to keep specifications relating to these distinct from their legal abstractions. Firstly, there is often a mismatch between the conceptualization of the acts performed as found in the sources of law and the more practical conceptualization within the organization, even if there is a considerable overlap in terms. Law is not the only source of design requirements and constraints, and the implementation of well-defined decision making procedures and software support requires additional commitments.

Secondly, the concurrent use of different regimes within an organization, or of alternative procedures for performing the same legal act (for real or for simulation), make such an identification tricky. While the organization may for instance use the vocabulary of the law to structure it's data

structures, it will inevitably be confronted with changes in that vocabulary, and the question which data can be *regrounded* in the new legal vocabulary.

Thirdly, straightforward legal rules are often in practice implemented as formal acts, creating a confusion between proposition and formal representations of such a proposition. For immigration, the proposition that someone is married may for instance be legally relevant; In the implementation of this criterion this however for instance becomes the proposition that someone has supplied a marriage certificate.

Since marriages may end, such a proposition is obviously not an essential quality of a person: the correct way to represent such a proposition is as a participation in a (time-limited) marriage. Moreover, if the organization for instance adds another condition that the marriage certificate must be less than one year old, and a procedure may take more than one year, a service requester may in fact be required to supply a marriage certificate multiple times. A certificate may in fact be still valid at the moment of decision making, while the marriage is not at the point in time in existence.

The administrative organization is conceived of as an implementation of a legal institution. Institutions can be conceptualized as abstract social systems with a well-defined interface with an environment. The structures of the legal institution are defined by the institutional facts that make up the institution, and its mechanisms of change are the constitutive rules – found in the relevant sources of law – that specify what brute act *constitutes*, or counts as, an institutional act. The administrative organization must at least *implement* each of the relevant institutional acts it is supposed to perform in brute reality in a business process and advertise it as a service to the relevant agents. Conversely, it recognizes a limited number of ways in which agents in the environment can perform the acts that count as a request for the performance of a service.

Relevant patterns in logical propositions describing the functions of legal rules revolve around the notions of *constitutiveness* and *applicability*. The legal rules represented by the source of law appeal to two separate realities – institutional reality and brute reality – and perform a mapping from brute reality – the ontological substratum – into institutional reality – the ontological superstratum. The substratum has an existence independent of the rules, while the superstratum is supervenient on the substratum and exists by virtue of social recognition of the rules of the institution.

Applicability plays a central role as soon as the logical proposition and the legal rule are separated. The law frequently does so: A special class of legal rules, *applicability rules*, constrains the applicability of other rules, or make the application of one legal rule conditional on the application of another legal rule.

The institutional interpretation however tells us little about the functions of law for its users. To explain these functions, we have to appeal to planning and plan recognition. In the AGILE project this aspect is filled in with *agent simulation*.

In some cases such an explanation is straightforward. The analysis of normative rules in terms of normative positions and obligation, i.e. deontic

logic, is such a straightforward abstract theory of behaviour, based on the expectation that people generally avoid the circumstances in which they are liable to be punished. To explain the normalizing effect of other rules one must ascribe intentions and preferences to agents: People generally intentionally try to bring about or avoid certain legal facts.

The principal aim of Hohfeld's work (in [8]) was to clarify *jural relationships* between parties. Hohfeld's relationships distinguish between the (legal) competence (or power, ability) and incompetence to play a certain agent role, and therefore to cause a certain change of position, and between the obligation to cause a certain change of position or the absence of such an obligation, and most importantly, between the one who acts and the one who predicts the actions of another. In essence we are dealing with the ability of one agent to infer:

1. that another agent has the *ability* or *inability* to change his (in this case legal) position in relevant ways, and
2. that the other agent has a *preference* for changing or not changing it.

Business process specifications represent an intention to use one's (legal) abilities in a predictable manner. Services publicly advertise this intention, so that it creates an ability (to change their legal position) of prospective clients. These clients use this ability by requesting a service. Of central importance is the adoption of agent roles: the client becomes a client by requesting a service and – thereby – adopting a well-defined role, while the employee of the administrative organization adopts an agent role in an associated business process. Agent simulation as a tool for impact analysis and exploration of design options assumes the development of prototypical agents representing both the organization itself and its relevant environment.

4 Discussion

The discussed elements are all found in legal knowledge representation. A deviation from mainstream legal knowledge representation is found in the rigorous ontological stratification (cf. [7, 14]) of legal entities and organizational entities we propose for AGILE. Although legal knowledge representation literature discusses the "counts-as" or constitutive rules (cf. for instance [1, 11]), it usually considers them just one type of rule, among other (notably normative) ones, instead of applying the concept throughout.

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