

# CAN LEGAL KNOWLEDGE BE DERIVED FROM LEGAL TEXTS ?

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## ABSTRACT

*Knowledge acquisition is undoubtedly one of the major bottle-necks in the development of legal expert systems. Usually the knowledge is collected by knowledge engineers who are forced to make their own interpretations of the knowledge in order to map it on a knowledge representation technique, thus resulting into erroneous and legally unacceptable interpretations of the law. The aim of NOMOS (an EC supported project under the ESPRIT II initiative) was to assist the knowledge engineer by providing tools that perform semi-automatic knowledge acquisition from legal texts in Italian and French. This paper reports on the results of the first evaluation of the knowledge collected by these tools. The evaluation was performed by complementing the tools with a fully functional expert system that accepted the generated knowledge bases and allowed experts to test the completeness of the knowledge through a series of interactive consultations. The knowledge base used for this evaluation was derived from the text for the Italian Value Added Tax Law. The text was pre-processed in its ASCII form by the Nomos tools and the generated knowledge base was filtered through to a conventional expert system shell to generate the evaluation expert system.*

*Knowledge extracted directly from text was converted into a hybrid of production rules and Conceptual Graphs. [see SOWA 1984] Knowledge collected from other sources, such as previously resolved cases, explanations of terms and examples, were linked to the knowledge base using an automated hypertext technique. [see KONSTANTINOU & MORSE 1992] Finally, the expert system was tested using real-life cases supplied by the Italian ministry of finance.*

## 1. THE PROBLEM DEFINED

### 1.1 The Case of Nomos<sup>1</sup>

This paper focusses on the prototype expert system (Nomos - Advisor), which is based upon knowledge supplied by the semi-automatic acquisition tool ILAM. Following Sergot's<sup>2</sup> effort to classify the relevant projects it is believed that the distinctive factor of Nomos is its computational formalism ie. Sowa's Conceptual Graphs. It must also be reported that Italy is a Civil Law country and our application refers explicitly to a certain Statute Law ie. 'Decreto del Presidente della Repubblica No.633, 26.10.72' (The Italian VAT Law - see Appendix I). Consequently, Nomos is not a case based reasoner, since it is not attempting to reason from previous decisions but mainly from rules derived from the DPR.633. Nevertheless, previous cases were taken into consideration and they affect the users' decision by means of an hypertext facility. These previous cases, (supplied by the Italian Ministry of Finance) although not of binding authority, in practice show the way of interpreting the

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<sup>1</sup> For more details on Nomos and on The Italian Linguistic Analysis Module (ILAM), see ESPRIT-DOC TE-31-40-01, Design of ILAM module for Nomos, 1991 and the general Esprit documentation. Members of the consortium were SOGEI (I), AXON (F), CNR - IDG (I), HELLASLEX (GR), IRETII (F), INESC (P), ORION (GR), STEP (F), TECSIEL (I). The University of Westminster was an ORION sub-contractor.

<sup>2</sup> SERGOT in BENCH-CAPON(ED.)

Law, and indeed, later interpretations follow previously decided cases.

## 1.2 The ILAM Output 'Knowledge'

Our prototype expert system (Nomos- Advisor) was based on knowledge supplied by the semi-automatic tool ILAM. Therefore, our main aim was to use the knowledge supplied by ILAM without any post-processing or manual modifications. In particular we had to show the continuity of the chain from Knowledge Acquisition (input of a legal text) to actual Legal Advice. In this respect (a) we had to use the ILAM output as such ie. in the Conceptual Graphs formalism, and (b) we were not "allowed" to refine the above "knowledge base" eg. add heuristics and rules of thumb existing beyond the text of the Italian Law. At this point it should be reported that in contrast to other systems that admit human intervention, by eliciting expert knowledge at a later stage, our prototype stays closer to the project's main line, since we argue that the latter sort of information should be acquired before the ILAM elaboration.

## 2. THE PROBLEM TACKLED

### 2.1. Feasibility Analysis And Scoping

Since the area of the law was predetermined (Italian VAT law) questions may arise specifically as to *why* it was chosen and *how* narrow the domain should be. On the latter question the ILAM module had formalised the Article 7 of the Law which refers to the '*Territoriality of the Tax*' and which is manageable enough in size but, in our opinion, not complex enough to justify the need for formalisation. Nevertheless many arguments justify that decision. First, historically, tax laws have always been at the centre of research on Legal Expert Systems<sup>3</sup>, since they affect, apart from Lawyers, accountants, public servants and finally every citizen; they are more precisely defined; they concern a narrow domain and they are relatively carefully drafted. However this latter point, being only a general assumption, was not confirmed in our case, since even the single article 7, presented inconsistencies. Second, in the case of the Italian Law, it should be noted that the Italian Ministry of Finance keeps a whole department devoted to the interpretation and the application of the Law, not to mention that a whole division deals with the '*territoriality of the tax*', ie. with the specific interpretation and application of Article 7 of the Law. Third, on the substantive value of the project, it can be argued that VAT is a tax applied in all EEC countries affecting the every day life of millions of citizens and therefore a possible fruitful outcome could signify the future commercial exploitation of the project.<sup>4</sup>

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<sup>3</sup> See the general bibliography and especially MCCARTYS Taxman projects and SUSSKIND, Expert Systems in Law p.52

<sup>4</sup> The idea of having systems installed in public places, giving on-line expert advice on VAT law is described in ESPRIT-DOC SG-51-40-01: Requirements Capture and Architectural Details for Nomos. See also the ILAM and FLAM preliminary evaluation, ESPRIT-DOC AS-62-50-01, 28-Oct-92

### 2.2. Goal Definition

The basic goal of the system is to determine whether a legal entity (person or company) is liable to pay VAT in connection with the place where its economic activity (usually transfer of goods or supply of services) has taken place. Given that the facts are entered by the user in response to questions posed by the system two assumptions were made at this point: First, that the user is - if not a lawyer - at least capable of answering the "trivial" legal questions generated during the phase of data input to the system eg. whether a certain transaction falls within the transfer of goods or the supply of services category etc. Second, that the user should not be left free to input his/her question but he/she always be guided with menus and restricted answers in order (a) to avoid his/her intervention to the knowledge base (b) to diminish his/her ability of actually interpreting the Law.

### 2.3. Data Collection - The "Knowledge Needed"

Given the statutory character of the law there was no *prima facie* need to gather all previous cases and relevant material. Nevertheless, during the Knowledge Acquisition phase of the project the director of the previously mentioned division of the Italian Ministry of Finance was interviewed and our attention was called to the fact that previously decided cases, even though not formally binding, show the way later interpretations must follow. The crucial question was how rules extracted from these cases, constituting part of the '*needed knowledge*' of the relevant legal domain, could be added to the system leaving intact the Conceptual Graphs ILAM knowledge base. The handy, although not perfect, solution was to add a hypertext facility, which by using a 'pop-up' window advises the user on items not covered by the ILAM output but referred to in questions<sup>5</sup> and answers<sup>6</sup>.

This methodology was followed for three reasons: First we wanted to broaden the coverage of the domain and to extend the system's capabilities beyond the contents of the ILAM output. The ambition was to persuade the user that the system's knowledge is integrated enough and thus able to represent a '*legal sub-system*', according to the theoretical demand<sup>7</sup>, and offer reliable advice. Second, this particular effort should not be confused with Case-Based-Reasoning systems. In our prototype previous cases and the other material not provided by ILAM are only presented for information purposes to support the decision of the user. Third, this latter information procedure could add much to the system's transparency, which is always desirable.

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<sup>5</sup> A possible example would be a window telling the user that according to X case, already solved by the Ministry, Y transaction has been characterised as Transfer of Goods, thus giving arguments to support his/her characterisation of a transaction while he/she inputs the relevant facts to the system.

<sup>6</sup> A possible example would be again a window explaining terms and supporting arguments with cases eg. saying that Y transfer of goods [action described in the Italian Civil Code art.Z as...] which according to the rules...is liable to VAT [solution also followed in case X, arguing that...]

<sup>7</sup> SUSSKIND op.cit p.52

## 2.4. Legal Knowledge Structuring

Nomos handles a very narrow legal domain, and furthermore all the legal expertise was derived from an authoritative source: the Advice Bureau, of the Italian Ministry of Finance, which solves ambiguities and through previous cases has the power to harmonise the interpretation of the law.<sup>8</sup> Nevertheless contradictions are still present and therefore, in its predictive function<sup>9</sup>, ie. the lawyer's task to predict judicial and official behaviour our system could never reach a high standard since the heuristic predictive knowledge is not added to the knowledge base. In its justificatory function, ie. in its capability to give apparent reasons for its decisions, the system will be of high performance through the backward-chaining mechanism and the hypertext explanations. In its persuasive function, ie. the lawyer's task to convince of the argument he/she is presenting it will be of high transparency through the juxtaposition of the rules and the conclusions, reinforced by the hypertext facility.

The deep structure rule<sup>10</sup> in the case of article 7 of the Italian VAT Law should be: *All transfers of goods and services carried out on Italian territory are liable to VAT*. Exceptions arise for certain goods and services (named in the law) or due to special attributes assigned to the subject (eg. domicile, legal seat etc.) or the object (eg. real estate situated within a certain territory). Furthermore the article provides the basic concept of what constitutes Italian Territory and assimilates certain transactions as if they have taken place within that territory.

## 3. OVERVIEW OF THE ILAM MODULE ARCHITECTURE

The ILAM module (see fig.1) of the NOMOS system is responsible for the semi-automatic acquisition of knowledge from normative texts. Although the texts are not pre-processed, ILAM exploits certain features of the restricted domain, such as segmentation, legal semantic information, and standard text markup symbols. In addition, it should be noted that the system is *semi-automatic* : There is need for a degree of human intervention (such as additional syntactic information and the provision of a type hierarchy) within the module, to ensure correct results.

Thus, two basic types of input are necessary : The full text of an article of the law, and a certain amount of validation and interpretation of the resulting representations, by a human knowledge engineer / expert.

The ILAM module itself can be decomposed into three *major* processing units, although other sub-systems are involved. These units are strongly interactive in operation, co-operating

with each other as necessary to achieve the best results. However, for the sake of clarity, their operation can be described individually, as follows :

The '*Macro-Level Processors*'. These act at the article level, segmenting the text into logical substructures ; articles, comma's, letters, etc. They produce the '*structural view*' of the text, describing its overall organisation, and the '*logical view*', representing the inter-relations of its substructures : For example, the fact that a certain paragraph is a definition, and that some later paragraph is an exception to it.

The '*Micro-Level Processors*'. These work at the sentence level, discovering the functional roles of phrases, via semantic processing, legal markup symbols in the text and a certain amount of contextual information. The functional roles assigned to each sentence describe its function as a definition, property, argument to a conditional 'or', and similar.

The '*Syntactic/Semantic Analyser (SSA)*'. This is the unit which produces the majority of the output from the ILAM module. Using a chart parsing technique, it accepts sentences, or logical sentences and phrases, with their functional roles, from the micro-level processors, and produces a '*Conceptual Graph*' representation (see below) of the text.

These units, in conjunction with several other sub-systems (Semantic and morphological lexicons, a hierarchy of concept types, etc), produce an output which, following possible validation and refinement by the human knowledge engineer or expert, should represent the knowledge embodied within the text, and which is to be used by our Expert System.

## 4. ILAM KNOWLEDGE REPRESENTATION

The representation used by the *SSA*, is based upon the Conceptual Graph formalism, developed by Sowa<sup>11</sup>, and which has been shown to be useful for knowledge representation in both the linguistic<sup>12</sup> and retrieval domains<sup>13</sup>.

However, the ILAM system does not employ full, complex conceptual graphs, but a simplified form (the Concept-Relation-Concept (CRC)), in which a graph consists only of two concepts connected by a single relation<sup>14</sup>. Related graphs, forming a clause or (logical) sentence, are linked by cross-referencing variables<sup>15</sup>:

<sup>8</sup> This Division is also the editor of a periodical on the interpretation of the VAT Law, which is usually followed by the 'front-end' civil servants at Internal Revenues offices etc.

<sup>9</sup> Described by SUSSKIND op.cit.p.42

<sup>10</sup> According to a model proposed by SMITH, GELBART AND GRAHAM, A Procedure for Creating Expert Systems in Law in Computers and Law, Vol.3, Issue 3, July 1992, page 23.

<sup>11</sup> See SOWA in the bibliography

<sup>12</sup> See in the bibliography SOWA in all his writings.

<sup>13</sup> See in the bibliography VELARDI ET AL. and FARGUES ET AL.

<sup>14</sup> See in the bibliography FARGUES ET AL.

<sup>15</sup> All of the following examples were translated into English from the original Italian text for the purposes of this paper.

```

crc( conc(effected : [1])
    rel(loc : in)
        conc(territory : [# ,3] )
    )
crc( conc(territory : [# ,3])
    rel(poss : of)
        conc(state_nation : [# ,5] )
    )

```

(Two CRCs representing the logical sentence of 'effected within state territory' Italian: 'effettuare in territorio di stato nazione').

Additionally, in contrast to Sowa's conceptual graph notation, the CRC carries value fields on *relations* as well as concepts. This enables the orthography of both concepts and relations to be retrieved, as well as their semantic roles, ensuring that the representation is information conserving. (i.e. The original text of the document can be reconstructed from the CRC notation).

Also, In some cases *anaphora* is explicitly flagged in the value field of the relations. For example ; paragraph 4.e. of Article 7, '...or to subjects resided **therein**' translates into the CRC form :

```

crc( conc(resided : [13])
    rel(loc : (\therein))
        conc([general_place... : [_102311] )
    )

```

Here, the backslash in the value field of the relation indicates that an anaphoric pronoun has been identified. Unfortunately, the referent is not resolved, as indicated by the uninstantiated variable on the following concept. Nevertheless, it was found to be valuable to be able to identify the anaphors in this way, even though the resolution had to be performed manually.

In the next layer of structure, (the *micro-level*) several of these CRC's are grouped together within the scope of a logical operator (AND/OR) to form a representation of a logical sentence of the source text. Within each such block, parentheses indicate precedence ordering of the operators.

The output also contains the *macro-level* logical and structural views, and the complete text of the logical paragraph (or 'block') under consideration.

Overall, then, the structure of an ILAM block, is as follows :

## BLOCK

### --- STRUCTURAL VIEW

```

[art([[7,-]]) , num(633) , tipo(dpr) , comma(4) , letter(d) ,
stru_comma(item) , item_period(1)]

```

### --- SOURCE TEXT

[the supply of services deriving from hiring out, chartering and similar contracts concerning mobile

goods other than means of transport is considered to be effected within the state territory if it is the object of the above services]

### --- MICRO\_STRUCTURE

```

micro_crs
    def_prop_1
        def_prop_focus
            [the supply derives from hiring out, chartering
            and similar contracts concerning mobile goods
            other than means of transport]
        def_property
            [effected within the state territory]
    condition
        cond
            [the goods constitute the object of the above
            services, and are used within the state territory]

```

### --- SSA\_OUTPUT

#### MICRO\_SEGMENT\_OUTPUT

[micro\_crs, def\_prop)1, def\_prop\_focus].

#### SSA\_INTERPRETATION - gn

```

[ crc( conc(deriving : [3])
    rel(subj : subj)
        conc(supply of services : [# , { * } , 2] )
    )
  crc( conc(deriving : [3])
    rel(fsrc : from)
        conc(contract : [ { * } , 5] )
    )
  AND
  .
  .
  .
  Other CRC blocks...

```

## 5. PROBLEMS WITH THE KNOWLEDGE CONTENT

The knowledge structures contained in the ILAM output for article number 7 of the Italian VAT law was found not to include the following:

1. any inference control information apart from the focus fields

2. enough information for generating the question texts needed by the inference engine.

### 5.1 Inference control information

The lack of inference control information is the most serious problem we have encountered during the design of the Nomos-Advisor knowledge base. Although, this was expected, as there is no need for 'human inference control' information in legal texts, and consequently the ILAM modules could not 'find' it. Therefore, we had to use several heuristics in order to create a usable kb.

The obvious control structure that we could use for an automatic mapping, was the information in the focus fields (*def\_prop\_focus*). We have identified three possible top level values for the focus: transfer of goods, supply of services, transfer of goods for export (*le cessioni di beni, le prestazioni di servizi, le cessioni all' esportazione*).

By top level we mean that the above focus information exists in all of the ILAM structures and effectively categorises the rules. In the ILAM output there are also several other values for the focus field which attempt to categorise the rules in even narrower groups, but for the purposes of our prototype (as it included only Article 7) the top level focus was adequate.

Therefore, we defined the following:

1. An Nomos-Advisor category that includes all rules defined for Article 7. This category is used to find values for two attributes : **FOCUS** and **ADVICE**.
2. **FOCUS** is defined as a frame variable that has one of the three top level values as described above. There is no default value for this variable, but the system will force the user to select one of the above values. The value of **FOCUS** is determined by a direct question rather than the invocation of any production rules.
3. The search strategy employed by Nomos - Advisor in order to search this category searches for the **FOCUS** first. Once the **FOCUS** has been determined then the category rules are searched to find the **ADVICE** for the given problem.
4. **ADVICE** is defined as a text variable without any default values. To trace a value for it Nomos - Advisor uses a series of production rules that have a close relationship to the ILAM structures.
5. In the case where no rule can succeed then Nomos - Advisor asks the user to suggest a solution. This question will accept any answer and can be used to trace cases that are not covered by the KB, as Nomos - Advisor keeps track of all solutions.

6. All *cre* conditions from the ILAM structures were translated into straight-forward (boolean type) questions. Only those conditions that were defined by other rules were defined as frames and the *same* function was used to trigger the inference engine when a value for them was needed.

### 5.2 Additional control problems

Article number 7 defined exceptions to rules by preceding the paragraphs referring to exceptions with the phrase "with exception to the previous paragraph". For example paragraph 4 of the law defines all the exceptions for paragraph 3.

Although the phrase "with exception to the previous paragraph" (*in deroga...*) is included in the *STRUCTURAL\_VIEW* of all of the affected structures generated by ILAM for paragraph 4, there is no explicit information about its meaning or relationship to paragraph 3.

The main problem that arises here is that of inference control again. If we assume that the inference engine of the application evaluates the rules for paragraph 3 first (after all as there is no control information this is the most likely scenario), then we have the following possible control strategies:

1. None of the rules of Paragraph 3 succeeds and the inference engine continues with the evaluation of paragraph 4.
2. One of rules for paragraph 3 succeeds and the inference engine continues with the evaluation of paragraph 4.
3. One of the rules for paragraph 3 succeeds and the inference engine stops the search and reports its conclusion.
4. None of the rules in paragraph 3 succeeds and the inference engine does not continue with paragraph 4.

Strategy 3 above seems to be the logical course of action but it may apply just in this particular example (article 7). Because the two paragraphs are not connected with any control information which will explain the meaning of the phrase "with exception to".

Strategy 2 on the other hand, could be used to reinforce the validity of the conclusion as the rules in paragraph 4 seem to deal with specialised cases. The problem with this strategy is that we are effectively ignoring the meaning of the phrase "with exception" as we are forcing the inference engine to try all rules. We could, however, force the inference engine to try all of the **related** rules only. By related we mean those connected with that phrase. This appears to be the most correct approach

but we believe that study of the uses of that phrase in other articles is needed to determine whether we wish to fix this control strategy.

Strategy 1, is the one that will be used by any of the conventional shells that use the frame/production rule knowledge representation and a conventional backward chaining search technique. This may be the correct strategy if we interpret the phrase "with exception to the previous paragraph" as meaning that "if the rules for 3 fail then try the following". This however may not be the correct interpretation as it contradicts the *interpretation* for Strategy 2 which appears to be a desirable one.

Strategy 4, is clearly wrong as it will not result in any values for ADVICE. The reason for that is that the FOCUS "supply of services" applies only to rules for paragraphs 3 and 4. Therefore, if we stop after 3 it is definite that there will be no more solutions.

Currently, for the Nomos-Advisor KB we use strategy 2 or 1 if it applies (i.e. all rules for 3 fail). This implementation does not use the localisation of the exhaustive search just among the rules for 3 and 4 as we would like to study other articles before, we modify Nomos-Advisor to accommodate this type of search.

An automated solution for this problem, however, can be found by utilising the output of the logical view analyser module which was recently completed by the ILAM team. The output of the logical view analyser could guide the Nomos-Advisor system by using a modified agenda mechanism that would be triggered directly by collecting the different Logical Block Structures.

### 5.3 Generating the question texts

As mentioned above the Nomos-Advisor system supports the query-the-user interface paradigm, that is the user is prompted with a question and he/she is expected to answer rather than presenting a menu with multiple choices.

Using this approach, one of the most serious problems in the design of the kb was the generation of the question texts. This is a serious consideration for the user interface as the questions must be unambiguous and correctly phrased.

One solution is to use the CGs themselves to create the text but in that case the very fact that they are not related to each other (as ILAM produces a separate CG structure for every logical sentence) did not allow us to generate the correct texts.

In the NOMOS KB prototype we constructed the texts manually from the original text, but with reference to the ILAM CGs in order to test the completeness of the knowledge contained into them. The main problem, however, was encountered when we had to generate texts for:

1. exceptions
2. or add alternative cases to questions

Question texts for exceptions must include the text of the original question. This is needed because it is impossible to guarantee the order of evaluation of questions in a production rule system (some of the questions may have been evaluated by another rule etc). Therefore, we cannot assume that the text for an exception question will be understood if it does not include the original question (case) text.

To illustrate the problem for case 2 above, consider the following extract from paragraph 1 of the law:

"... with exception to the Districts of Livigno, Campio d'Itallia and of the national waters of the lake Lugano...."

This exception is described in a separate CG structure in the ILAM output . If we use this CG to generate the text, a text similar to the following will be generated:

"Is the activity carried out in one of the following territories

(Please select by number):

1. Districts of Livigno
2. Campio di Italia
3. National Waters of Lugano"

This may seem to be correct but there is a need for an "escape case", i.e. none of the above. If this case is not there the inference engine will force the user to answer one of the three choices. As the case "none of the above" is a valid one this must be included for the system to function properly. But again this can only be done manually at the moment as there is no indication as to where this addition is needed.

## 6. USING HYPERTEXT TO SUPPORT EXPLANATIONS

As the Article 7 does not include term explanations (such as what is defined as supply of services, or what is included in the various categories of services etc) in order to clarify the different terms we used for our question and advice texts we decided to use hypertext definitions.

Most of these term explanations are listed in article 2 of the Italian VAT law, therefore we used that article to manually acquire the definitions. To prepare the hypertext links for all texts appearing on any screen at any one time, we used an automated cross-referencing program (developed by the

AIRG)<sup>16</sup> which creates and maintains the links without affecting the knowledge base. The end result was welcomed by both the developers and the users of the system, as all occurrences of the same term in either questions or advices were always linked to the relevant definitions and were always available to the user.

Furthermore, the hypertext mechanism helped us to include knowledge from previously resolved cases provided by the Italian finance ministry and could not obviously be derived from the text of the law.

## 7. CONCLUSIONS

### 7.1 Lack of Methodology

Although we have not entered the long debate<sup>17</sup> concerning the applicability of Legal Expert Systems<sup>18</sup>, we were, however, continuously aware of the state-of-the-art in the relevant field<sup>19</sup> and we have considered as many as possible of the contradictory notes. It should be noted, however, that SUSSKIND'S EXPERT SYSTEMS IN LAW provided some very useful and stable guidelines that have, though not strictly, been implemented during our work, while a recent article by SMITH, GELBART AND GRAHAM<sup>20</sup> proposed for the first time enumerated methodological steps for creating a legal expert system and helped us to streamline the process of the undertaken task.

The already existing paradigm of AI and Law, contains a surprising gap, ie. that it does not set out a stable methodology for future researchers. Those already working in AI and Law are best placed to create such a methodology.

### 7.2 Can legal knowledge be derived from legal texts using the ILAM approach?

Although this project concerns applied research it presents many of the classic characteristics of basic research. This is, to the best of our knowledge, the first time that an automatically extracted conceptual formalism - in our case through the ILAM

approach with Conceptual Graphs - is used to represent Legal Knowledge used for Automated Legal Reasoning<sup>21</sup>. In theory that approach presents an extensive power of formalism, but up to now this has been implemented only in Natural Language applications not to Legal applications. During the Nomos project the ILAM method proved suitable to represent *legal* (in the sense of *normative*) texts and consequently the *legal knowledge* contained therein. Nevertheless, this was made possible on the hypothesis that "*in the normative domain, knowledge is mainly contained into natural language texts such as laws, decrees and regulations...*"<sup>22</sup> and in accordance the ILAM system was limited to those sources. The possibility of elaborating other sources of Law, of equal importance, such as jurisprudence, legal doctrines and case-law (irrespective of the legal system)<sup>23</sup> was not examined. This demonstrates that further investigation, particularly from the legal point of view<sup>24</sup>, is needed if future applications involve a broader legal domain.

The conclusion is that although it can be argued theoretically, and indeed was proven practically by our prototype, that the ILAM approach is a suitable method to represent legal (in the sense of *normative*) texts, it is not yet clear how it could represent, as a transformation of natural language, legal knowledge as a whole<sup>25</sup> (in the sense of a *legal subsystem*).

### 7.3 Final Remarks

The following points summarise the most important findings from the implementation process:

- An Expert System is a suitable application for the ILAM output, although others (eg. Conceptual retrieval, Intelligent front-end etc.) may prove less cumbersome.
- The Italian VAT Law is a suitable domain of application.
- The Hypertext explanation facility should be considered as a handy tool to enhance the explanation facility of future systems

The prototype expert system (Nomos - Advisor) that we produced proved that the ILAM module succeed in extracting

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<sup>16</sup> see EDS by KONSTANTINOU-MORSE

<sup>17</sup> There are many voices arguing that law is not a suitable domain of application. See for example the severe criticism of Leith in all his writings and especially LEITH P., *Legal Expert Systems: Misunderstanding the Legal Process in Computers and Law*, 49, September 1986. see also LEITH in MARTINO-SOCCI NATALI (Eds)

<sup>18</sup> For a detailed analysis on AI and Law see the general bibliography, for previous legal expert systems see especially SUSSKIND, *Expert Systems in Law*, Oxford 1987, and SERGOT, *A Survey and Comparison in BENCH-CAPON(ED) Knowledge Based Systems and Legal Applications*, Academic Press 1991 which contains a detailed analysis and classification of all the recent projects with extensive commentaries

<sup>19</sup> See the recent articles in the 1992 Australian Journal of Law and Information Science and especially TYREE A., *The Logic Programming Debate in J LIS V.3, 1992, No.1*

<sup>20</sup> SMITH, GELBART, GRAHAM, *A Procedure for Creating Expert Systems in Law in Computers and Law*, Vol.3, Issue 3, July 1992, page 23.

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<sup>21</sup> see also DICK J., in proceedings of the 3rd ICAIL, Oxford 1991 who also uses a Conceptual Graphs representation but, nevertheless admits (p.252) that "...we are attempting to model conceptual content in order to facilitate the retrieval of information rather than to reason ..."

<sup>22</sup> GIANNETTI ET AL. in *Nomos: Knowledge Acquisition for Normative Reasoning Systems*, Final Report

<sup>23</sup> See SUSSKIND citing ATIYAH op.cit.: *Law is a seamless web, a huge network of interrelated rules of common or case law and of statute...*

<sup>24</sup> Reference is made to the difficulties in connecting common sense knowledge and legal concepts which may prove insurmountable in very big corpora of normative texts. See also LEHMAN H., *Legal Concepts in a Natural Language Based Expert System in Ratio Juris V.3, No.2, July 1990*

<sup>25</sup> Not only the text of a certain law, but empirical and procedural knowledge as well.

the knowledge encapsulated in the legal text. The need, however for including hypertext definitions in order to support other sources of knowledge confirms that automated legal reasoning cannot be guided only by 'paper rules'. We also discovered a clear need for research in ways of automatically extracting heuristics for inference control from legal texts.

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## APPENDIX I.

### Extracts from the draft translation of the Italian VAT Law.

**DPR 26.10.72 N.633 Article 7**  
**Decree of the President of the Republic**  
**of the 26th October 1972,**  
**Number 633, Article 7 (in force from 1.1.82)**  
**Institution and Regulation of Value Added Tax.**

#### Object: Territoriality of the Tax

1. State Territory is considered to be the one subjected to Its sovereignty, with the exception of the Districts of Livigno, Campio d' Italia and of the national waters of the lake of Lugano as they were bordered by the fourth paragraph of Art.2 of D.P.R. 23 January 1973, n.43.
2. The transfer of goods is considered to be effected within the State Territory if its object is real estate or national or nationalised mobile goods [existing within that territory] or goods bonded under the temporary import regime existing within that territory .
3. The supply of services is considered to be effected within the State Territory when services are supplied by subjects having their domicile within that territory or from subjects having therein their residence and not having a permanent domicile abroad, as well as when services are supplied by permanent organisations in Italy owned by subjects domiciled and resided abroad. When services are supplied from permanent organisations abroad owned by subjects domiciled and resided in Italy they are not considered to be effected within the State Territory. For subjects other than natural persons and for the purposes of this article, domicile is considered to be the place where it is located the registered seat and residence is considered to be the place of the actual seat.
4. With exception to the previous paragraph:
  - a.the supply of services connected with immobile property [relating to real estate], including expert evidence [evaluation], agency and services relative to the preparation and coordination of the execution of construction [real estate] works is considered to be effected within the State Territory if the real estate is situated within that territory.
  - b.the supply of services, including expert evidence, relative to mobile tangible property and the supply of cultural, scientific, artistic, educational, sporting, entertainment and similar services, as well as the operations of loading, unloading, maintaining and similar, as supplementary to the transport of goods, are considered to be effected within the State Territory when they are performed within that territory.

c. the supply of transport service is considered to be effected within the State Territory in proportion to the distance covered therein.

d. the supply of services deriving from hiring out [leasing], chartering and similar contracts concerning mobile material goods other than means of transport is considered to be effected within the State territory if the good, which does not constitute an object, is used within that territory.

e. the supply of the aforementioned services indicated in art.3.2, the supply of advertising services, of legal and technical consultancy, of processing and supply of data and similar, the supply of services relative to banking operations, finance, insurance, and personnel agencies, as well as the supply of services of intermediation relative to the above mentioned services and those relative to the obligation to refrain from carrying out the above mentioned services, are considered to be effected within the State territory when they are performed to subjects domiciled in that territory or to subjects resided therein that have no permanent domicile abroad as well as when they are performed to permanent organisations in Italy owned by subjects domiciled and resided abroad, unless the services are used outside the European Economic Community.

f. the services of the previous letter (e) supplied to subjects domiciled or resided in other States members of the EEC is considered to be effected within the State Territory if the beneficiary is not passive subject to the tax in the State where he is domiciled or resided.

g. the supply of services of letter (e), with the exception of legal and technical consultancy and of elaboration and supply of data and similar, supplied to subjects domiciled and resided outside the EEC as well as those derived from hiring out, even financially [financial leasing], chartering and similar contracts concerning transport means supplied by subjects domiciled or resided outside the EEC, or domiciled or resided within the territories excluded from the rule of the first paragraph, or from permanent organisations acting in the above mentioned territories are considered to be effected within the State territory if they are used within that territory; these last services, supplied by subjects domiciled or resided in Italy to subjects domiciled or resided outside the EEC are considered to be effected within the State Territory if they are used in Italy or in other State member of the EEC.

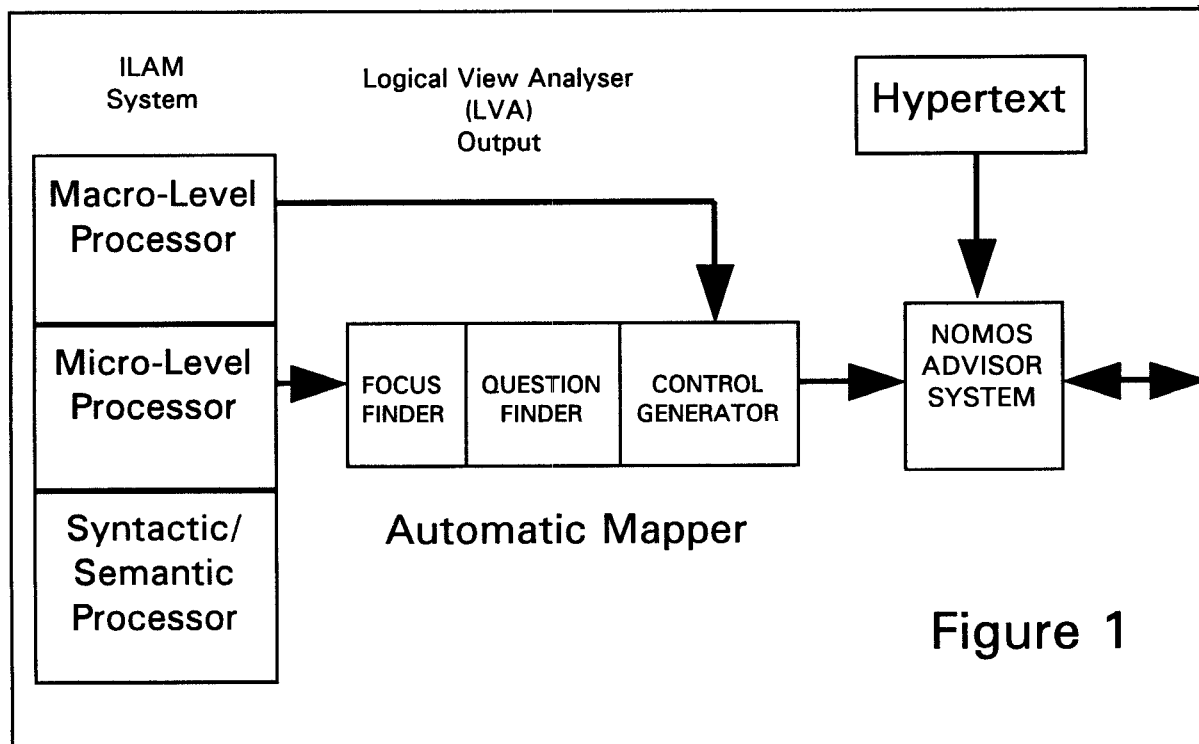


Figure 1