KNOWLEDGE IN E-GOVERNMENT

Enhancing Administrative Processes with Knowledge

Maria Wimmer and Roland Traunmüller

*Institute of Informatics in Business and Government, Johannes Kepler University of Linz,
Altenbergerstr. 69, 4040 Linz, Austria*

Abstract: With the emergence of e-government and a novel concept of governance the role of knowledge has become dominant. Building a modern administration with new patterns of cooperation means that the redistribution of knowledge has to be designed and orchestrated carefully. This corresponds to the concept of “knowledge enhanced Government”. In the public realm there is cosmos of knowledge repositories and a plenitude of diverse processes. Thus, understanding the knowledge part in administrative processes is a must. This contribution investigates knowledge aspects in e-government and gives a survey on relevant knowledge issues in the public sector. Based on the comprehension of public sector knowledge, examples are considered where administrative work is enhanced with knowledge. Examples of such intelligent e-government processes are given in the second part of the paper: data interchange in routine processes, policy making and citizen advice. Next step of knowledge enhancement in e-government is to seamlessly interweave human and software expertise.

Key words: e-government, knowledge management, frameworks, e-governance, public services

1. KNOWLEDGE IN GOVERNMENT AND PUBLIC GOVERNANCE

1.1 Integrating Government and Public Governance

The issue of public governance draws more and more attention. Also the views about Government become broader and comprise legislature, executive and judiciary as well as sustaining democratic deliberations. The notion includes democratic policy formulation, citizen involvement, the execution of policies and the evaluation of their results so as to improve future policy making. In the same line goes the growing interest in e-democracy and e-voting. This has led to a broader scope regarding the whole governance cycle.

Further, the standpoint of governance is a necessary counter-position to the service view. The State is to be considered as one of the largest organizations to be managed and governed. Yet all too long, administration's activities have been subsumed under the header of public service provision respectively. This is surely not the case when the State collects taxes and when traffic wards issue parking fines. One has to recall the principal rationale: the activities of diverse branches of government (legislature and the judiciary included) contribute to the balancing of societal interests and maintaining the stability of patterns of societal life. This is reached often by using authority and by the state monopoly of legitimate use of physical coercion. Public governance is the underlying principle guiding and ruling government activity in general.

1.2 Knowledge is key in Government and Governance

Exerting authority and control can be understood as cycle. Viewing governing as cybernetic model has been widely used as it is a good means for explaining control in government and administration. Control loops can be visualized in the following way: starting with observing a specific domain and gathering of administrative data, then comparing incoming data with values provided from norms set, and subsequently turning to appropriate actions in order to control the events in the domain.

In reality, countless cycles exist - in parallel, nested, on diverse levels. But one fact is in common: for every cycle, informational input is the key for action. In this connection, one has to recall the breadth of Government and Governance to imagine maze of cybernetic feedback. And all these loops have one goal - ensuring social stability. Government has to guarantee (and

enforce) a well-organized, structured and safe society as well as standards of quality of life within a common culture and society. Basic goals of its action include: proper functioning of legislation and jurisdiction; promotion of economic development; protection of principles of civic rights; preservation of nature; emergency management, etc.

The goals to be attained are set politically and they are partly rooted in the national constitution. Managing the implementation of these goals and the assessment of success thereof is a responsibility and activity of public governance. As such, public governance can be understood as governing and managing a society via the instrument of government, i.e. the implementation of goals. Sometimes, goals are ambiguous and even in contradiction with other goals, yet public governance has to cope with that.

As a matter of fact, Government and Governance as a whole can be understood as a large knowledge-intensive organization. Public agencies host a particularly high percentage of professionals and special staff who command important domains of knowledge-based activities, especially in ministerial departments, in the judiciary, and in regulatory agencies. Many public organizations are chiefly “intelligence organizations” and officials can be considered as knowledge workers par excellence. Complex decisions are particularly knowledge demanding. Decision making is a public official’s daily bread. For any agency, its specific domain knowledge is an asset of key importance.

2. MAKING KNOWLEDGE WORK

2.1 A must from the point of demand

From the point of demand prospects for knowledge management in e-government are remarkable. Ultimately, a better management of knowledge will lead to forms of “smart government”: Knowledge derived from previous action or gained through policy evaluation will be fed back into policy making in an attempt to improve and better target policies.

Knowledge Management aims at managing knowledge distributed within and outside an organization with the purpose to establish an organizational memory. This is done in a systematic way according to a lifecycle of knowledge production, integration and validation. In praxis, the development process is an ongoing and adaptive interaction with the instrument of a knowledge base. Moreover, an organized transfer of know-how, skills and expertise has to be arranged in a proactive way; a learning organization is the goal which one has in mind. Technical means for that are KMS (Knowledge

Management Systems) which integrate diverse concepts and tools. For more on Knowledge Management and KMS we refer to the literature (Borghoff and Pareschi, 1998; Macintosh et al, 1999; Probst et al, 1996; van Engers, 2001, Wimmer, 2003).

2.2 The praxis: Managing knowledge is still underrated

Turning to the public sector as application domain, one has to say that public administrations are not yet mentally prepared to that development. Crucial as it is – knowledge management is underrated in this field. There are several reasons that dealing with knowledge finds little regard: not many administrations will evaluate “their knowledge” in financial terms, others see themselves not responsible for that issue. Sometimes even a high esteem may be the cause: knowledge is seen as so high appreciated and so complicated that only someone in the higher ranks can cope with. So administrators have to become conscious that, in their agencies, respectable and extensive riches of knowledge – a real bounty of worth and benefit - is hoarded. More, administrators have to conceive themselves as knowledge workers and so, they must have concern for knowledge as an asset.

2.3 The goal: knowledge enhanced administrative processes

Building a modern administration means novel patterns of cooperation. Thereby, changing the distribution of knowledge is tantamount. In a novel concept governance and service provision have to become more intelligent. Redistribution of knowledge has to be designed and orchestrated carefully. All these facts point to the concept “knowledge enhanced Government”.

Such a new direction will engender considerable progress. In the main, the focus of attention is shifted away from a discussion of structures and processes towards issues of content. It reaches the very heart of administrative work: making decisions. The management of legal and administrative domain knowledge is becoming a critical factor in governance. Seeing governance as cybernetic model dates back to the Sixties (Luhman, 1966) and has been widely used for explaining control in government and administration. A comprehensive recent governance model can be found in (Palmirani, 2003). A deeper understanding of the connections between processes and knowledge becomes important for building of the system and design of the user interface. The next two sections dig deeper into the analysis of knowledge in e-government.

3. THE BREADTH OF ADMINISTRATIVE KNOWLEDGE: A COSMOS OF KNOWLEDGE TYPES AND REPOSITORIES

3.1 Knowledge types in administrative action

Considering the dynamics of administrative work, one may discern the environment, the own action of an administration, potential addressees, states concerning the administration itself, and the boundaries of the own action. The handling of information in the public sector deserves great care and has to be characterized through remarkable consideration. At a first glance, governmental work involves manifold types of knowledge:

- Knowledge about legal regulations and their use in administrative decision processes.
- Knowledge concerning the cases to which the actions of the administration are directed.
- Knowledge about the potential effects that the communication of an administrative act entails on the environment of the administrative body.
- This includes also the knowledge about the own resources and abilities in order to influence this environment as well as to enforce the law.
- Knowledge about the internals of the administrative system in general. This is approximately in the sense of an internal accounting and evaluation.
- Expertise knowledge when applying the general knowledge to particular cases.
- Knowledge how to protect basic citizen rights.

3.2 Knowledge in repositories

One may regard the plethora of knowledge residing in long-known procedures and existing data collections. For the latter, three clusters of repositories can be distinguish:

- *Registers*: A big amount of administrative data is stored in traditional registers covering information on persons, land, real estate, property rights, entitlements, and geographical data. Also repositories on income tax, corporate tax, tariffs, duties, excise etc. are registers that have always been basic to authorities.
- *Legal databases*: Another big realm is the legal one. The traditional way of implementing political decisions and – at the same time – of observing standards of rule of law and public safety is legislation. The legal struc-

turing of administrative work has several functions. It can be seen both as a restricting and as a guiding force. In the concept of the rule of law, norms serve to protect basic freedom of the citizenry from public interference. At the same time, legal norms are a standard vehicle of communication between government and executive agencies. Especially in continental Europe, public administrations are highly regulated by legislation which is enacted on European, national, regional and local levels. This leads to a multitude of legal databases storing a huge bunch of governmental knowledge.

- *Management information:* A further area to mention are the plentitude of repositories containing controlling and management information. Such data are mainly financial in nature; yet the traditional controlling is changing and a broader view arises. Only in coupling with other data, new planning systems are possible that cover the full domain “citizen-politics-administration”. Departing point for the development are the existing systems with major numbers of the budget, from which - over traditional procedures of the accounting - key numbers are derived. What is necessary is a connection to other tiers and the creation of new key numbers. To give an example, further data may be added to a controlling system from the environment, geographic information or also soft data from opinion polls.

3.3 Knowledge embodied in Governance

Legislation is managed and enacted on various layers. Governance on a *strategic-political layer* defines and assesses the strategic decisions using the law and regulatory instruments in the realm of politics. So the repositories of this layer comprise legal databases as well as socio-economic planning data. Implementation at the *tactical layer* is given in the way of policies (policy formulation and the managerial part of policy implementation). In concrete, it means applying the framework of law. At the tactical layer of the administrative bodies, the procedural workflow is being defined specifying (and enforcing) work processes to be performed at the executive layer. It should be mentioned that - in defining a workflow - often some de facto changes with regard to the wording of the law may occur. So in design, categories are specified and indefinite law terms are defined; hence the room for discretion becomes restricted (e.g. grades of fines are being defined, but no continuum is allowed; etc).

In public agencies, the executive staff exerts diverse actions in order to carry out the policies of the administrative bodies. The *executive layer* is the world of action and a plentitude of knowledge types is involved: laws and regulations, organization models, process models (workflow), information

objects of all kind, human resources with their skills, competencies and experiences. At the execution level, process knowledge is central and the motto is best practice.

3.4 Knowledge management in Government

Bringing together afore mentioned types of knowledge leads to rethinking knowledge distribution in a systematic way. Knowledge management in Government has to be understood as a continuous work and several tasks have to be completed such as categorizing knowledge, integration of content and planning ways of dissemination. Questions about the various knowledge sources, structures and containers are central. For domain ontology, a rich kit of methods for knowledge representation exists: taxonomies, semantic nets, semantic data models, hyper links, knowledge based reasoning, time models and process graphs. Regarding Public Administration the problem is that sizeable formalized ontologies are scarce. Administrative work, in general, lacks such precise descriptions. As an auspicious sign such activities are under way, so to mention the Power system (Boer and Van Engers, 2002) leading to MetaLex¹ and CEN activities on metadata².

Content integration has to follow meaning the tough task of connecting the countless existing data collections. Mostly a collection of rather heterogeneous data repositories is entailed that contains data of diverse type formats that are originated from different sources. Content integration engages all sorts of conventional ways of keeping data: files, databases, legacy information systems. Efforts for content integration are rather high and the basis is a sophisticated content management. Minor or major obstacles are common just as to mention rendering information visible by use of one browser for all diverse data types and formats involved. Rather problematic becomes the question of joining different content - as the semantics of data in a particular application often have been defined long time ago. Such problems accrue in automatic such as in data mining, when semantic inconsistencies in data may lead to statistical artifacts causing misinterpretations.

Disseminating knowledge means orientation towards the addressee; information on actual and potential users is necessary for a matching of offers and demands. It is a pro-active approach that is needed ensuring a sufficient flow from sources to demand. To promote this idea, the somehow placard-style notion of a knowledge pump (Borghoff and Pareschi, 1998) has been invented. For administrative data some additional questions arise: How to

¹ <http://www.metalex.nl/pages/welcome.html>

² <http://www.cenorm.be/cenorm/aboutus/information/cenproducts/index.asp>

prepare knowledge for public display? How to ensure data protection? How best present geographical databases and environmental information?

4. APPROACHING THE KNOWLEDGE PART IN ADMINISTRATIVE PROCESSES

4.1 Interweaving knowledge and processes

Administrative decision-making exhibits characteristics which depart from well-structured bureaucratic production processes. In the latter, interpretation of the law plays only a minor role whilst in a typical decision process, legal premises and knowledge holdings are brought together in ways which often defy their structuring beforehand. The legal premises are themselves objects of knowledge which apply to both, the decision content and the process structure in which the decision-making processes evolve. There is a hard-to-define relationship between law, facts of the case, knowledge about law & facts, and decision-making. This relationship has to be clarified either by a single decision-maker or in a co-operative act: Knowledge and law strongly shape the decision and the process in which the decision is reached. Also, co-operative patterns may be of importance if the decision is not taken by a single actor.

4.2 Categories of administrative processes

Administrative processes are different – so when comparing them with the common view on production processes several distinctions become visible. First of all, a huge variety of different processes can be encountered. Then, a tension exists between fully structured production processes and complex decision processes. Most actual processes fall in between these two extremes. Numerous cases exist where at the moment when a process starts, it is far from clear how complex it will eventually become. Although many ways exist in which different agencies make their distinct interventions into the social fabric. So there is a necessity for major revisions compared to conventional processes: In the case of well-structured recurrent processes an extension to open decision processes is necessary. Also negotiation and consensus building of the administrative process need a blending of procedural and collaborative work modes. In public services additional views of customers have to be added. A very coarse-grained distinction may differentiate

four basic categories of administrative processes (Wimmer et al, 2001) as shown in table 1.

The various process types identified exhibit certain characteristics with regard to the knowledge required in carrying them out. We will not deal exhaustively with all types of knowledge of some relevance for service provision and for administrative and democratic decision-making. Rather, we highlight some typical coincidences. The use of knowledge depends on the type of process. In an earlier publication (Lenk et al, 2002) we have treated typical problems arising for diverse types of processes in the context of knowledge management.

Table 1: Categories of administrative processes and related knowledge aspects

Process type	Issues in Information and Knowledge Management
Routine processes	Knowledge from interaction, citizen information; inter-change
Individualized decision making	Knowledge of law and “process memory”
Negotiations	Knowledge-enhancing platforms for group decision-making
Democratic deliberation	Basic civic information / structuring debates

4.3 The dynamics of legal knowledge

From the standpoint of knowledge, the picture of influences and transformations is amazing. In closer regarding one may start with the point that in administrative decision-making both, legal norms and a predefined schedule guiding the course of administrative processes, play an essential part. With respect to law this may be seen evident, as it is the basis concretizing administrative decisions; concerning the process the workflow is dominant. But both influence each other and one sees an interwoven fabric of regulation, process and knowledge. Legal knowledge exerts multiple and dynamic influence in administrative processes. In several ways, e.g. consensus seeking or using earlier decisions as precedence for later ones, even feedback loops are created; thus legal knowledge is both, influencing and becoming influenced. The influences occur in multiple forms – sometimes stamping, sometimes subtle: yet their comprehension is necessary for the sake of achieving a good design. Some interdependencies between processes, regulations and knowledge are sketched next in outlining some influences (Lenk et al, 2002):

- Almost all processes are shaped by legal rules; in the regulations there are parts defining the (workflow) routing of documents and the course of decisions within the workflow systems.

- Consequently, the external structuring of the flow is derived from the legal regulations in general as well from the particular procedural rules valid for a certain agency.
- Forms intertwine processes and data and so exert a substantial influence. Part of the influence is effected by stating, which pieces of information are in and which are out (*quod non est in actis non est in mundo*).
- In some cases, also the material contents of the legal norms might determine the flow prescribing, which particular expert persons or agencies are to be involved.
- Such demands make the process open leading to the creation of a “process memory” (which later on might influence the course of the process).
- Also general legal requirements such as data privacy or the request for transparency may have a specific influence on the definition of the workflow.
- The mutual influence between process and law can be very subtle. With the modeling of an administrative process, inevitable ambiguities in regulations must be cleared.
- In establishing a workflow, discretion rooms are limited in multiple ways: giving categories, declaring default variables, encircling indefinite law terms; substituting them by defined types.
- An additional mutual interdependence is given by the fact that every agency tries to edit decisions that are in some way consistent.
- In that way, former decisions influence later and discretion rooms are limited. Such limitations may be given in a direct form by guidelines, yet, may also occur when glancing at former decisions.
- It is a mark of consensual procedures that collaboration is high. So in an actual procedure, convergence of opinions will come through an internal discussion of the civil servants.

4.4 Decision taking - the essence of the procedure

Decision taking is what knowledge is aimed at. Generally speaking, administrative decisions are the result of combining factual and legal information in more or less well structured processes. Here the ambiguity of the term “decision” should be mentioned denoting choosing particular options per se as well as processes of such choice acts. A decision can be seen as the result of using different pieces and different types of knowledge. The focus on decision making determines the whole process.

In administrative decision-making, formal and material factors combine: formal structures depend on administrative procedures whereas the content of the decision is influenced by legal norms applicable to the specific problem domain. In addition to legal interpretation, handling individual cases is

characterized by a higher degree of communication with certain dynamics. Taking building permits as examples: On the whole, there is no routine: much legal interpretation becomes necessary and communication becomes intense. The big difference to the recurring and well structured processes is that, at the beginning, the process sequence is not always foreseeable.

One has to discriminate the single steps within the process and one has to be well aware that decisions are made at the very steps of the process. Some may be trivial or automatic in nature, other need enormous effort: steering the process, gathering pieces of information that are required, knowledge exchange in collaborative modes, the decision taking part per se. These different steps are also reflected in the use of diverse tools: tools may sustain the decision taking part by itself by modeling (expert systems, software agents etc.), other tools necessary managing knowledge repositories (e.g. databases and document management systems) or support collaborative problem solving (argumentation systems such as Issue-Based Information Systems (IBIS)). Further tools are still in their infancies yet will become important such as to mention support for categorizing, retrieval and navigation with advanced systems for categorization, fuzzy retrieval and case based search.

4.5 Decision taking seen as knowledge interaction

In an attempt to develop a comprehensive concept for understanding the various kinds of knowledge in the public sector, the authors suggest a three-layers concept as depicted in Figure 1. This view on e-government reflects many knowledge aspects which are combined to reach the intended goals.

Figure 1. Three-layers concept of knowledge identification

The conceptual layer (knowledge types) provides a general distinction on three different categories of knowledge: process, context and object knowledge. The interaction layer discusses the combination of different knowledge categories according to the systemic view on a productive process. We understand that knowledge is embodied in different types of artifacts that interact to perform a specific process. The representation layer treats aspects of knowledge reflected in different knowledge carriers and how these components are interwoven. Such knowledge carriers may be IT systems, where knowledge is embodied in workflow systems, information systems, specific application systems, databases, controlling systems, management information systems, etc. Equally to knowledge in IT systems, knowledge is available in people's minds and in physical and abstract artifacts belonging to the system. From the people's point of view the third layer of Figure 1 comprises specific know-how, expertise, skills intuition and information. Putting focus on material and ideal artifacts, manuals, equipment, formal rules and laws etc. would be reflected. In a holistic view, the layered concept can be considered as a three-dimensional space addressing on one axe the three different layers, on the second axe the different types of knowledge and on the third one the different knowledge stakeholders: people, IT systems and other material and ideal artifacts belonging to the productive system.

It is the interchange between the conceptual layer of knowledge types and the knowledge representations that attracts our attention, because an adequate mapping of knowledge concepts and flow of knowledge is a prerequisite for attaining a proper functionality of the system. Key traits of knowledge types and knowledge stakeholders mark and emboss the interaction in the interaction layer. In that way, a determining influence is exerted with broad effect: on the particular tool, on the interoperability of tools and on the way tools are used in co-operation. A further strong influence between the layers is that a highly achieved functionality has always a history of adapting and tuning, i.e. a dynamic evolution of knowledge is an important matter.

Exemplification of knowledge embodiment in administrative action will ease the understanding of knowledge in e-government. Three examples are provided in the next sections: routine processes, policy making and citizen advice.

5. MODELLING LEGAL KNOWLEDGE FOR DATA INTERCHANGE

5.1 Turning to particular examples illustrating knowledge enhancement

Now we turn on discussing three particular points where legal/administrative knowledge comes in. First example shows that even for rather apparently unglamorous routine processes modeling knowledge is a prerequisite because data interchange of administrative information is far from being trivial. Further examples treat the knowledge part in processes of planning and policy making and show how knowledge enriched public services may improve citizen information.

The first example focuses on the embedding of legal/administrative knowledge for automatic data interchange. The way towards standards is via legal ontologies. If one compares the public and the commercial domain one can see both, differences as well as commonalities (Wimmer, Traunmüller, Lenk, 2001). The later ones occur at the technical level; at the application level, the complexity may significantly surmount the private sector. All in all, standardization has to be seen with a broad focus including several issues: establishing a common understanding of processes, while building on widespread administrative concepts, ensuring interoperable platforms, having a workable administrative domain ontology, defining formats for data

interchange. Standardization is an enormous task yet from its accomplishment, all partners involved will gain

The core of the problem is not on the technical level, it is at the conceptual level as one has to capture the semantics of legal-administrative concept and norms. It is the characteristics of a web that data that formerly have been used locally before these have become used globally. It becomes necessary that data carry along their specific legal-administrative context. So there occurs a lot of automatic data interchange when regarding a case (e.g. civil marriage) handled via online one-stop Government.

5.2 Standards for data interchange

So for the life situation of a civil marriage, many transactions and numbers of repositories are involved. They may be dispersed over many locations under the competencies of diverse agencies and residing on several systems. Before the event takes place, several documents located in different agencies have to be checked; afterwards, a lot of updates have to be sent (change of name, civil status, common domicile) to documents that are also distributed on diverse locations. Interstate e-government makes the example even more complicated. One may imagine the case of two persons with different citizenship marrying in a third country. For the aim of maintaining a smooth running of system, interchange has to be done automatically. Such an automatism is only possible if both, semantics and rules, are in the systems.

On closer inspection, one can see that standards are not a technical problem only; moreover it is an issue of accountability and privacy as well. In some way releasing data can be seen similar to opening Pandora's box. As often the data are sensitive releasing data in the custody of an agency has to be founded trust in a reliable system preventing misuse. To say it frankly: standards are a core issue from many aspects. In fact, the initiatives and projects of the European Union have spurred a lot of discussion on this topic and one can be proud on the progress already achieved; nevertheless – it is still unfinished business.

5.3 Defining standards – an exercise in knowledge engineering

Standardization has to be seen with a broad focus. Ensuring interoperable platforms and defining formats for data interchange are one part; establishing a common understanding of administrative concepts and processes is another. Standards at the technical level are often common to the public and

the commercial domain, but vexing problems are posed by standards for a multitude of applications which imply forms of interaction between human actors and software which are extremely manifold. Standardization is an enormous task and sophisticated domain knowledge is indispensable for their development. From its accomplishment, all partners involved (public agencies, software industry, private companies) will gain in the long run.

There is a long history of data interchange with EDI as most renowned pioneer. It has enabled smooth computer-to-computer exchange of standardized information items and of transactions, yet demands on description have grown. So current interest points at other exchange features such as extensible markup languages together with resource description facilities (XML and RDF). With them it is possible to build standards for rather complex structured concepts. So it becomes the basis for a Governmental Markup Language (GovML)³, i.e. a language for defining administration specific content. Such a language has to provide a common, flexible and extensible syntax for administration-specific content. Other attempts such as the standardization activities from MetaLEX and CEN are cited in section 4.3.

However, defining legal concepts is not easy due to the inherent intricacy and complexity of law. So troubles start on the basis with legal terms themselves that all too often are not adequately defined. This is due to several reasons: vagueness that may be on purpose, genuine inconsistencies and fuzziness, dynamics in law, planned discretionary power of street level bureaucrats etc. Further, mapping administrative semantics is full of more or less inhibiting difficulties: profound differences in legal systems, adequate meaning of terms, different connotations of terms and non-existence of counterparts.

6. PLANNING, POLICY MAKING AND ADMINISTRATIVE KNOWLEDGE

6.1 Planning and policy making

Policymaking is normally taking place through multiple processes of negotiation, ranging from cooperative search for acceptable solutions to outright clashes in interests. Decision making in public policy is a process

³ GovML has been defined in an EC-cofunded Project called eGOV (an integrated platform for realizing online one-stop government), <http://www.egovproject.org/>, the Governmental Markup Language is described in Deliverable D231

which more often than not is characterized by a mix of commonality in interest and struggle. It is rarely abiding to well-behaved teamwork.

The amount of negotiations, their length, as well as the amount of parties they involve seem to be constantly increasing. Many negotiations in public policy span organization boundaries. The classical policy triangles involving parliamentarians, administrators and field representatives has emerged to a net. The negotiated character of policymaking becomes apparent in all phases of the policy process, even in as early phases like information collection and analysis.

Mostly taking decision is characterized by a mix of commonality in interest and struggle. One type may resemble a litigation process with clear-cut roles of opponents acting in a quasi zero sum game. Labor relations and international conflict are often of this type as are many judicial processes. In other cases, positions may seem contradicting at first glance, but a skilful mediation process might lead to an acceptable compromise. Town and regional planning provides ample evidence for conflicts, which may be resolved in that way. Related to this is enhancing democratic participation in planning processes and other decision making which can be achieved in reasonable time frames through better support. Parliamentary commissions are another case in point. Other types of negotiations have the goal of achieving a common strategy such as it may be the case in a board meeting. At the implementation level, policy negotiation may also occur, although strategies are given. Also discretionary behavior of street level bureaucrats is normally accompanied by negotiation with clients.

6.2 Knowledge used in planning

Supporting the most various settings in which planning and policy deliberations take place is a must. It goes in two directions, bringing in the knowledge and sustaining the cooperation. The amount of knowledge used in a concrete planning decision is mostly extensive. There is a high dependence on organizational goals and on the situation. Some aspects are listed below:

- Pending tasks and general expectations about them
- Situation of the institution and the world outside
- Key numbers from controlling and result of evaluation and inquiries
- Expertise gathered from operating processes and handling citizen contacts
- Stakeholder in decisions (institutions and persons) and their interests
- Discretion for actions given by legal rules
- Familiarity with the organization, its structures, personal compositions and traits

- Possible procedures and directives, grip on resources
- Control of effectiveness and monitoring of directives
- Anticipating the effects of decision options
- There is a rich collection of instruments for support:
- First and foremost, tools should sustain the decision taking part by itself by modeling (expert systems, software agents etc.).
- Other tools necessary in decision taking manage knowledge repositories (e.g. databases and document management systems)
- Important is the support of collaborative problem solving (argumentation systems such as Issue-Based Information Systems (IBIS)). Mindmaps and semantic nets are graphical means to be used as well.
- Further tools are still in their infancies yet will become important such as to mention support for categorizing, retrieval and navigation with advanced systems for categorization, fuzzy retrieval and case based search.

6.3 Sustaining cooperative decision making

What has to be sustained is cooperation in the broad. Support of computer-mediated cooperation in a comprehensive sense means sophisticated tools, multi media and video-contact become a must. First, the meeting activity per se may be performed via video techniques – so economizing on travel costs and time. Next, many activities associated with meetings can be largely improved by tools using multimedia. Examples are plentiful: clarifying procedural questions; scheduling of meetings and implied sub-activities; supporting the agenda setting and spotting experts. Special software may assist in brainstorming sessions and structuring issues as well as bringing material such as geographical information. Many attempts can be found under the label of computer supported cooperated work (CSCW) as well as E-Democracy applications using group decision and mediation systems (Gordon and Märker, 2001, Märker and Trénel, 2002, Paralic et al, 2003, Richter and Gordon, 2004).

7. IMPROVING INFORMATION FOR THE CITIZEN

7.1 Poor usability means poor uptake

Common experiences show deficiencies in usability of public services. The typical interaction process on the Web revealed harsh insufficiencies.

Users were unable to cope with the logic of administrative thinking and did not comprehend the legal language. What the users lack in particular is a customized assistance, i.e. help that meets the individual situation and competence. Giving mere textual information does not suffice, information has to be “palatable” for citizens. A priority request is to translate the demand for a service from the citizen’s life-world to administrative terminology. This is part of a very common conflict situation: an urgency of a citizen’s request and the limited explanatory capabilities of the system to provide the necessary in-depth explanations in an unambiguous way.

7.2 Knowledge enhancement

Thus usability becomes a main concern and improvements go several ways. Some are less spectacular as building on past experience and applying common sense. So even plain rules will contribute to usability such as “Less is more” and “Keep it straight and simple”. But there are complicated interaction processes needing a deeper analysis. So design may use several means, mostly it means putting more intelligence in the application. Such knowledge enhancement is particularly necessary when legal information is presented. There are too many users who are neither familiar with concepts of law nor with the logic of administrative thinking. They need active help in finding the information items they are searching for. This means translating demands of the everyday-world in the legal-administrative jargon and vice versa. Legal information touches some matters of principle, as the law as a citizen right has to be promoted as a matter of principle. Further, an active participation of the citizens in democracy can only be achieved on the basis of knowledge.

In praxis, several modes are viable for improvement. One would construct clarifying dialogues, and describe illustrative scenarios. Also detailed knowledge (on both, on the field in question and on the interaction) can be embodied in software agents. All this works in actively helping users in accomplishing their tasks. Finally, very advanced future design will result in intelligent multi-lingual and multi-cultural personal assistants being integrated in electronic public services portals. So we will consider several task with high potential for improvement.

7.3 Offering an integrated access management

An integrated access management has to adapt to diverse preferences: some persons may stick to writing letters; others might transfer the dominant written mode from mail to Internet; numerous citizens want to personally expose a problem to an official; some do it during an actual visit and others

via a multimedia linkage. No wonder that the following become crucial points: how is the actual access point arranged in its physical setting and how is the organizational framework. So the delivery of services may be provided in various forms such as:

- Municipal neighbourhood one-stop offices functioning like miniature town halls;
- Multifunctional service centres working like a travel agency (offering public services as well as commercial services like insurance or banking);
- Virtual offices, where several formally independent agencies are made to appear as a single one. Citizen entering would get immediate access to the services of all agencies.

7.4 Taking care of the routing part

One of the first steps is to route automatically to relevant knowledge repositories or to the agency with competencies in the legal sense. The concrete target may be diverse: a plain database, a sophisticated software, a staffed service center or an official in a particular agency. An annotation should be made that demands of the agencies have to be considered as well: offering access options and rights, indexing and profiling, providing assistance in tracking etc. From a technical point of view various means are possible such as comparing keywords of requests or evolving scenarios of life situations. Also avatars should be mentioned with their capability for guiding user. Further meta-dialogues aiming at structuring tasks and artifacts in communication are important. A core problem of routing is that formalized ontologies are scarce.

7.5 Adequate interaction in public services

Citizen services have to be viewed in as an interaction between agencies and citizens somehow resembling the world of Commerce. Schmid (1999) has defined a Business Media Reference Model pointing out the different phases of transaction in both, e-commerce and e-government. It has been adopted by adding an aftercare phase:

- Information: This phase deals with providing necessary information to customers. This includes push- and pull-services, adequate representation on the web, search mechanisms etc.
- Intention: This phase covers the representation of supply and demand. In the case of e-government, this means that it should be easily possible for the customers to map their intentions to the offered services.

- Contracting: The agreements taken in this phase have to be in a form that it is clear for both parties, what they want and what they are obliged to do. Since the contract that is signed here is obligatory, this phase includes the problems of the identification of persons and the authenticity of documents.
- Settlement: In this phase the agreements of the contract are realized. This includes exchange of goods, money, documents and/or information.
- Aftercare: Claims-management, caring for the client as well as a feedback on the quality of service deserve special attention.

7.6 Invoking human expertise

After the routing of the demand according to administrative competencies as next step advice capability comes in focus. A lot of improvement is possible with minor resources and in small steps: working on better comments, drawing clearer scenarios, adding help-functions. Giving the complexity of the field, there is need for substantial improvements as well. So intelligent pieces of software may act in performing clarifying dialogues. One could also envisage service portals which comprise intelligent multi-lingual and multi-cultural personal assistants.

Given the complexity of cases, a purely software driven solution for advice is not an ideal option. Indeed in the public sector, many situations exist that require the intervention of a human mediator:

- Mediating persons at the counter of public one-stop-service shops improve their capability for advice by using the system. For the designer, this means not only to focus on the citizen but to regard also the people behind the counter.
- Remote expert know-how is accessible when needed for a specific case. Such expert dialogues may be enabled via advanced multimedia technology.
- With mediating persons and remote experts themselves using knowledge repositories ultimately human and machine expertise become totally interwoven. This is knowledge enhancement at its best.

8. OUTLOOK: CONFIDENCE AND CAVEATS

Closing a tour d'horizon on the enabling capabilities of Knowledge Management one comes back to the point of departure: Will Government use the potentials offered by concepts and technology? Let us mention some of the plentiful opportunities:

- providing proper information for planning and achieving better decisions;

- better information and services for citizens;
- civil servants empowered to improved work;
- surmounting organizational boundaries of public agencies;
- tailor-made service delivery for citizens or companies;
- citizen feedback as part of quality-oriented policies;
- measurable effectiveness and quality of public interventions;
- stakeholder participation in zoning and planning processes.

The crucial point in this question is not the state of technology; it is the state of awareness and concern of the leading administrators, of those who have to blaze the trail in the right direction. They have to be convinced: it is knowledge that they need for accomplishing their professional task. At the moment mixed signals are coming in. There are encouraging pilot applications, yet for administrative practice change is slow. Thus knowledge and change management become the keys to success. Only so the public sector will make a leap in innovation.

REFERENCES

- Boer, A., Van Engers, T. 2003. A Knowledge Engineering Approach to Comparing legislation, in: Wimmer, M. (ed). Knowledge Management in Electronic Government, Springer-Verlag, Heidelberg.
- Borghoff, U.M. and Pareschi R. (Eds.). 1998. Information Technology for Knowledge Management, Springer Verlag
- Gordon, T. and Märker, O. 2001. Mediation Systems, in: Hilty, L. and Gilgen, P. (eds.). Sustainability in the Information Society, Metropolis Verlag, Zürich,
- Lenk, K., Traunmüller, R., Wimmer, M. A. 2002. "The Significance of Law and Knowledge for Electronic Government", in Grönlund (ed.), Electronic Government - Design, Applications and Management, Idea Group Publishing, Hershey, pp. 61-77
- Luhmann, N., Recht und Automation in der öffentlichen Verwaltung, Berlin: Duncker und Humblot, 1966.
- Macintosh, A., I. Filby and J. Kingston 1999. Knowledge Management Techniques: Teaching & Dissemination Concepts. International Journal of Human Computer Studies (Special Issue on Organizational Memories & Knowledge Management), vol. 51, no. 3, Academic Press.
- Märker, O. and M. Trénel, (eds.) 2002. Online-Mediation. Neue Medien in der Konfliktvermittlung - mit Beispielen aus Politik und Wirtschaft. Berlin, Edition Sigma.
- Palmirani, M. 2003. Role of the legal knowledge from e-Government to e-Governance. in: Palmirani, M. and Traunmüller, R. (eds.). E-Government: Modelling Norms and Concepts as Key Issues. CIRSFDI, Bologna.
- Paralic, J., Sabol, T., Mach, M. 2003. First Trials in Webocracy. in: Traunmüller, R. (ed.). Electronic Government. Springer-Verlag, Heidelberg.
- Probst, G.J.B., Raub, S. and Romhardt, K. (Eds.) 1996. Wissen managen: wie Untemehmen ihre wertvollste Ressource optimal nutzen (2nd Ed.), Gabler Verlag, Wiesbaden
- Richter, G. and Gordon, T. 2003. DEMOS – Delphi Mediation Online System, ERCIM News No.48, January 2002

- Schmid, B. 1999. Elektronische Märkte - Merkmale, Organisation, Potentiale. In Hermanns, A; Sauter, M. (Eds.), *Management-Handbuch Electronic Commerce*, München: Vahlen
- Van Engers, T. 2001. *Knowledge Management*. Belastingdienst. SIKS, Amsterdam.
- Wimmer, M. (ed.). 2003. *Knowledge Management in e-government*. Proceedings KMGov 2003. Springer Lecture Notes #2645, Heidelberg et al.
- Wimmer, M., Traunmüller, R., Lenk, K. 2001. Prozesse der öffentlichen Verwaltung: Besonderheiten in der Gestaltung von e-Government. In Horster (Hrsg.). *Elektronische Geschäftsprozesse: Grundlagen, Sicherheitsaspekte, Realisierungen, Anwendungen*. it Verlag (IT Security & IT Management), Höhenkirchen, pp. 436 – 445
- Wimmer, M., Traunmüller, R., Lenk, K. 2001. Electronic Business Invading the Public Sector: Considerations on Change and Design. Proceedings of the 34th Hawaii International Conference on System Sciences (HICSS-34), Hawaii