Loge-expert:
From a Legal Expert System to an Information System for Non-Lawyers

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Introductory remarks

1. Law is more than statutes or Court decisions. Statutes and Court decisions constitute the written expression of a legal system, but a legal system is driven by actors who deploy explicit and implicit principles and rules which give diverse meanings to statutes and decisions. To be accurate an expert system in law must take this characteristic into account . This, however makes it much more complex to build.

2. A second consideration respective to expert systems in law is that they should be formulated to clearly pecify who the end user will be. Building an expert system in law for legal expert users is different from building it for laymen users.

3. A third consideration should focus on the purpose of an expert sytem in law. Is it designed for legal decision-making for legal problem-solving or for the dissemination of legal information? These do not present the same challenges and the choice should be made clear at the start.

Our experiment in developing Loge-expert, an expert system in Québec Housing Law, gave us the opportunity to deal with these considerations. Since a small scale model of Loge-expert is now ready to be tested in the real world, we are interested in sharing the observations we have drawn from its development and elaborating the direction we are now following in order to fulfill our initial aims.

In our paper we will first present what Loge-expert is. Secondly we will point out the limitations of Loge-expert and the solutions we are working on to overcome them.

1. Loge-Expert: an expert system in Québec Housing law.

When we started developing Loge-expert, we made three fundamental choices:

       - It would be documented with multiple legal sources;

       - It would be oriented to the layman user;

       - It would be oriented.to the dissemination of legal knowledge.

Before elaborating on the consequences of these choices, we will describe the legal field in which we are working. We will conclude this first part with some evaluative statements about Loge-expert.

1.1 The legal domain: Québec Housing Law.

1.1.1 Description

Why have we chosen the field of Québec Housing Law? It is not a traditional field, but rather a new branch of law which has grown in Canada, as in many other countries, since the Depression and World war II compelled governments to take legal measures to keep the housing supply at a sufficient level and to prevent abusive tenant evictions. In Québec, most of the legislative provisions have been adopted over the last twenty years.

Since this legal field is a new one, the people it is supposed to protect need to learn about it. We intended to experiment with expert systems technology in order to facilitate the dissemination of Housing Law knowledge among the general population; but Housing Law is a heterogeneous legal domain which includes contract law as well as property law provisions. It focuses on housing and creates horizontal cut into vertical well delimited legal field such as property law, contract law, tort law, company law, public housing law and building regulations.

Our initial aim in developing an expert system in Housing law had to be tailored to manageable dimensions. Among landlord and tenant relationships which belong to contract law (the residential lease in Québec's legal system), we have selected the more specific question of repossession of rented premises .

The right to repossession of rented premises is recognized for residential landlords by articles 1659 to 1659.8 of the Civil Code of Lower Canada. These articles set limits to its use by landlords in order to give effect to the opposing right of tenants to stay in the premises, which is established by article 1657 of the same Code.

Loge-expert will then be mainly consulted in conflictual situations where tenants and landlords disagree and are looking for legal advice.
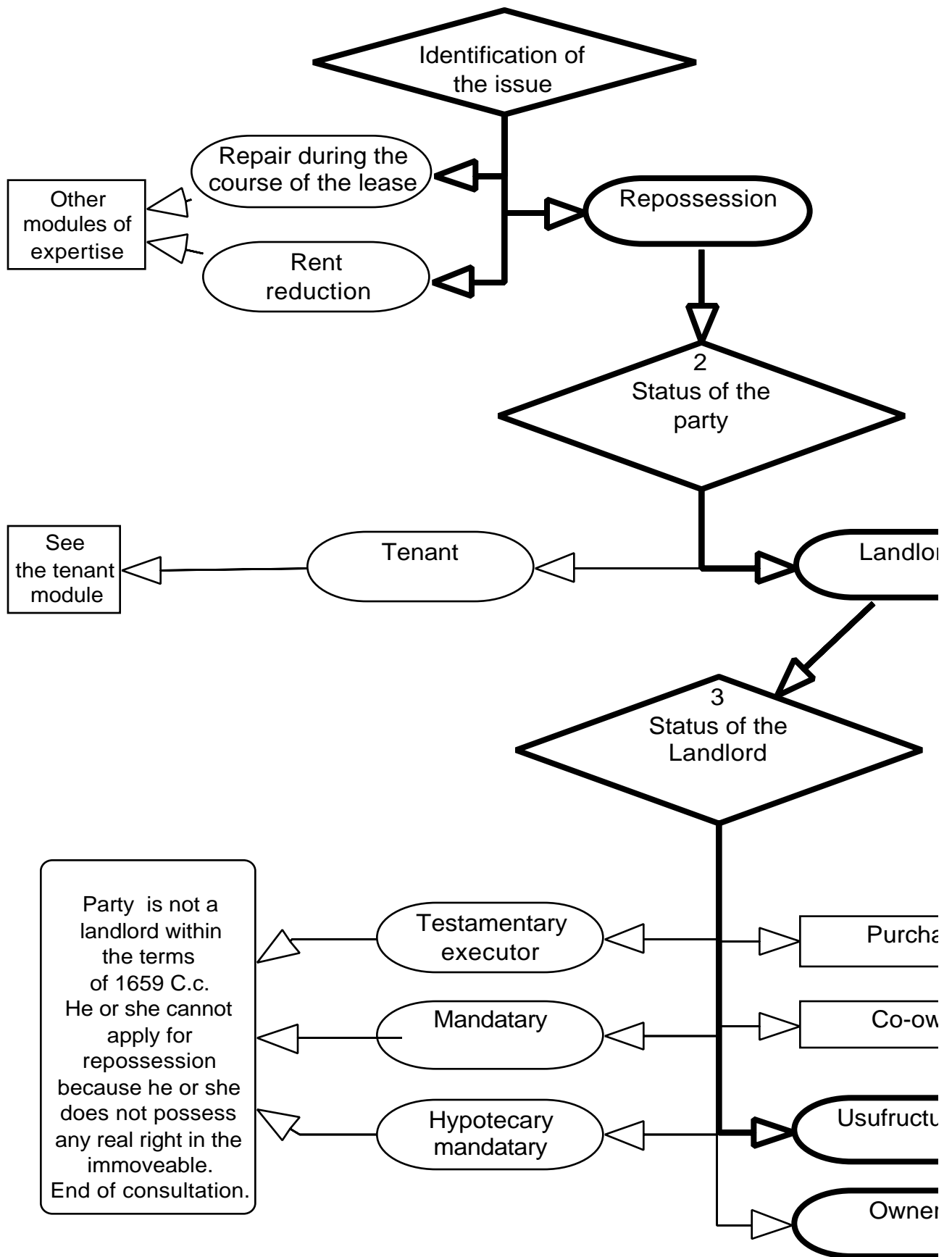
1.1.2 Formalization

The formalization of this specific and limited legal question into the Loge-expert knowledge base has compelled us to modelize the relevant legal dispositions expressed in the Civil Code of Lower Canada . As we will explain later,however, we have validated this modelization by refering to significant tribunal decisions and legal doctrine.

Within our case under dispute approach (see 1.4), we have first modelized repossession from the standpoint of a landlord. As Kowalsky and Sergot (1989) have suggested with logical models of laws, we were able to use this modelization again, in part, when we redid the formalization from the tenants' point of view. For example, from the standpoint of a landlord, the categorization of the kind of "landlord" in the case at hand has a very important effect on the outcome: the right to repossess. For our purpose, the seven kinds of landlords that we had identified from our examination of law, decisions and practice had to be scrutinized before we could tackle any other tasks in the chain of resolution. Then, from the standpoint of a tenant, the same categorization of "landlord" had to be done after other steps were filtered in order to check if the "landlord" is entitled to send a repossession notice to the tenant.

In order to modelize the legal question of repossession in a more efficient way, we have broken it down into specific modules such as: the landlord module, the tenant module, the purchaser module, a procedural module, and so on.
Figure.1 shows the final configuration of our modelization of repossession. We had the opportunity of elaborating this stage of our work in former papers (Thomasset,1989; Thomasset, Blanchard, Paquin, 1990 b).

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                    ◇ Identification of
                      the issue

    Repair during the
    course of the lease            Repossession

Other
modules of        Rent
expertise        reduction

                              ◇ 2
                                Status of the
                                party

  See
the tenant        Tenant              Landlor
module

                              ◇ 3
                                Status of the
                                Landlord

Party is not a
landlord within
the terms         Testamentary          Purcha
of 1659 C.c.      executor
He or she cannot
apply for         Mandatary             Co-ow
repossession
because he or she
does not possess  Hypotecary            Usufructu
any real right in the  mandatary
immoveable.
End of consultation.                    Owner
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1.2 Multi-legal source documentation.

1.2.1 Purpose and strategy

Our purpose was not to modelize the Civil Code of Lower Canada articles as such. We intended rather to formalize an expert legal knowledge in Québec Housing law. This knowledge is composed of various legal sources, textual as well as non-textual including: the Civil Code of Lower Canada articles and related statutes, Court and Tribunal decisions, legal doctrine and finally the know-how of legal experts (heuristics).

Our strategy was to create a dictionary of all legal and non-legal concepts required for the specification of our legal field. These concepts were found in articles of the Civil Code of Lower Canada as well as in other related statutes and court or tribunal decisions. They constitute the "granules bases" of our Loge-expert knowledge base required by the expert system generator we have selected (Paquin, 1987, D_Expert, ATO).

This operation led us to some advance conclusions (Thomasset, 1989; Thomasset, Paquin, 1989).
First, the formalization of a very specific question such as repossession implied that we refer to concepts belonging to the whole domain of the theory of obligations to which residential lease is related. We described this process as a macro-modelization.
Second, and in the opposite direction, some concepts needed to be completely described and broken down into their ultimate componants. We named this process micro-modelization.
Finally, we had to elaborate the fundamental principles which give meaning to textual legal sources. For example, to understand legal provisions related to residential leases, we need to know such general principles as freedom of contract and mutual consent which are key concepts to understanding how contract law operates according to the general theory of obligations. At the same time we must be aware that residential leases are exceptions to these principles since their specific legal provisions are compulsory and are classified among public order clauses.

1.2.2 Integretion of concepts and sources into rules

Rules which are activated by the D_Expert inference engine are constructed according to our interpretation of all these textual and non-textual legal sources. To support that interpretation, we wrote notes into each rule referring to Court or Tribunal decisions or to relevant legal doctrine.
All these legal sources are subsumed in the modelization of repossession of premises, as shown in Figure 1. This logical pattern of our specific legal field, initiates the sequence of rules into the Loge-expert knowledge base.

In order to validate the assertions expressed in the rules, we developed a textual data base. It includes all the published decisions about repossession issued by the Régie du Logement, a tribunal created in 1980 mainly, to adjudicate landlord and tenant disputes and to control the transformation of residential buildings. Since September 1990, we have access to all the decisions issued by that Tribunal in this specific domain. We expect to go on with the processing of all the pertinent articles of the Civil Code of Lower Canada which will be soon replaced by the corresponding articles of the new Québec Civil Code which has just been submitted to the Québec National Assembly in December 1990. We will integrate later on, the related statutes and regulatory dispositions.

In developing our textual data base, we were well aware of all the problems we might encounter in the retrieval of this textual material. We decided, after a thorough analysis of the dual-reading processes adopted by legal experts faced with legal textual documents (Wroblewsky, 1988), to get help from the computer for the recognition of key words in order to give access to the most appropriate documents which to validate the rules created for the Loge-expert knowledge base (Thomasset, Blanchard, Paquin, 1990 a).

1.3 Loge-expert, a legal expert system for laymen.

The main purpose of Loge-expert is to give access to specific knowledge in Québec Housing Law to the general population. In building our Loge-expert knowledge base we formalized legal concepts and most of the rules are expressed in legal language. We could not ignore the fact that the general population is not comfortable with legal concepts and legal language. This led us to seek a way to make legal language understandable by laymen without watering down its meaning. We finally created modules called communication layers. They will be the vehicles to move from legal language to plain language and vice-versa (Thomasset, Paquin, 1989; Ribordy, Laflamme, Cazebon, 1986-1987; Rialle, 1988; Barthet, 1987; Tersac De, Soubie, Neveu, 1988).

We do not yet have the precise characteristics of our typical Loge-expert users, but we intend to implement Loge-expert in places such as landlord or tenant associations or public information offices, where people can easily have access to it with some help from appropriate supervisors. In the long run, Loge-expert is designed to be accessible directly by the general population in the same way as automated bank tellers. Because of this, we decided to pay special attention to the formulation of the notes included alongside the rules. In fact, even parts of the core of Loge-expert which includes the concept dictionary and the rules, are devoted to the communication process with users. Interactive messages thus appear on the screen as filtering is occurring, as rules are launched and as conclusions are reached. These messages are linked in a more or less seamless way from the user's point of view, by means of a "hyperaid"

module where we give examples, references, and explanations expressed in plain language about legal rules and concepts.

1.4 Loge-expert: a legal knowledge disseminator.

Despite efforts to give access to legal information through handbooks, radio and TV programs, too many people are still uninformed about what to do when disputes occur over housing. Does expert system technology offer a viable alternative to facilitate the dissemination of housing legal knowledge? Does this goal affect the way the expert system is built?

In developing Loge-expert we have had to go through different stages which are common to all expert systems in law, such as modelization and formalization of legal knowledge; however, because we had made choices at the very beginning about the end users and the purposes of Loge-expert, we had to develop original strategies to work towards these aims.

In the same way as decision-making or problem-solving expert systems in law, Loge-expert contributes by bringing accurate information to solve conflictual situations. It tries to give answers to questions selected by users among a choice offered to them on the screen. But Loge-expert goes much further by providing its users with access to explanations about words, expressions or assertions through HyperAid. Users can thus navigate among levels of information according to their request. The legal knowledge is processed through a simulation of a lawyer-client interview structured into a logical modelization of our specific legal knowledge.

We have not yet proposed our logical modelization to the evaluation of other legal experts in Québec Housing law. In preparing for interviews with some selected experts, we were faced with the necessity of clarifying the purpose of these interviews. It became obvious that in order to interview those experts about their patterns of divulging legal information, we could not adopt the same strategy we would use when looking for their patterns of client interviews or legal problem solving. This means that our logical modelization must be accurate in terms of the pattern an expert in Housing law will adopt in synthetizing information about a specific field.

1.5 Work in progress and a preliminary evaluation of Loge-expert.

1.5.1 Work in progress

Loge-expert gives answers to users' requests about repossession of premises by landlords. Its dictionary of concepts is composed of 60 notions (regrouped in 10 categories) that are associated with 50 features expressed by 260 values. It currently filters through 83 rules but is upgraded in a continuous manner so

that it can deal with means of defense invoked by tenants. Few explanations, decisions or definitions have been written in the Hyper-aid module, but we expect to get this job done during 1991, after some applied research on readability and plain language have been carried out.

Loge-expert is going to be tested first by selected users belonging to tenants' associations in Montréal which are willing to use it and to give us their feedback. We will then be able to make a more accurate judgment about its effectiveness and accuracy.

At this stage, we can make a few remarks about the developing process of Loge-expert and its end product. First, even if the specific legal field selected is well delimited into legal textual documents (Civil Code and tribunal decisions, legal doctrine), we nevertheless were faced with open-texture legal concepts such as "logement de même type" (flat with same specifications...), "bonne foi" (good faith) or with legal concepts without legal definition such as: "locateur" (landlord). These legal concepts had to be explored and delimited through tribunal decisions and doctrinal works to establish their meaning. In so doing, we standardized these concepts by elaborating their meaning. Standardization being one of the end results of formalization, we intend to evaluate its positive and negative effects.

Second, modelization of legal knowledge consists of its reduction into logical structures which can never express all its richness. Its formalization into shells or languages for computers is another reduction from natural language to computer languages. We must identify the consequences of these processes in terms of the integrity of legal knowledge.

Third, we have learned from the Loge-expert experience that expert system technology alone is not sufficient to fulfill our goal of building a legal information system for laymen. We tested other technology, namely the textual database retrieval and the hypertext, which proved to be very helpful.

1.5.2 Integration of other technologies

1.5.2.1 The textual data base retrieval technology

The knowledge required by the system is extracted for the most part from a reading of textual documents. The textual database retrieval technology substantially helps the early stages of the reading process: it gives access to the relevant text content. This technology has proved to be effective in performing the knowledge elicitation. On one hand the KWIC (key word in context) function enables us to visualize all the contexts of the words expressing a target concept. The concept could be formalized into frames by means of classification, condensation and standardization of the context into features and values. On the other hand, the KWOC (key word out of context) function with a paragraph or the page as context helps the inference rules writing by grouping all the utterances of a given concept. It reduces the reading time to

find what is related, how it is used or what happens to this concept. Furthermore, it guarantees the exhaustivity that is lacking in the note-taking process. A minimum structuration of the lexicon is, however, required; the multiplicity of words which designates the same concept (synonymy) must be minimized by means of a table where the equivalent wordings are put into relation with the canonical one.
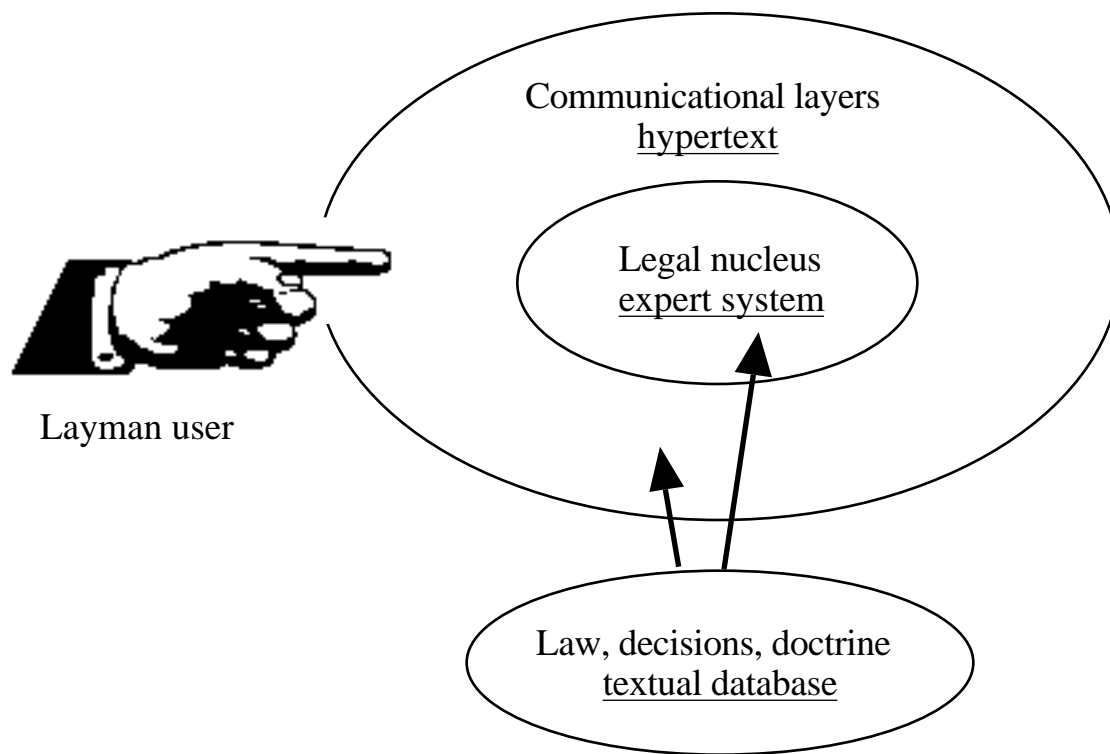
1.5.2.2. The hypertext technology

The usual explanatory devices of the expert system inferential process, namely the Why? (this question is asked) and the How? (this conclusion has been reached) have proved not to give satisfactory explanations to the user. This is so because the answer to the user question, formulated in terms of inference rules, lacks context and does not show the way the problem is solved but rather how the solution is implemented in the particular logical dialect of the shell. The task of designing an algorithm to give a satisfactory explanation to users appears futile because the type of question and the level of answer expected, even from an average user, are far too varied. A standard explanation will always be criticized for being too short or too long or too specific or too general, etc. Furthermore, this problem of balancing the user's questions and the capacity of a program to provide a satisfactory answer is complicated by the orientation of our legal expert system towards laymen users. Our solution, to break the problem into manageable pieces, is to keep the legal nucleus where reasoning is done apart from the communicational layers, where the translation from legal to plain language occurs.

We found that the hypertext technology was the best suited to implement both the explanatory devices and the communicational layers. This technology maximizes relations between texts of various length and origin. For example, the wording of a question asked by the expert system is related to an explanation, to the cause of its appearance, the way it should be answered, to the means to get the answer, to the concepts involved which are related to their definition to examples and to other concepts, and so on and so forth. The user could navigate in this net until his or her information need is satisfied. The associative access to the system's legal knowledge and its plain language explanation creates learning conditions which enable the user to get acquainted with the domain gradually and according to his or her own needs. The writing of the texts to be placed in the hypertextual net could be facilitated by recourse to the textual database.

1.5.2.3 Interrelation of technologies

The actual interrelation of technologies is summarized in the following figure.

Communicational layers
hypertext

Legal nucleus
expert system

Layman user

Law, decisions, doctrine
textual database

2.- Towards a larger scale system

2.1. An assesment of our development process

The building of a legal expert system, even on a small scale, proved to be time and energy consuming. Since two specialties are needed, at least one apprenticeship is needed: the lawyer must learn the basic of AI or the AI specialist must be initiated to the particularities of the legal concepts and reasoning process. We adopted a pluridisciplinary group approach where one complemented the other. This mutual initiation does not need to be repeated and nor does the inventory of the legal concepts involved in the field. Nevertheless, the knowledge engineering itself of each module into which the whole expertise could be broken down has to be started from scratch. The high cost of this activity is due to its complexity; it should be split into consecutive tasks: the elicitation of legal rules from the expert reading of legal texts, the decision tree building, its formalization in terms of inference rules, and its extensive testing. The time needed to build a module cannot be shortened by increasing the size of the team. All the tasks must be done by the same people to avoid inconsistencies. Another source of difficulty comes from the legal aspect of the field. The experts, namely lawyers and adjudicators, and even legislators, do not practice in terms of the deterministic decision tree needed to build expert systems.

Given the cost and the time needed to build a module of the expert system on the one hand, and the present vacuum in terms of information support to help the poeple who have to deal with conflictual

housing situations on the other, we have asked ourselves if the development strategy by accumulation of modules is the most effective. A comparison of the advantages and the drawbacks of the three technologies on hand (expert system, hypertext and textual databases) and a close examination of the use we have already made of them, led us to think of an alternative way of considering Loge-expert. Instead of an expert system completed by the other technologies, we conceive of an information system which enables a layman user, through a unique communicational layer, to get an answer to his other conflictual question by means of any of the three technologies or a combination of any of them.

2.2. Comparative analysis of avalaible technologies

2.2.1 The textual data base retrieval technology

We compared the three technologies in terms of noise and silence, coverage, development costs and effort required by the user (cf figure p.12). Given an answer from the system to a specific question from the user, the noise is the irrelevant information and the silence is the relevant information that is not included in the answer. The coverage is the portion of the field which the system takes into account. By the effort required by the user, we mean the level of data modelization embodied by the technology.
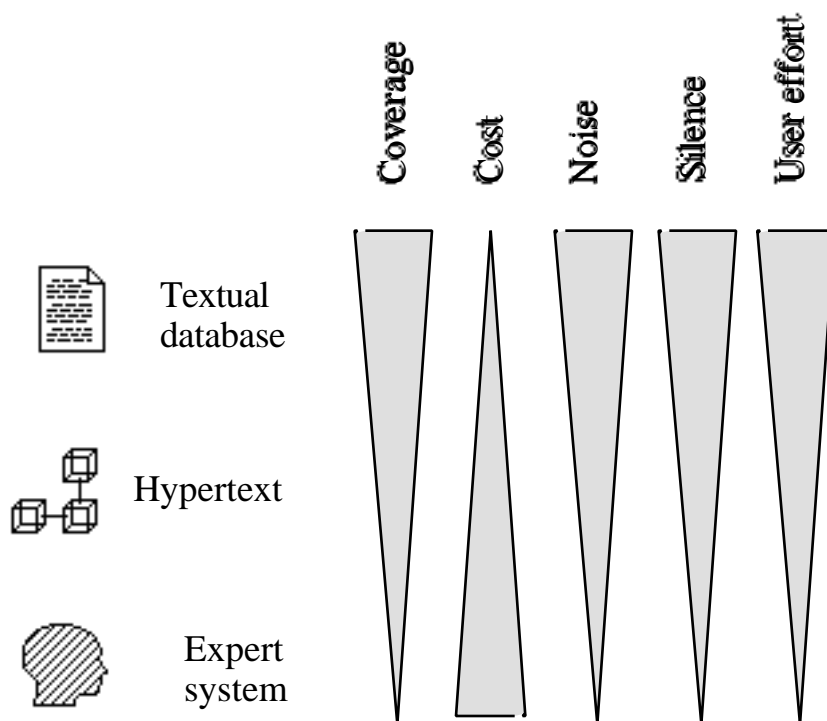
The textual database retrieval is the least expensive technology to develop because it implies only the gathering of texts, given that they are already in ascii file format. The noise is usually high because an answer is obtained by means of pattern matching of strings. The silence too is usually high due to synonymy (cf supra) and anaphora, that is, when a term is replaced by a pronoun or another contextually

equivalent term . It could be reduced by indexation which is a process designed to represent the elements of the document contents in a constraint language, usually a set of key words to facilitate the information retrieval. This operation needs qualified workers, with legal training in this case, and this raises the cost of the technology. Both the question formulation and selection of the relevant information in the system's answer are completely the responsability of the user. The question formulation could be laborious on the one hand because the interface is not always friendly, the query language sometimes being esoteric; on the other hand, the question may have to be reformulated in other key words until a substantial answer is obtained. In short, this technology with no modelization at all could be helpful; we already use it.

2.2.2 The Hypertext technology

The hypertext technology answer to a given question is based neither on pattern matching as in textual databases nor on calculus as in an expert system, but rather by embedded relations between various text segments. The user could navigate from one relation to the other and even backtrack. The hypertext modelization is not that of the text knowledge itself, but a modelization of the relations of the text segment, being read with other texts. For example, a concept such as "usufruitier"(usufructuary) could be defined in a given segment of the legal doctrine according to decisions which refer to an article of the Civil Code. This technology enables immediate access to all those segments upon request by the user. The hypertextual indexation by means of establishing those links based either on reference, on hierarchical organization or other cognitive associations is an operation that is often underestimated: it requires time and planning and can only be done by qualified people. The cost of this indexation is higher than that of the previous one. The coverage is less thorough than the previous one because after a peakpoint, the expansion of the net reduces efficiency. To be manageable, significant and consistent, the quantity of textual segments and their links should be limited. The user still has to read the texts to evaluate the relevancy of the information linked and extract the knowledge he or she needs to solve the problem. The silence is the absence of links, the noise is having too many links to access the needed information. Selective access to the first text is a problem solved by coupling this technology whith the pattern matching of the previous one.

2.2.3 The expert System technology

The expert system technology has already been extensively commented. The answer to a question is obtained by logical calculus made on knowledge units. Conditional rules are selected by facts and produce facts. The silence, the noise and the effort required from the user are minimal because the modelization level is the most profound possible: the knowledge of the text. The coverage of an expert system is usually narrow because the level of modelization implies such a number of concepts and transitory states that the growth of the system is exponential. We have already said that the development cost of such a system is very high. Sometimes when it is impossible to break concepts and reasoning processes into

clear and distinct components or states, the modelization of the expert system appears too powerful and deterministic to be adequate, for instance the concept of "bonne foi" and its proof, in the case of Loge expert. The only way to modelize thoses concepts would be by examples, in which case the previous technologies appear to be more suitable.

2.3 For the coverage of the entire field

After the development of a first sub-field of Loge-expert with the expert system technology, our next step should be guided by the analysis of that technology. It seems more appropriate to cover the rest of the field and deliver a system, even without the same depth of modelization, rather than build another narrow sub-field with an expert system. This step will necessitate the expansion of the textual database we built to cover the needs of the first sub-field to the entire field. It will also require an easy access even for a layman to the content of those legal texts . To achieve this we can extend the hypertextual device we developed to implement the model of the communicational layers. For a given string denoting a concept, a note or a question, the user could then access plain language explanations and related concepts.

The table of equivalent wordings in plain and legal language, until now accessed through the expert system, needs to be accessed directly. Furthermore, the device lacks a browser for the user to pick up the plain language formulation of a concept and a textual databased query writer to translate the user's question into the equivalent legal terminology . The segment of legal text retrieved by pattern matching will be read by a layman with the help of the device transformed in a somewhat electronic legal associative dictionary. When the textual database coupled with the revised communicational layers is functional, the remaining potential modules of the field will be evaluated to find out which technology is best suited and then only the pertinent expert system will be developed.

The proposed revision of Loge-expert architecture is summarized in the following figure:
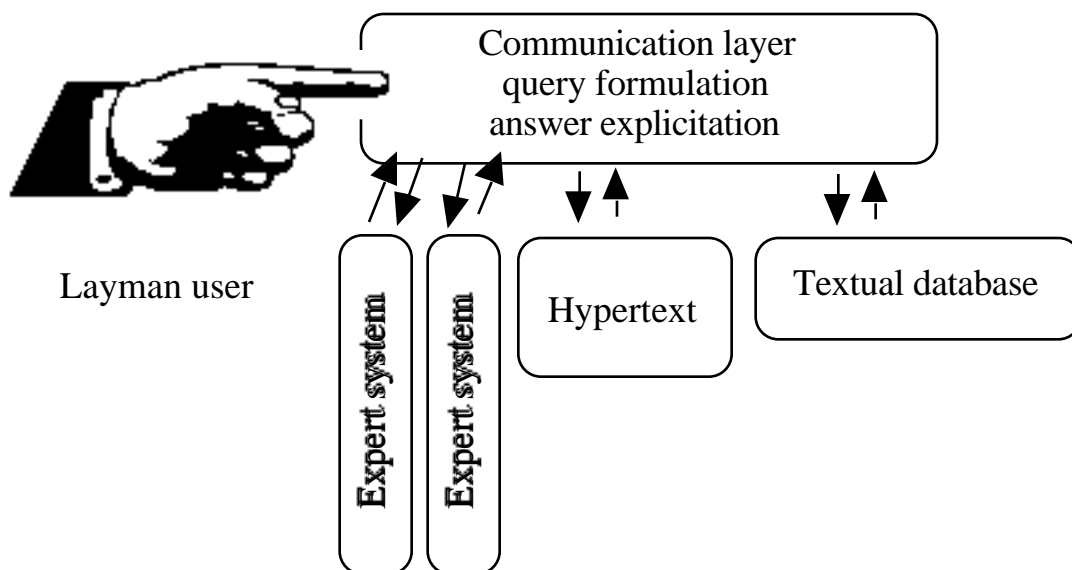
Conclusion

We think that a shift from a dominant mono-technological point of view, that is, a legal expert system, to an integrated point of view where the user is included in the same way as several technologies, is more productive in terms of a real world scale system. This point of view relinquishes the pretension of automated legal decision-making. It considers those systems for what they are: information systems that help human decision-making. It respects the various contexts and the various types of information needed. Even if a decisional system could be built, we must ask ourselves whether as a society we have an interest in doing so where the legal field seems to leave little or no room for discretion. Given the finite nature of both our human an financial resources, would it not be better to devote our energy to developing more information systems, ones which are perhaps less sophisticated but nevertheless of immediate use?

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