eGovernance and its Value for Public Administration

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Abstract. In the public context, governance is about how to steer or guide society so as to best serve public interests and achieve the common good. We present a cybernetic model of governance focusing on the role of legislation and regulations as primary instruments for guiding and directing society. By eGovernance, we mean the application of advanced information and communications technology to improve governance. The life cycle of legislation model of governance leads to an appreciation of the potential of legal knowledge-based systems for eGovernance. Focusing on the implementation phase of the legislation life cycle, we discuss how legal knowledge-based systems can be used to improve the correctness, consistency, transparency and efficiency of deep transactions, i.e. those determinative processes of public administration requiring the application of complex legislation and regulations. Most efforts of public administration to bring transactions online have been restricted to simple transactions requiring little or no knowledge of the law, such as change of address notifications. Only when deep transactions are supported will the full potential of information and communications technology to improve the quality and efficiency of public administration be fully realized. Legal knowledge-based systems are a mature and proven technology with the capability to help realize the potential of eGovernance.

1 Introduction

There are many conceptions of eGovernance (Reinermann and Lucke; Malkia, Anttiroiko and Savolainen). Our view is that eGovernance is about the use of information and communications technology to improve the quality and efficiency of all phases of the life cycle of legislation. In this conception, computer models of legislation play a central role. We use the term "model" in a broad way, to cover every kind of data model of legislation or metadata about legislation, at various levels of abstraction or detail, including full text, hypertext, diagrams and other visualization methods, and legal knowledge-bases using Artificial Intelligence knowledge representation techniques. The appropriate kind of model depends on the particular task to be supported.

In this paper, the focus will be on the use of legal knowledge-based systems (LKBS) to support the implementation phase of the life cycle of legislation. LKBS

can greatly improve the correctness, consistency, transparency and, last but not least, the efficiency of the administration of complex legislation.

The rest of this paper is organized as follows. Section 2 presents our view of the concept of governance, including its relationship to government and democracy, explains why governance is a topic of current interest, introduces the life cycle of legislation and discusses the use of models of legislation to support all phases of this life cycle. Section 3 motivates the use of LKBS to support tasks in the implementation phase of the legislation life cycle and provides a brief introduction to LKBS technology. Section 4 discusses various application scenarios for implementing public policy and legislation using LKBS. Although research on technology for legal knowledge-based systems continues, it is a mature technology with many impressive applications in regular use by public administration. Section 5 explains the purpose and goals of the eGovernance Consortium, which consists of the leading companies providing LKBS products and services in Europe. Section 6 concludes the paper by reiterating its main points and discussing future work.

2 On eGovernance and its relation to eGovernment

Governance is a **topic**, not a standpoint, thesis, method or solution, let alone a technology. The topic of governance is about how to manage, steer, direct or guide an organization so as to best achieve its goals and protect its interests. Governance is an issue not only for cities, nations, federations and other political entities, but also for private organizations. In the political context, the interests to be promoted by "good governance" are the public interests of the society as a whole, including future generations.[1] That is, the purpose of public governance is to achieve and maintain the "common good".

Governance is a topic of current interest because of several developments (Malkia, Anttiroiko and Savolainen):

- The changing role and increasing importance of knowledge (cf. the "knowledge society");
- The trend towards non-hierarchical forms of organization and management, in particular networks;
- Globalization, with its shift of power from nation-states to international institutions and global corporations; and
- The potential of new information and communications technology (ICT) to improve the efficiency and quality of collaborative work and facilitate more inclusive participation in political processes.

Governance in the public context is closely related to government and democracy, but has a different focus. These three concepts can be considered as different views of political entities such as nation-states. Government is the **institutional view**. It focuses attention on political bodies such as cities, counties and states; the legislative,

[1] |With respect to the interests of future generations, governance is entwined with another current topic, **sustainability**.

executive and judicial branches of government; or the various departments and agencies of public administration in the executive branch of government. Democracy is the **legitimacy view**. It is concerned with grounding the authority of public institutions in the citizenry or body politic, assuring that actions taken by public authorities are sincere efforts to achieve the common good and to vest ultimate control and ownership of public institutions in the citizenry. Finally, governance is the **regulatory view**. It is about how to best guide, steer or lead the society so as to identify and realize common interests.

Public institutions and governmental agencies are not the only actors involved in the process of governing society. Governance is not a synonym for government. Having another term, "governance", for the regulatory view helps us to broaden our perspective beyond public agencies and think seriously about ways to make use of the potential of other actors in civil society to reform governance so as to meet the challenges of globalization and utilize the potential of ICT in the knowledge society.

As shown in Figure 1, based on a diagram in (Macintosh), governance can be viewed cybernetically, as a class of control systems. Many of the kinds of actors involved in governance are illustrated in Figure 1, including the press, political parties and lobbies, non-governmental organizations (NGOs), the general public and various governmental actors. The actors displayed in the outer ring of the diagram are positioned near a phase of the control loop in which they make an important contribution or have a significant role to play.[2] The phases of the control loop in this particular governance model are:

Agenda Setting. The main task here is to order the issues and problems that have been identified in the monitoring phase. (See below.) Opinions may differ about the priority of issues. Being able to influence the agenda is a significant political power.

Analysis. The goal of analysis is to better understand an issue, including finding, collecting and structuring information about the interests of all stakeholders, proposals for possible solutions, arguments about the advantages and disadvantages of the alternatives and trying to creatively design new, win-win solutions which synthesize the proposals in such a way as to, ideally, satisfy the interests of all stakeholders.

Policy Creation. Applying the results of the analysis phase, those with the necessary political authority and power, with the support of their advisors, create policy and enact legislation in this phase.

Implementation. Here the task is to put the policy and enacted legislation into practice, by designing and implementing the necessary organizational and technical infrastructure and work processes. The policy and legislation may need to be interpreted and refined at this stage, by developing administrative regulations that clarify and operationalize statutes to the extent they have been left vague, contradictory, ambiguous or otherwise unclear by the legislative body. Included in this phase is the design and implementation of computer software, whether legal expert systems or more conventional programs, for supporting the application and use of complex legislation by administrative clerks and other users.

Monitoring. Since people are not omniscient, unforeseen problems do and will arise. The purpose of this phase is to continually check whether the policy, legislation

[2] Actors may be involved in other phases; The diagram is incomplete in this regard.

and its implementation are producing the planned results. This requires the collection and analysis of empirical data. Even the goals of the policy may be called into question as a result of this new information. Monitoring can be conducted in various ways. In addition to scientific empirical research, the resolution of legal conflicts in courts of law and critical discourses in the media are a part of this process.

The life cycle model of legislation is not intended to be a strict "waterfall" model. The results of a phase may feed back to early phases. For example, during policy creation issues may arise which require further analysis.

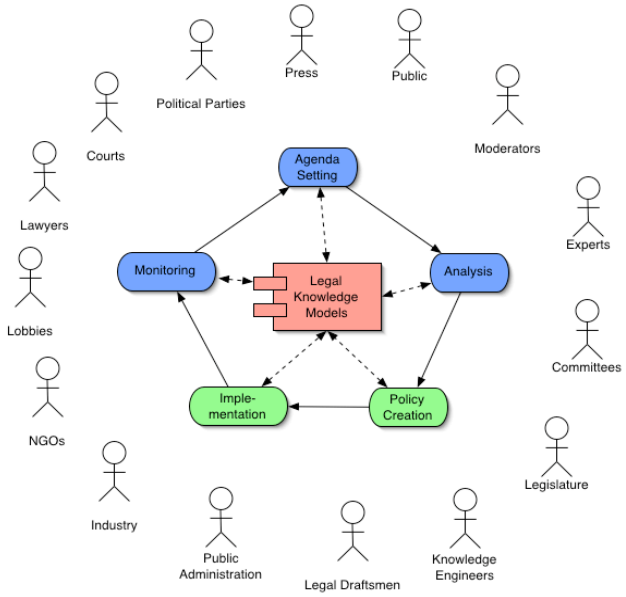

Fig. 1. The Life Cycle of Legislation

As illustrated in Figure 1, all phases of the life cycle of legislation create, use, maintain or evaluate computer models of legislation and other sources of norms, e.g. regulations, court cases, and best practices. These are called legal knowledge models in the figure. One could distinguish between the full text of the legal sources and metadata, abstractions or models of these sources, but for the sake of simplicity a full text database of some legal source is viewed as a kind of computer model.

Although others also have viewed governance as a cybernetic control loop, with phases similar to these, to the best of our knowledge our version is the first to make the important role of models of legal knowledge explicit.

Up until now, a conceptual view and life cycle model of governance have been presented, but what is **electronic** governance (eGovernance) and how does it compare to eGovernment? The current fashion of prepending an 'e' to just about every topic (e.g. eCommerce, eLearning, and eHealth) is nothing more than a simple way to create a name for the use information and communications technology to support tasks within the topic. eHealth, e.g., is about the use of ICT to support health care. Thus, eGovernment is not a new topic, but just a new name for the interdisciplinary

field of Information Science and Public Administration.[3] The distinction between eGovernment and eGovernance, then, stems from the different focus of the underlying topics of government and governance. Whereas eGovernment is about the use of ICT to support the work of governmental institutions and agencies, eGovernance is about the use of ICT to support the guiding or steering of an organization to achieve its goals. In the political context, as a special case, eGovernance is about the use of ICT to steer society and promote public interests.

Not all eGovernment applications of ICT are eGovernance applications, and vice versa. For example, eProcurement, the use of ICT to support the purchasing departments of public agencies, is an eGovernment topic, but not an eGovernance one. Conversely, an ICT application designed to help lobbyists participate effectively in the political process may be viewed as an eGovernance application, but not an eGovernment one, since its intended users are not public agencies.

Using the life cycle model of legislation as a model of governance leads to a more specific definition of eGovernance: the use of information and communications technology to improve the quality and efficiency of all phases of the life cycle of legislation. In this conception of eGovernance, computer models of legislation and other sources of norms play a central role. The appropriate kind of model depends on the particular task to be supported. In the rest of this paper, the focus will be on ways to use a particular class of models, legal knowledge-based systems (LKBS), to support the implementation phase of the life cycle of legislation. There are also important applications of LKBS for other phases of the life cycle, in particular to support policy creation and legislative drafting. Conversely, other ICT technologies have a role to play in the implementation phase, such as business process reengineering and workflow management systems. But these subjects require separate explication.

3 Introduction to Legal Knowledge-Based Systems

Computer models of legal rules and regulations for helping public agencies to administer complex legislation are nothing new. A large part of IBM's growth in the 1950s was due to the successful adoption and proliferation of large data processing applications for administering taxes and social benefits in the public sector. From the beginning, computer models of legislation have usually been implemented **procedurally**: applying knowledge of the law and administrative procedures, a step-by-step procedure is designed and then implemented in computer code for guiding clerks through the process of applying the legislation. The overwhelming majority of software applications for administering legislation are still implemented this way, although modern programming languages, such as Java, are replacing COBOL and new software engineering methods for modeling procedures, such as activity

[3] This is a bit of simplification, since it neglects possible distinctions between the fields of informatics, information and communications technology and computer science. We use "information science" here as a broad term covering all of these subjects.

diagrams of the Unified Modeling Language (UML), have largely replaced flow charts.

Procedural models of the law are expensive to build and maintain as the law changes. Since knowledge about the law is tightly intertwined in the procedural approach with knowledge about how to solve a particular legal or administrative task, it is very difficult to reuse models in different applications of the same law to reduce development and maintenance costs. In the 1970s, interdisciplinary research between lawyers and computer scientists began on ways to model the law and support legal reasoning, based on a deeper understanding of the law and legal processes, which overcomes this problem (Buchanon and Headrick). An active international research community, going by the name of Artificial Intelligence and Law[4], was founded and grew in the 1980s. This community, as part of the larger field of Artificial Intelligence (AI), developed methods and technologies for modeling legislation, regulations, and case law and supporting a variety of legal reasoning tasks, using rule-based systems, case-based reasoning systems and other AI methods.

In the mid 1980s, the first prototype legal applications of rule-based systems for public administration began to appear (Sergot et al.). Initially these were often called legal expert systems, because the focus was on modeling the expertise of legal experts. Today the broader term legal knowledge-based systems (LKBS) is usually used. It is broader in two ways: 1) it includes the use of all possible sources of legal knowledge, especially original, authoritative legal texts, such as legislation and case law, in addition to the commentary or opinion of legal experts; and 2) it includes all ways of modeling legal knowledge using computers, such as a case-based reasoning methods or so-called neural networks, in addition to rule-based technology.[5]

The first production applications of legal knowledge-based systems for public administration began to appear in the late 1980s and early 90s. The Australian company SoftLaw, for example, was founded in 1989. SoftLaw's entire business is based on "the provision of its legislative rule-based technology, STATUTE Expert, and related methodologies and services … to test, capture, execute and maintain the complex legislative and policy rules that are used by government and regulatory agencies to administer government programs".[6]

One of SoftLaw's first production applications was a rule-based system for the Australian Department of Veteran's Affairs, to help administer the entitlements of veterans to pensions and other benefits. An independent audit of the agency's performance had shown that decisions were often highly inconsistent, lacked adequate grounds or justification or incorrectly calculated entitlements. These quality issues

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[4] The leading international organization in the field is the International Association for Artificial Intelligence and Law (IAAIL), which organizes the International Conference on Artificial Intelligence and Law (ICAIL).

[5] Recently some people have begun to use the "legal knowledge systems". For example, the yearly conference of the JURIX Foundation changed its name from Legal Knowledge-Based Systems to Legal Knowledge and Information Systems in 2000. The name Legal Knowledge Systems broadens the field to also include legal applications of knowledge management methods and technology and helps to emphasize that these systems are not only **based** on legal knowledge, but comprehensively support the acquisition, use, structuring, dissemination, and maintenance of legal knowledge.

[6] http://www.softlaw.com.au/content.cfm?categoryid=1

were the primary motivation to reform the process using legal knowledge-based systems. In addition to resolving these quality problems, SoftLaw claims the use of LKBS led to an 80% productivity increase.[7]

Although there are different approaches to building legal knowledge-based systems, at a certain level of abstraction they all have the same basic architecture and share the same set of features compared to the conventional, procedural approach to building legal decision-support systems (Fiedler). The basic LKBS architecture is shown in Figure 2.

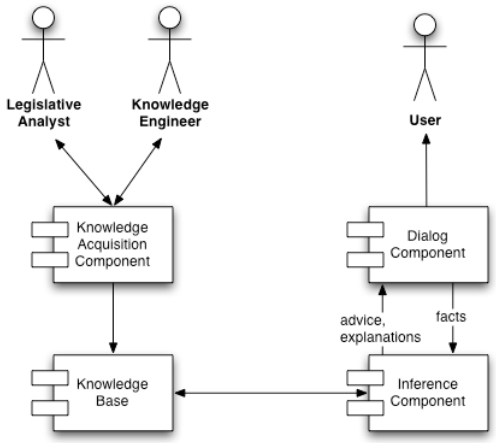

Fig. 2. Architecture of Legal Knowledge-Based Systems

As shown in this figure, an LKBS consists of four main components:

- The **knowledge acquisition component** is a specialized kind of computer-assisted software engineering (CASE) tool and integrated development environment (IDE) for legal knowledge-based systems. Notice that CASE and IDE tools are integrated in the LKBS methodology. As in model-driven architectures (MDA), the executable application is generated automatically from its design; rather than programmed manually. Ideally, models of the law and regulations are cleanly separated from procedural knowledge about how to apply the law to solve a particular legal task. A knowledge acquisition component will include tools for separately modeling the relevant laws, task-specific procedural knowledge and related supporting documentation and a way to link these elements to define complete applications. Developing a legal knowledge base is a collaborative effort requiring software engineers specialized in knowledge-based systems, called knowledge engineers, and experts in the legal domain, such as legislative analysts. A knowledge acquisition

[7] Of course such claims should be taken with a grain of salt until they have been empirically replicated and verified by independent research.

component may provide particular support for the collaborative aspects of the knowledge acquisition process.

- The **knowledge base** component is a product of the knowledge-acquisition process. It is a declarative computer model of the selected legal sources.
- The **inference component**, also known as an **inference engine**, is the part of the runtime environment that applies the knowledge base and facts and other information provided by the user to generate questions, answers and explanations.
- The **dialog component** is the part of the runtime environment responsible for managing the interaction between the system and the user. It is responsible for keeping track of the state of the dialog, applying discourse and rhetorical knowledge so as to interact with the user in a supportive and collaborative way and translating between any formal representation languages used by the knowledge base and some natural language understood by the user. It is closely connected to the user interface of the system but not necessarily a part of it. Several different user interfaces, each with a different look and feel, e.g. for the web, various operating systems, personal digital assistants or cell phones, may be able to use the same dialog component.

The advantages of LKBS for implementing support systems for the public administration of complex legislation and regulations are manifold. Cleanly separating the model of the legal domain from task-specific, problem-solving code makes it much easier to maintain and verify the system as the legislation or regulation is amended. This reduces development costs and improves the "time to market", i.e. the time required to get the revised system up and running, making the updated service available to citizens and other "customers" of the public agency. The ability of an LKBS to generate clear explanations, with supporting references to the primary legal sources (statutes, cases, etc.), improves the transparency, acceptability and traceability of administrative decisions.

The dialog component of an LKBS provides a much more flexible form of interaction with users than conventional data processing applications. The conventional way is data driven: all possibly relevant information is collected from the user, by filling out a form, the data is then "processed" procedurally to produce an output and, finally, this output is formatted in a report. The interaction with the user in an LKBS is goal driven: the user asks a question and the system asks for only as much input from the user as required for answering the question. The user retains control of the dialog at all times. The goal can be changed. Previous answers can be modified. The user can ask why a question is being asked.

In summary, legal knowledge-based systems provides substantial opportunities to improve the correctness, consistency, transparency and efficiency of the assessment of claims, compared to conventional data processing methods.

4 Application Scenarios of LKBS for Implementing Public Policy

eGovernment applications are often categorized using a layered model, starting with the provision and dissemination of information, continuing with support for communication and collaboration between governmental agencies (G2G), businesses (G2B) and citizens (G2C), and ending with providing support for transactions. The kinds of transactions that have been put online are typically quite limited. The usual examples include applications for dog licenses, change of address notifications or the registration of business names. These are all simple or "shallow" transactions requiring little or no legal reasoning. LKBS provide the opportunity to broaden the scope of the kinds of transactions that can be brought online to include **deep transactions**, i.e. the determinative processes requiring detailed knowledge of complex legislation and regulations (Johnson), such as social security or tax administration.

Johnson identified four application scenarios of LKBS for supporting determinative processes: intelligent data collection, one-stop shops, outsourced services and, finally, self-service (Johnson).

Moving existing paper forms onto the web, using for example the Portable Document Format (PDF), is reminiscent of early automobiles designed as horseless carriages. It fails to appreciate the full potential of the new technology. The **intelligent data collection** scenario makes use of the flexible dialog component of an LKBS to provide a much more powerful, user-friendly and interactive way to collect information from a user. Since the dialog is goal-directed and problem-focused, only relevant data is collected. This enables the agency to reduce the time required of the user to provide the information or to collect more detailed, but still relevant, data without increasing the burden on the user.

The idea of a **one-stop shop** for delivering public services is to reorganize public administration by joining the front offices of various departments into a single front-office. Although this is primarily an organizational change, it is made more feasible by the use by advance information and communications technology. For example, email and other forms of computer-supported communication can be used to help overcome the increased distance between front and back offices, which used to be located together in the same building. LKBS also have a role to play here. If a one-stop shop is to be more than a pamphlet counter, it must be capable of actually delivering services and not just information about services. That is, front-office personnel must be capable of making administrative decisions requiring the application of detailed knowledge of law and regulations. Since a one-stop shop provides a wide variety of services, this is only feasible if the lack of specialist knowledge by front-office staff is compensated by the use of LKBS and other decision-support systems. LKBS empower front-office personnel to reliably make correct decisions, without specialist knowledge of legal details. This scenario changes the role of back office. Instead of processing forms to decide cases, the back office can take responsibility for developing and maintaining the knowledge-bases needed by the LKBS applications. Moreover, the shift of responsibility for processing applications and claims to the front-office frees up capacity of the back-

office to perform more extensive and thorough audits, assuring information provided by users is correct and backed by sufficient evidence.

There is a trend towards **outsourcing** public services to private companies, for example by forming **public-private partnerships**. But responsibility for determining entitlements and making other administrative decisions requiring a deep understanding of complex legislation and regulations cannot be outsourced unless there is some way to assure the personnel of the private company will correctly apply the law. Legal knowledge-based systems provide a way to achieve this. The public agency retains control over the development of administrative policy, by creating regulations interpreting legislation and modeling these regulations in the knowledge-base of an LKBS. The explanations produced by an LKBS provide an auditing trail enabling the agency to review decisions made by the private partner. Performance can be precisely monitored. New distribution channels for public services become feasible. For example, automobile dealers could perhaps process applications for car licenses, similar to the way they now serve as agents for insurance companies, and provide a one-stop shop for the "buying a car life event", including the whole package of a car, car insurance and car license. If being able to provide this service helps to sell more cars, public administration may be able to outsource this service at low cost, or perhaps no cost. This scenario would be a win-win-win opportunity for consumers, car dealers and public administration.

The final application scenario for LKBS we consider here is **self-service**, where a citizen or other user interacts directly with the LKBS, for example via a web interface, optionally with the assistance of a lawyer, tax consultant or other personal advisor. This scenario is not as novel or ambitious as it may seem at first glance. After all, citizens and business are expected to know and abide by complex legislation when managing their daily affairs. And in some cases public administration already expects citizens to process their own claims and applications, for example when completely their yearly tax returns. But LKBS makes this way of delivering services viable for a much broader ranger of determinative processes. The benefits to public agencies include a reduction in the amount of personnel resources required for processing claims, freeing up staff for other tasks, such as policy development, auditing and monitoring. Citizens too would experience benefits. They would able to process their applications from their home, at their own convenience. They would quickly obtain a decision, or at least a preliminary decision, together with an thorough and comprehensible explanation. Finally, citizens would be able to analyze the legal consequences of hypothetical situations, to help them to plan for the future. This example shows how LKBS not only can help to improve the quality and efficiency of an existing public service, but can enable completely new services.

5 The eGovernance Consortium

Although legal knowledge-based systems are a mature technology with many successful public administration applications in production use, they are not yet widespread. The main task now is to disseminate this technology with marketing activities to create demand and by helping young LKBS companies to get started and

to grow their businesses. For this reason, the FOKUS Institute for Open Communications Systems of the Fraunhofer Gesellschaft, a nonprofit association whose main mission is promote economic development by assisting companies to develop innovative products and services, took the lead in founding an industry consortium consisting of all LKBS companies in Europe. The name eGovernance Consortium was chosen, since the ambition is to eventually provide a complete and integrated portfolio of products and services supporting all phases of the life cycle of legislation.

The eGovernance Consortium was founded in October, 2003. Its founding members are:

- Fraunhofer FOKUS, Berlin
- KnowledgeTools International GmbH, Berlin
- RuleWise b.v., Utrecht
- SoftLaw Corporation Limited, London

The goals of the consortium are to promote and develop advanced information and communications technology for improving the quality and efficiency of all tasks in the life cycle of legislation, regulations and other kinds of norms. Where possible, the consortium promotes the use of appropriate industry standards ensuring the interoperability of eGovernance products and participates in the activities leading to such standards.

Further information about the eGovernance Consortium is available on the consortium's web site.[8]

6 Conclusions

Governance is a topic, not a standpoint, thesis, method or solution. Governance, in the public context, is about how to manage, direct or guide society in order to best serve public interests, i.e. to achieve the common good. Governance is a hot topic for many reasons, including the changing role of knowledge and information, a trend towards networks as an organizational form, globalization issues and, last but not least, advances in information and communications technology.

Like all the 'e' subjects, eGovernance is about applying advanced information and communications technology to improve and support all tasks in the underlying domain, in this case the governance domain.

We favor a cybernetic model of governance that places models of legal knowledge at the center of the cyclic process of policy-making, legislative drafting, policy implementation and administration, monitoring and evaluation. That is, we consider managing the life cycle of legislation as being of central importance for governance. Whereas most prior work on governance has focused on organizational or communication issues related to the trend away from hierarchical towards networked forms of management and collaboration, our approach focuses on the central role of

[8] http://www.egovernance-consortium.org/

public policy, legislation and regulations as the primary instruments for guiding and directing society.

In the context of eGovernance, this focus on the role of legislation leads to an increased awareness and appreciation of the potential of legal knowledge-based systems for governance. We are the first, to our knowledge, to have recognized this link between eGovernance and results from Artificial Intelligence and Law and hope this will lead to a renewed interest in legal expert systems by public administration.

Most efforts of public administration to bring transactions online have been restricted to shallow transactions, such as change of address notifications. Only when deep transactions are supported, i.e. those transactions requiring the application of complex legislation and regulations, will the full potential of information and communications technology for improving the correctness, consistency, transparency and efficiency of determinative processes of public administration be realized. Legal knowledge-based systems provide the most advanced and effective technology for realizing this potential.

Possible topics for future research include applying business process re-engineering methods to analyze the organizational implications of legal knowledge-based systems. How is the distribution of roles and required skill profiles affected? Can the efficiency and productivity increases reported in the literature be explained and confirmed? Another topic concerns possible dependencies between the complexity of legislation and legal knowledge-based systems. Is there a danger that the use of legal knowledge-based systems might exacerbate the trend towards ever more complex legislation? Or can the quality of legislative drafting be improved using LKBS methods, resulting in simpler, clearer laws and regulations?

Now that legal knowledge-based systems have been successfully deployed in a number of important production applications by public administrations in Australia, the Netherlands, the United Kingdom and the United States, and a small but growing LKBS industry has emerged, there is every reason to believe that the time for a rapid adoption and expansion of legal knowledge-based systems in public administration has come.

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