

# LAW-MAKING ENVIRONMENT: A MODEL-BASED SYSTEM FOR THE FORMULATION, RESEARCH AND DIAGNOSIS OF LEGISLATION

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## **1. Introduction**

### *1.1. Artificial intelligence and legislation*

The earliest studies and experiments relating to artificial intelligence applied to the law, date back to the 1980s, apart from some naive experiments at the end of the 1970s<sup>1</sup>, where an attempt was made to deal with legally complex matters, employing traditional techniques. On the whole, these mainly took into consideration the application of the law to the decision-making process and, in particular, to the inference mechanism from the laws of the consequents ("automated decision-making", "calculation of the norms") (see, on this subject [35], [26], [32], [34], [36] and [15]).

Inevitably, the initial studies proved to be excessively poor in the legal analysis of the subjects they covered, which led to naive and useless implementations. Towards the end of the 1980s, interesting research followed. Aspects of the complexity hidden behind a legal decision and legal phenomena in general, were analysed from a legal-cognitive point of view. These were studies which made a contribution towards subsequent artificial intelligence research applied to the law and which have also provided original points of view, regarding traditional legal studies (see, for example [19] and [37]).

Interest in the automated computation of normative consequents, has facilitated the orientation towards in-depth representation of the contents of the relevant aspects of specific laws. In most cases, the strictly regulatory, prescriptive aspects were examined. This approach, especially in the initial phase, aroused criticism in the legal world. Among other things, it was noted that a legal decision only partially arises out of inferences from the law. Furthermore, the formalizations of the normative contents, as they came to be developed, constituted normative interpretations which were debateable. On the other hand, so called expert systems originated from this approach, which, when properly placed in an administrative environment,<sup>2</sup> have certainly proved to be very useful. Furthermore, in the theoretical sphere, these experiments boosted the logical-cognitive in-depth study of aspects of reasoning concerning norms, modernising traditional legal-philosophical studies such as, for example, those related to deontic logic.

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<sup>1</sup> For example, in Italy, in the "accident insurance" domain ([18] and [16]).

<sup>2</sup> For instance management and consultation, rather than impracticable automated decisions, relating to very important laws, like those which regulate pensions, taxes, etc..

The project illustrated here does not deal with the process of legal decision-making, but aims at working on and around the law, with totally different objectives to those mentioned earlier. The general aim is to provide the legislator with tools for drafting laws and for the management of the normative system. Emphasis is not placed on the contents of the specific laws but, rather, on general aspects of all laws and on the process of their drafting and management.

It is an approach which, to a minor degree, was already taken in the 1980's. I am referring, in particular, to the work done by Carol Hafner on the modelling of legal precedents for documentation systems ([20], [21] and [22]). The research outlined here has some affinity with the above mentioned work (and with very few other similar projects), in both its objective and methodology. The objective is the drafting and management of the norms and the method is based on the adoption of some kind of model.

### *1.2 Towards a law-making environment*

The project presented here has by now its own history and reflects the difficulties, doubts, choices, and second thoughts that characterized experiments into artificial intelligence applied to the law in the 1980's. At the beginning of the decade, a research trend began at the Istituto per la documentazione giuridica, directed towards the computing of norms, with the slightly vague objectives of aiding decision-making (inference of the consequents provided for in the law) and of evaluating the consistency of the norms themselves. It was based on a view of the normative system as a system of logical rules, inspired by certain trends in legal philosophy. The extraction of the logical rules from normative texts took place in an arbitrary fashion, encouraging those kinds of criticisms which I mentioned earlier.

In this context, in order to be provided with a formalization method, a study was carried out, for identifying a model of the norm, that led to the definition of some general criteria to be followed in its representation. It was based not only on legal philosophy and science but also, freely, on the linguistic theory of "speech acts" and on the technique of semantic networks for defining concepts. A proposal for an embryonic model of the static definition of the norm derived from it, which was inspired both by the science of language, and above all by the analytical theories of the norm. We were convinced that the best techniques for representing norms were those mainly based on the principle of isomorphism, therefore on the closeness between the adopted formalisms and the way of expressing features of the domain in which they operates. (see [17]).

The Esplex prototype for the computation of normative consequents ([3] [36]) was an initial test for the introduction and use of a limited distinction between types of normative speech acts (meaning provisions) in representing norms. The law (in this case, in the domain of agrarian law) formalized and represented in Prolog formulae, allowed us to carry out some deductive reasoning:

- firstly, among the sentences that had been appropriately distinguished, in accordance with a given classification table;
- secondly, among the legal concepts that had been organized with the technique of semantic networks, through the identification of their attributes, either within the law itself or else within legal authority.

Another original aspect of this prototype was constituted by the introduction of a limited form of

processing deontic modalities, associated to normative propositions of a particular class.

The complexity of the formalization process of the laws, discouraged experiments of this type, above all when the aim was not that of computing a single law, but, as here, that of designing a tool of more general validity. This was so even if description models were adopted in some way based on the legal world, therefore more isomorphic and less rigid than those of strictly logical origin, popular at that time.

All this led to the belief that the shortest way might be the longest. In other words, it was necessary to introduce some modelization at the source, during the phase of the formulation of the law; taking it up again only later, on the more solid basis given by the availability of a model to some degree inherent in the laws themselves (see [5]).

Furthermore, we should consider that, at least in my opinion, a good description model of the norm is indeed indispensable for the formal representation and computation of norms, but it is also necessary for the creation of truly effective computer tools for aiding in the drafting and rationalization of norms. In this case, the model is used as a guide to the formulation of the normative text.

From this new point of view, the objective became the creation of a tool for aiding in drafting and correcting normative texts (Lexedit [28]). It consisted of a commercial word processing program, including specialized functions, where the law maker is assisted with different technical-legislative and linguistic features.

Both superficial and deep models of the norm could be used. Generally speaking, it can be said that efforts behind the legislative drafting technique, point in the first direction and those of legal philosophy (of analytical trends) in the second. While the former are superficial and indisputable, the latter are deep and debateable.

The new research approach was, therefore, initially based on formal models of the law, defined by legislative draftsmen: to be precise, on the "Rules and Suggestions for Drafting Legislative Texts", prepared by a national working group coordinated by the Interregional Legislative Observatory, in which our research group is institutionally and actively present. This knowledge is basically constituted by formal rules for the organization of a normative text, by linguistic and orthographic suggestions and by indications regarding the use of terms. The system was initially designed as a prototype, then as a demonstration and is now operational, in experimental use by Italian legislative bodies. The system interacts with other computer or documentary tools, which are increasingly available to the Italian legislative authorities, especially regional bodies.

The substantial approval by the legislator of this tool, has allowed us to widen the scope of our research, by introducing a deep and articulated model of the organization of the text in the drafting stage. It is the "functional structure", that will be described in Part 2, that views the law as an organic set of functionally differentiated provisions. This view is well-known in legal philosophy and science and in law-making and it is absorbed (but only partially respected) in legislative practice. Lexedit, therefore, offers, amongst other things, the possibility of organizing the text according to the traditional division of it, and also in accordance with the "functional structure" model.

Therefore, it has become feasible to recover those old, once abandoned, objectives of

computing norms (which I talked about previously), without, I hope, running up against well-known criticism. This time they are based on models of an essentially legal nature, already operational in legislative practice, even though partial and therefore in need of strengthening. The choice was, therefore, to use the model of the norm not merely for the formalization and representation of laws, but, in some degree, for their organization and formulation. At this point, the extraction of meanings becomes easier, more certain and less arbitrary. This itinerary, which is not as yet concluded, required a long period, necessary for giving the legislator a way of becoming familiar with the computer tools for drafting and, above all, with the use of expositive models.

The effects of this method (managed by the computer) should be:

1 - setting out and organizing of legislative texts becomes user-friendly, rationalized and uniform, because they are guided by a model;

2 - assisting the formulation of the individual provisions, guided by models and with the "generation" of standardized expressions, as far as possible;

3 - searching the laws, guided by the analytical model;

4 - diagnosis of normative pathologies, through the activation of modules for the computation of relations between elements of the norms, highlighted by the model adopted in the drafting phase.

These matters will be discussed in Part 3.

## **2. Identifying the model**

### *2.1 - Legal and linguistic theories for defining normative models<sup>3</sup>*

The greater the availability of models, both of the normative act, and of its constituent elements, the greater the possibility of designing tools for aiding in the formulation of the same. However a more complex articulation of the functional structure of the normative text derives from this. It means seeing how far we can go and how far it is worthwhile, without upsetting current legislative practice too much.

Suggestions for a more audacious modelization can be found there where legislative drafting technique does not reach, as, for example, from certain analytically oriented theories of the norm, developed by legal philosophy, and by certain theories of language, developed by the philosophy of language (see [2]).

The model of the rule for abstractly expressing the legal norm, is very popular in studies of logic applied to the law as well as a normative system understood as a set of rules. However, if we take a normative text<sup>4</sup>, we come up against a dimension that deviates from our reasoning in terms of the normative system as a set of rules. In other words, we find ourselves faced with a

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<sup>3</sup> *Part of this paragraph has been taken from [4].*

literary text, containing a consistent range of expressive modalities. Furthermore, we come up against elements that, with difficulty, lend themselves to being seen as rules, as Dworkin points out [14].

Amongst other things, in legislative drafting we find the law viewed as an organic set of provisions. Each type of provision performs its role, like defining new legal entities or attributing competence to bodies and so on. The analytically oriented philosophy of law is especially rich in studies on this theme ([23], [29], [30], [11], [12] and [13]), and is the main source of the criteria for modelization adopted here.

In the philosophy of language, work has also been done on defining models for the comprehension, description and explanation of natural language. One important theoretical tool is Austin's theory of "speech acts", later developed by Searle [33]. As Austin maintains, each speech act has "happy conditions" under which it proves to be appropriate and "satisfying conditions" under which it is completed. Therefore, an effective and wide classification of normative speech acts is valuable, because the acts in the various categories do not occur by chance or should not.

This theory should, therefore, assist in the analyses and modelization of the various types of normative speech acts, in the sense that we can imagine that an adequate expressive model and proper rules for use, may correspond to each one. But an especially appropriate formalization language, whenever we intend to build expert systems, based on logical rules, extracted from the laws, may also be founded on it.

Here, this means also using the theory of speech acts, not for explaining the norm, but for defining the functional structure of the text and generative frames for the (computer-aided) construction of provisions (normative speech acts), as we shall see in Part 3.2. In practice, the idea expressed here is to accept the view of the law as an organism made up of various types of provisions (each having its own functions within the law), and, in their linguistic expression, to see these as speech acts of various kinds. It would also be useful to see a normative text in the light of the theoretical tools provided by the philosophy of language and, in particular, by the theory of "speech acts", in order to reach a thorough knowledge of the individual provisions, to the point where legislative science and technique do not always reach.

This means a parallel and complementary point of view: in fact, to talk about norms as rules making up part of a system of rules, is a useless abstraction, because it emphasizes the role that the various provisions have within the normative corpus that includes them and of the normative system in general, understood as an organic set. We are, nevertheless, always dealing with propositions expressed in natural language. It therefore seems worthwhile to look at the same entity, at the same proposition, in these two ways: on one hand, observing it as a particular speech act, therefore concentrating our attention on its communicative role, within the framework of the system of natural language; on the other hand, looking at the role it plays within a system of normative rules.

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<sup>4</sup> *This is the operation that who intends to define a model for an information system must perform, above all one for aiding legislative drafting.*

The impression is that the view of the normative system as a system of rules and of these as provisions, each having a specific role within the organism of the law, allows for a macroanalysis, fostering the definition of a good model of the law. While the use of the linguistic tool constituted by the theory of "speech acts" permits a microanalysis, fostering the definition of expressive and analytical models of the various types of provisions, where the standards taken from legal technique and practice do not reach. Computer-aided drafting of a normative text requires a sufficiently expressive and therefore analytical representation model.

For these additional analyses, necessary for the definition of models of normative provisions, to be used jointly and within the model of the normative system described above, we will need to use linguistic and legal tools (analysis and classifications, especially analytical and pragmatic, developed by lawyers). This is not the place for an analysis of the theoretical tools found in the science of language and in legal science, for the understanding of normative language. It is sufficient here to assume that they are able to constitute the source from which to derive the definition of models of the norm and the resulting computer tools for an effective functional structuralization of the normative text; as well as for the computer-aided construction of the different types of provisions (comments on these issues can be found in [5]). The technical nature of legislative legal language would, in fact, appear to reside not only in the lexical sector, but also, at the illocutive level, in the speech acts adopted<sup>5</sup>. The identification of the types of provisions (or speech acts) and the determination of their deep structure, are the bases for the definition of good functional structures, as well as the expressive frame to be used as tools for assisting in the generation of normative propositions (studies in this sense, developed within this project, can be found in [17] and [7]). This should be the most complex and determining function of a specialized editor for the computer-assisted drafting of normative texts.

## *2.2 The functional structure as a method for the definition of models of the norm*

As mentioned earlier, legislative drafting, together with legislative science, provide methods suitable for their computer reformulation. An example of this is a view of law which, in this research, I call "functional structure", studied in the analytical theories of the norm (in particular, see [29]) and partially assimilated by law-making techniques and practice.

The third part of the handbook "Rules and Suggestions for the Drafting of Legislative

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<sup>5</sup> *"Following J.L. Austin, every speech act is defined as illocutory (or illocutive) that realizes or tends to realize the cited action"; "practically every sentence may be considered in one way or another as illocutory" (Dictionnaire de linguistique, Larousse, Paris, 1973, Italian ed., Zanichelli, Bologna, 1979). It seems to me that it is especially true if referred in general to expressions of a normative text, whose reason for being is precisely that of intervening energetically in the regulated reality. This is still more evident in certain provisions and formulas of a performative nature, that is, those containing orders.*

Texts"<sup>6</sup> identifies the elements of the normative act and regulates its organization. The subject of the structuralization of legislative texts may be better understood by dividing it into three aspects:

- 1) formal structuralization, that is, the distinction between the "body of the law" that contains the normative provisions (the prescriptions designed to make changes to the "legal order", with the relative schedules) and a set of "informations about the law" (indications that identify the normative act and place it within the sphere of the system of sources: date of the promulgation of the act, the source to which it belongs, etc.);
- 2) hierarchical structuralization of the body of the law, that is its organization in the traditional hierarchical partitions (chapter, heading, section, subsection, etc.);
- 3) functional structuralization of the body of the law or, in other words, its subdivision in provisions that perform separate functions (objectives, definitions, substantive provisions, provisions imposing sanctions, etc.).

The Handbook deals with the subject of functional structuralization from two connected points of views: the identification of the different functions that may be performed by the provisions found in the normative documents; the organization of texts of the law in parts that unite sentences with the same functional characteristics, an appropriate form of organization especially in provisions aimed at establishing the overall regulation of a particular domain.

In normative texts, the constituent elements would seem to reside in all those provisions that perform sufficiently distinct functions. That of the functional structure is a notion which has scarcely been implemented in technical-legislative practice, in my opinion<sup>7</sup>. The choice of the functional organization of the text is, therefore, entrusted to the norm-maker-draftsman. With this, in short, I mean any partition, structuralization and organization of the text centred on the functional components of it. Actually, the normative text, in Italian legislation, is articulated in traditional partitions (sections, subsections, etc.) and structured, it seems to me, in accordance with two concurrent strategies, thematic and functional, but not in a strict manner. This can also be seen in the headings of the sections, where sometimes the subject is shown, or sometimes the nature of the provision, or sometimes both, or sometimes neither.

A law-making environment should provide an option for functional and thematic structuralization of the text. Furthermore, the draftsman should be provided with a tool that facilitates the input of individual provisions in the sphere of a reasonably standardized expositive scheme. According to necessity, the use of different structures is not to be excluded. Legal science provides very complex and articulated formulations, from which to obtain models.

I believe that the tool of functional structuralization is very versatile and that its potentialities go well beyond aid in the organization of a normative text. This tool should not only facilitate the drafting of the text, but also its interpretation, both in favour of decision-making and of all those legal and computer-related activities flowing from the moment when norms are created. For example, and above all, the creation, management and use of transparent legislative data bases and the analysis and formalization of normative acts, for the building of normative

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<sup>6</sup> *The Handbook was published by the Corordination of the Interregional Legislative Observatory in December 1991.*

<sup>7</sup> *Here, as elsewhere, in this article, I am referring exclusively to legislative drafting in Italy.*

knowledge bases for expert systems.

The functional structure constitutes a method for identifying models, even if elastic models, of the law: structural more than content-based models, "syntactic" rather than "semantic", but mainly general models, valid for every norm or, at least, for large families of norms.

To be more precise, a basic model has been defined which is general and valid for every type of law. This is seen as a organism composed of several types of fundamental elements: information about the law, provisions in the law, and related matters (amendments to other laws and legislative references).

Components such as the name of the law, the formula for promulgation, and so on, correspond to the first type; the normative corpus to the second type; the provisions amending other laws that may be involved and references to other laws or provisions correspond to the third type.

The corpus of the law is made up of various provisions, whose types are defined in second-level models according to the type of legislation to which they refer. Lists of provisions that are characteristic to the various legislative domains are, therefore, identifiable: for example, national laws, regional laws and so on.

The law-making environment will use these sources of knowledge both in the drafting phase of the normative texts and in the search phase in legislative data bases organized in this way.

Similarly for provisions: as the law is seen as a set of provisions, thus within the provisions the structural (or at least recurrent) and legally significant aspects may be highlighted. In this way, the embryonic structure of the various provisions is placed alongside the structure of the law. While, in some measure, the former is indicated by legislative science and technique, the latter are identified pragmatically, by comparing current practices with the theories of both legal science and, in this case, the science of language.<sup>8</sup> Therefore, for example, if we highlight the types of provisions that attribute competence, we can also identify their recurrent and necessary elements, like, for example, their addressees (bodies, organisms, activities, etc.), whose contents may be emphasised.

A special and autonomous rank is attributed to amendments, while there is a distinction between references: references between norms and references between provisions.

Therefore, the method proposed here, as a condition for designing innovative and effective tools for processing laws, consists in preparing a structural, "syntactic" model of the law and its components (provisions). Proposals of this type are not completely new (like the structural modelization of legal precedents in [20], [21] and [22]).

The weak point of proposals like these is their onerous nature for the legislator, who sees

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<sup>8</sup> *In particular, as has already been mentioned, the theory of speech acts: a study of the combination of the legal and linguistic perspective in the analysis of laws is found in [7]).*



himself as burdened with a further task, that of conforming, in the formulation of the laws, to an additional restriction, namely, that of respecting a model. In reality, this is an already existing restriction, considering the recommendations regarding the law-making technique, but one which is largely disregarded. Only the availability of computer-aided tools for legislative drafting makes similar proposals practicable. This has already been advocated for some time, relating to the "law-making environment" as an integrated tool for the legislator, based on models (see [8] and [6]). It is, in fact, the job of the computer, in the drafting phase, to assimilate the contents elaborated by the draftsman and guide him with regard to the technical-legislative rules and the model, taking on the management of the structure of the text.

This procedure, apart from fostering the correctness and good quality of the legislative text (the scope of a tool for computer-aided drafting), contextually provides the equivalent electronic document, making it available for further processing, as we shall see later. The information system for legislative drafting described here also performs the role of a system for easy and authentic data entry: the result is the possibility of, simultaneously, proposing tools for drafting and organizing the text, analytical documentary tools and tools for normative diagnosis.

### **3 Towards a model based law-making environment**

In order to adequately support the legislative process (formulation of laws and attention to the normative system), it is necessary to design computer tools that aid in the phase of the formulation and drafting of the law, in the phase of investigating the normative domain involved and in the phase of updating the normative system.

The project in course at IDG, illustrated here, aims at designing and implementing a "law-making environment", with the three given features. The module for computer-assisted drafting, understood as a tool for revising and correcting pre-existing texts, is being experimented, as I have already mentioned, by legislative bodies [28]. The module for formulation of new texts, called Lavagna, guided by the model, is in the building phase. The technique for "intelligent searching", based on the model, is in the phase of experimentation, while that for diagnosis, is already underway, but still being researched.

It seems to me that enough has already been done for legislative drafting, both in research and on the level of implementation, even though the tools being offered are still (at least in Italy) in experimental use (on the general theme of "legimatics", see [10], [9]; for a review of computer drafting systems, see [27]). However, the wordprocessing program, specialized in legal texts, is already in circulation and offers draftsmen a user-friendly working environment, with technical-legal consultation and automated text operations (management of the articles, etc.). Here, I shall present the new law-making techniques, in phase of experimentation, based on the adoption of some model of the law, a pre-condition for tools like the one described here.

#### *3.1 The model as a guide to the organization of the normative text*

From the combination of the formal structure of the normative text, of the hierarchical and the functional structures, results an initial, elementary, conceptual model of the law, managed by the computer. This model can act as an active guide for the draftsman. It is the frame in which the

contents of the act are inserted, but, at the same time, it offers some tools for drafting that act and codifies the act itself in a structure that can be recognized by the computer.

The text can be drafted thanks to a model which proposes the subdivision of the legislative document into successive partitions, each destined to contain provisions that perform a particular function (for example, in the order suggested by the Handbook: scope, definitions, etc.). Apart from being able to be used for documentary ends, this subdivision can aid the interpreter to understand the meaning of the text, as can be seen from the links between the sentences that make up the text itself. Lexedit, the module for the technical-legislative revision of existing or even just drafted texts, has already been implemented and is operational. This tool also allows for the functional structuralization of the legislative text, but a posteriori, with the highlighting of the parts of the text and their functional definition (attribution of the type of pertinent provision). Contemporaneously, the text may be stored, if the user wishes, in a data base of structured laws.

We are now perfecting Lavagna, a module specialized in drafting ex novo the legislative text, guided by the model. Here the model operates not only as a conceptual map of the law (while hierarchical partitions are, we could say, a geographical map), but also as an active guide to the organization of the text, instead of being subsequently superimposed on the already formulated text.

The draftsman begins his session for the formulation of the new legislative text, by selecting the functional model of the pertinent law, among those available to him. In fact, the system does not offer a rigid model and it is presumable that every normative system (national, regional, etc.) assumes a specific model. We can also imagine that it is advisable to assume more than one model, also according to the type of legislation involved. This is of absolutely no hinderance to the proper functioning of the system, that can manage an unlimited number of models. Superimposing several models on the same legislative text is also feasible, should it be necessary. In fact, the models deriving from the functional structure method are to be understood and used more as "views" on the law than as models of it. It is, therefore, technically acceptable that the same component of the law is "viewed" as performing different functions. The limit of the views that can be superimposed, simply depends on the convenience or not of the degree of complexity introduced. This can largely be assessed subsequently, in the phase of research and diagnosis of the laws drafted in this way.

In other words, the structuralization of the law by type of provision, is an elastic tool and can be graded and "zoomed". Faced, for example, with a provision of a regional body, attributing competence to a municipality, we can stop at this, tagging the provision as "one attributing competence"; or we can gather within it more specific sub-provisions that describe various aspects of the relative attribution. The choice depends on subsequent expectations, with regard to searching the stored laws and to the types of diagnostic controls which are expected. Therefore, these problems will be solved in the phase of tuning the system, deciding what is expected as a result, properly modulating the method in the phase of formulating new legislation. In practice, it means deciding the degree of optimal analytical depth, choosing between restricting ourselves to highlighting the more visible and interesting provisions (especially for searching); or maximum transparency, by making even secondary provisions contained in primary provisions emerge, moving in this way to a structured use of the model of the provisions.

Object-oriented programming was used to create the prototype. The formulation of the text occurs provision by provision. The draftsman, therefore, indicates which type of provision he

intends to draft. Every type of provision uses a special wordprocessing window that is available to it. Tools and guides for the formulation and all the knowledge available on the provision itself, are at the draftsman's disposition, offering in practice the technical legislative and legal assistance already built into Lexedit. One of the advantages for drafting, is that of specializing the technical-legislative help offered, concentrating all the available knowledge on the type of provision, in the specific window.

Another advantage is that of permitting the automated management of the text itself. The various provisions are assembled by the initiative, or under the active control, of the model, applying technical-legislative knowledge in the organization of the legislative text. We can adopt various and even variable approaches, compared with the degree of intrusiveness of the model and rules, in the organization of the law. Gradually, through repeated evaluations, the just balance between active and consultative use of the available knowledge can be identified by the draftsman.

The organization of the text determined by the functional structure, does not present problems, being a criterion of acquired law-making technique. Instead, the problem arises in the case of more complex laws, where they deal with more than one general theme. In this case (and I believe it is the majority of cases), it is, indeed, necessary also to take into consideration the thematic aspect in defining the best organization of the text. It will result in the structured end product, both from the thematic as well as functional point of view. This occurs in the initial phase, when the opportunity is given to clarify whether a monothematic or multithematic law is being drafted, managing then, in the second case, the complexity that derives from it, through the integration of the thematic point of view with the functional. After completing the composition of the text, or rather, of all its provisions, the draftsman may, nevertheless, discuss the organization that he has followed, reorganizing, should he believe it necessary, the various provisions in another way.

Having finished the draft and having organized the act in a satisfactory way, the draftsman will ask the system for the automatic partition of the text. The system will propose an articulation, automatically inspired by the technical-legislative rules with regard to it, incorporated in the system's knowledge base. With respect to the above mentioned rules, the system will attempt to work in order to give the maximum correspondence between the thematic-functional and articulated structure. This occurs in current practice, where, for example, draftsmen rarely split up a provision of definitions into several articles.

As far as the hierarchical structure is concerned, a relative correspondence between the thematic-functional and articulated structure, will improve the quality and comprehensibility of the law. Without doubt, also the automated articulation may be disregarded by the draftsman and he may, nevertheless, autonomously decide on the final form of the law.

We intend with this experimental implementation to evaluate the effectiveness of the model in managing the expression of the text, as well as in designing the drafting environment for the introduction of functions for generation or, in any case, very propositive functions, as well as, above all, making it feasible to use new techniques of documentary research and diagnosis.

### *3.2 - Generation of provisions for legislative drafting*

After having defined the thematic-functional structure of the normative text as satisfactory,

at least in the initial phase, the draftsman will move onto the formulation of the individual provisions. In this phase of wordprocessing, tools for technical-legislative consultation, control and computer-aided drafting are also made available.

Assembling and generating tools may enable the user, according to pre-established models, to produce provisions characterized by certain functions. The functional definitions, deriving from the use of the input windows, would be translated into precise structural features of the individual provisions, that would conform in this way to their schemata-type. For example, once a scheme for drafting the provisions of a definition-type has been identified, all the definitions produced in a semi-automated way are made uniform with this scheme.

We are dealing with functions that assist and facilitate the formulation of the various kinds of provisions that make up the normative texts. They take on a concrete form in procedures based on models of the provisions, that provide the draftsman with schemata, conversational "windows", capable of directing the norm-maker towards correctly formulating the contents and enable him to adequately systemize these in the frame of the pertinent provision. On the one hand, the development of these tools draws on the experience of the 'generation' of language, developed in the sphere of computational linguistics, and, on the other, studies both by jurists and philosophers of language, for identifying valid models of normative provisions and normative text.

An elementary but acceptable and non-controversial model of the legal order is necessarily the starting point from which to obtain a model of individual laws, on which then to base and organize the 'generative' modules of the various provisions that have been identified. We have in mind designing a system that allows the draftsman to prepare the type of provision he wishes to formulate, by choosing the relative generative scheme. In the choice of the pertinent generative scheme, the norm-maker orients himself, being guided by the models of the laws introduced into the system. He could, for example, expand his choice by opting for a constitutive rule, that implies a provision attributing competence; that provides for a normative speech act of a declarative type, whose necessary elements are known (for example, the competent body). The menu at this point would be enriched and the draftsman would complete his choice, by indicating the specific propositional content and the logical structure in which the chosen speech act is inserted. It would be up to the system to construct the linguistic structure, into which the draftsman would insert the specific contents of the provision.

The use of generative tools would allow for an increase in precision, uniformity and rigour in the normative texts. In this way, we would obtain the highest degree of standardization compatible with the complete freedom of the norm-maker with respect to the contents.

I have used the conditional mood, because at present the actual generative modules have not been developed. The orientation followed at the moment is the pragmatic one of using heterogeneous techniques, according to the case. Therefore, it involves the real generation of the expressions, but also simply assembling them through the use of standardized expressions from usage, which seem reasonably frequent in the legislative domain.

This type of feature of the 'law-making environment' is essentially the guideline of the program. For the moment, only 'windows' for the formulation of especially standardized elements, like amendments and normative references, are available, while for other more complex provisions, windows containing only basic aspects are offered.

This basically means the attributes provided by models of the various provisions, given their

important role in documentary research, and technical-legislative assistance.

Therefore, in the phase of drafting normative provisions, what I am presently worried about is to give technical-legislative assistance and to pay attention to the aspects that are required by documentary tools, leaving aside for the moment support for the actual expression of the provisions themselves.

Designing tools of this type will require time, due both to their complexity and because they presume a familiarity by the legislator, superior to the one he currently has, with the tool for the functional structuralization of the legislative text (as well as the use of the computer for drafting laws).

An interesting application of this type was presented at the workshop "Artificial Intelligence and the Public Administration", held at the Italian Artificial Intelligence Association Congress (Florence, 13 October 1995). It related to the 'generation' of regulations, starting from their graphic representation [38]. This tool would also adapt perfectly to the formulation of parts of legislative texts, those of procedural provisions, and I am very hopeful about the possibility of transferring experiences developed in other domains into the legal domain. In the project illustrated here, the use of a tool for block diagrams for the representation of procedural provisions was provided for, but only in order to offer the draftsman a means for evaluating the logical correctness of the procedural provisions in the draft, by highlighting, for example, any gaps (internal diagnosis) (see Parts 3, 4 and, more generally, [1]). The use of similar tools in the phase of formulation, rather than in the diagnostic one, of the procedural provisions, would certainly be more efficient.

### *3.3 Intelligent searching for investigating normative domains*

The use of the computer for documentation, represents the best known and consistent contribution of informatics to legal activities. Automated documentation has constituted the initial area of action of informatics in the legal sector. From the point of view of quantitative implementation, everything seems to have already been done, given the very wide availability of databases. Much less, it would seem, has been done from the qualitative point of view. The weak aspects of automated documentary systems have always been the discouraging variety and complexity of access languages and the unrefined nature of the full text systems of documentary retrieval.

Today, the first problem seems finally to have been solved. User-friendly interfaces make interrogation easy. Vice versa search strategies and the organization of legislative documents seems to have made little progress. Anyone who carries out a full text documentary search, like a fisherman, casts the hook of the keyword in the black box of the legal document (in this case the text of the law) and relies on good luck (with a little assistance from, for example, thesauri regarding the semantics of the terms).

In the field of legal artificial intelligence, studies have, for some time, been carried out into the possibility of formalizing the knowledge required for documentary retrieval (for example, for legal precedents, see [20], [21] e [22]). I believe as far as legislative data bases are concerned, there is no other way but the transformation of the legislative document. This should always be increasingly transparent, both structurally and as far as its contents are concerned. Structural transparency should make the functional components of the document itself visible. This is the

orientation that has guided me, in designing legislative documentary tools, within the sphere of the project illustrated here.

We have seen how, by exploiting new computer-aided tools for drafting, we can give structural transparency to the legislative document, without this leading to great technical and organizational efforts<sup>9</sup>. This automatically leads, through the creation of structured legislative data bases, to new and more effective strategies of documentary retrieval. A normative text drafted in conformity with particularly analytical functional structures, constitutes per se an already reasonably "intelligent" document. I have in mind a normative text in which elements such as provisions containing sanctions, definitions, referrals, prescriptions, etc. are highlighted. They constitute, once the text is stored in a data base, precious channels for documentary retrieval. We are, in fact, always dealing with formal and structural, not content-oriented retrieval channels, but especially analytical ones.

The investigation has as its objective the identification of a normative domain of special interest, within the normative system. The domain may be described and identified from either a thematic or structural point of view. In other words, the search in certain cases will aim at identifying the legislation regarding a certain theme; on other occasions, it will be concerned with consultation of domains regarding specific types of provisions; more often the objective will be mixed.

The functional structuralization method provides the greatest number of opportunities as far as searching for types of provisions is concerned. Without designing special tools, but simply by taking advantage of the functional structuralization of normative texts, it is, for example, feasible at the time of introducing a definition into a newly drafted text, to consult the data base of the structured laws. Through the search channel of the provisions containing definitions,<sup>10</sup> the draftsman will be able to control whether analogous definitions, with which to compare it, exist or not, avoiding the reproduction of the same definition, or other similar drawbacks. There are sectors of the public administration that are especially interested in particular types of provisions: it is sufficient to bring to mind the interest of bodies responsible for the protection of public safety, in relation to provisions containing sanctions.

The formalization of references and amendments, obtained automatically in the drafting phase, allows, in the search phase, for the identification of the normative domains, determined by explicit and formal relations. This tool should be especially valuable in the reorganization of specific legislation, such as, for example, in obtaining framework laws.

The identification of thematic normative domains is more arduous. The model proposed here provides an additional tool compared to traditional techniques (key words). It involves the

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<sup>9</sup> *It should be kept in mind that the phase of assisted drafting, with tools for the organization and structuralization of the text, concerns the production of both the text of the law and the equivalent electronic document to be stored (drafting and data entry).*

<sup>10</sup> *At least the definiendum, among the structural aspects of the provisions containing definitions, will be highlighted.*

highlighting of recurrent aspects of the provisions. Let us suppose, as an example, that there is an interest in investigating the provisions that attribute competence to the various administrative bodies. The law-maker has, let us suppose, the purpose of discovering and displaying those that are assigned to a specific body, like, for example, a Municipality. Assuming that originally (in the drafting phase of the laws) a computer-aided drafting system was used, like the one illustrated here, furnished with the tool for the functional structuralization of the legislative text. Assuming that the model of the norm used provided, among the types of provisions, for that attributing competence, and that, among the relevant and recurrent elements of it, that of the body whose competence is attributed (and thus it should, reasonably, have been so). Here, then, we would have the possibility of answering fully and exactly the initial question.

Within the project for a "law-making environment", to which all the proposals described here refer, we have already completed the creation of a computer-aided system for drafting laws, which also contains an organizational tool according to the "functional structure" model. The text is, at the same time, also a document, managed by a documentary system that provides the possibility for searching by types of provisions. This documentary component of the project is already operational<sup>11</sup>, but in the phase of experimentation and perfection.

Functional definitions may also be attributed a posteriori, therefore by a documentalist who works on the already existing text. In this case the definition has only a documentary purpose. The functional definition of the individual sentences in previous legislative texts, would constitute an informative element, which would enable the additional forms of retrieval illustrated here to be carried out.

### *3.4 Diagnostic tools for evaluating normative impact*

It is also the case of computer tools for the evaluation of normative impact, as we shall see. I am referring here to all the formal and content-based operations for the analysis, comparison, and control of the new normative text, within and among single provisions; therefore, of internal consistency. Furthermore, I am referring to the analysis of the relations between provisions of the law being drafted and similar provisions of pre-existing laws and, in general, to relations between the norm and the normative system; therefore to the external consistency of the norm.

While the tools for the analysis of internal consistency should necessarily be found and used in the drafting phase, those relating to external consistency are useful both in the drafting phase and elsewhere. In the former case, they are useful in the pursuit of the correctness of the drafted text; in the latter, for updating the normative system, an operation that may be performed at any time. Therefore, certain diagnostic tools may be used in both phases without distinction. It will be advisable to place all the diagnostic tools, useful for reaching correctness in the drafted text, within the drafting phase. It will, nevertheless, be necessary to carry out controls within the normative system for highlighting relations and "pathological" states.

This aspect of the "law-making environment" project is at present only formulated in its

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<sup>11</sup> *A commercial documentary tool, Access by Microsoft, was used for the experimentation of the method.*

general outline. The method adopted is that of the adoption of the functional structure model of the law and the choice of concentrating the diagnostic investigation on the evaluation of the relations between basic aspects of the various provisions.

Certainly, even the evaluation processes can be supported by computer tools, in as far as the normative texts reach greater transparency, in structure and content. The methods and techniques for legislative documentation proposed in Part 3.3, are, therefore, the pre-condition and constitute the foundation on which to make the diagnostic modules operate.

Designing computer tools that assist in normative evaluation, presupposes the law is expressed in the most articulated and analytical way. Every one of its constitutive elements must clearly emerge, in such a way that it can be acted upon, with the proper mechanisms for analysis.<sup>12</sup>

Tools can, therefore, also be imagined for the control and evaluation of normative impact, or at least aspects of it.

### **3.4.1 Internal impact**

Within the act, the internal impact may be understood as analysis of the consistency of the single provisions. Here, however, it is inappropriate to speak of normative impact. It would be more correct to talk about the logical-legal evaluation of the formulated provisions, by making reference therefore to the problems of drafting (in the strict sense) rather than of normative impact. On the other hand, a check on the logical consistency of a provision would appear to have positive effects even with regard to normative impact. This role of the system is, however, performed in the phase of the computer-aided drafting of the text: as we have seen, every specialized "window" provides assistance and exercises control or directly manages aspects of the formulation of provisions. According to the type of provisions, we will be able to offer diversified aids which are more or less incisive, according to their nature and the knowledge available about the various provisions.

Certain provisions will receive more propositive help than others. For the purpose of evaluating internal consistency, with reference to provisions of a procedural nature, a tool based on block diagrams, the language of expression of procedure, may be validly utilized. This has a relatively simple logic and involves graphic forms of representation which are easy to understand and use. Through the adoption of a limited number of graphic symbols, we can proceed to the representation of the basic elements of procedure (parties, agents, activities, legal effects, etc.) even of those of the most difficult sentence in complex situations, such as logical and temporal dependency (represented through arrows that link the symbols).

As diagnostic tools, formalized models of the procedural norms contained in the legislative text allows lacunae, defects and incompleteness to be found, in the course of drafting, and permits a initial and immediate evaluation of the degree of complexity of the procedure.

Furthermore, other functions may be performed by the diagrammatic representation of the procedural provisions. Formalized languages foster the comprehensibility and learning of the

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<sup>12</sup> *This is obtained with the introduction of the functional structuralization tool in the drafting phase.*



legislative text. During a discussion taking place at the legislative body, the diagram may accompany the Bill in order to foster understanding and evaluation of it. Furthermore, the diagram may follow the law during its existence: as a tool for interpretation and teaching, for training administrative personnel, for facilitating the citizen in gaining knowledge about procedural aspects of the law, and as a monitoring tool for the administration.

In this project, these aspects are being studied and the diagram will perform the role of a tool for the assisted construction of procedural provisions, therefore made available in the phase of constructing a normative act, in the specialized "window". I am discussing it here in order to stress the additional, indeed main, role this tool performs: apart from aiding in the formulation of procedural provisions, it also implicitly effectuates a control on its consistency. As I have said, diagnostic tools relating to internal consistency find their most suitable place in the legislative drafting phase.

### **3.4.2 External impact**

External impact, seen as the analysis of relations between the new law and the normative system and between analogous or, in any case, correlated provisions of the new law and pre-existing laws.<sup>13</sup>

Explicit links are an aspect of this, stated in special expressions, the references<sup>14</sup>, between the new norm and the normative system. The problems mainly deriving from the use of implicit references, which are obviously discouraged because they are a source of ambiguity in the normative system, are well known.

The use of advanced systems of documentation in legislative data bases, by means of the activation of explicit references and the identification and activation of implicit references, can constitute a considerable aid to the norm-maker. The control of explicit amending action by the norm on the normative system, is carried out through the provision-reference, for the evaluation of aspects of the legal impact of the drafted norm on the normative system that receives it. In this way the insertion of the drafted text into the normative system can be simulated, verifying the effects that it would produce, with the activation of the references found in it.

Procedures of this type have already been created (see on this matter [31]) and used and, within the framework of a law-making environment, they represent an example of a diagnostic tool. A tool of this kind points out whether the user is trying to repeal a law that has already been repealed, whether he is citing the law in the correct way, whether he is repealing a law that repeals another<sup>15</sup> or it may suggest citations and references and advise the legislator about any ambiguities

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<sup>13</sup> *For example, comparisons between provisions relating to the objectives of various laws in the same domain.*

<sup>14</sup> *In our experimental system of "intelligent searching", references are treated as attributes of the provisions that house them and are, therefore, made available for computerization.*

<sup>15</sup> *With the danger of technically bringing the former back to life.*

deriving from the introduction of the new norm in the legislative corpus.

A control on the relations of content, between the norm and the normative system or between parts of the same norm, according to other points of view, is without doubt feasible. The reference is a specific type of expression, that is distinguished from the others by the fact that it is formulated in a strict manner, both in form and content, so that evaluations referring to it are clear and directly computable.

As was already done for references, diagnostic controls are also practicable among the significant aspects of other provisions, once they have been highlighted through the use of the functional structure method, enabling some conflicts generated in the normative system to be identified.

It will be necessary to clearly ascertain these conflicts and carrying out a search in the functionally structured laws, in order to find specific relations between the elements of the various provisions. Those particular relations, which will mainly have been described as "pathological", will be sought. For example, we can presume that the presence in the normative system of two definitions, with an identical definiendum, constitutes a pathological situation.

The design of computer-aided tools for normative evaluation is possible now that we have a tool for the functional structuralization of laws. A careful study of legal practice and doctrine is required in order to acquire analytical and detailed knowledge of the comparative reasoning between different norms and between provisions, in such a way to enable us to have a cognitively clear and complete panorama of the diagnostic interventions on the norms. It is then necessary to verify whether we can give a clear and universal formulation of the individual pathologies (conflicts, lacunae, etc.). Naturally and above all, it is necessary that the drafting tools described here enter into daily use by the legislator, so that he has available to him structured legislative data bases, on which he can act diagnostically.

The treatment of normative systems, through diagnosis of norms, constitutes the third nucleus of the project for a law-making environment and assumes the completion of the other two. This means the availability of functionally structured normative texts and their storage in documentary systems, these also organized on the model of the law described here. These two phases are currently being completed and this will also allow us to face, on an applied research level, the aspect of normative diagnosis.

#### **4. Conclusion**

The construction of the text, based on the method of the functional structure, should offer the following advantages:

a - facilitate the formulation of the normative text, even for those who do not have a solid technical-legislative knowledge, because parts of this competence are taken on by the system itself;

b - encourage uniformity in normative acts;

c - increase understanding and interpretation.

Various ways of processing the laws, constructed in this way, will be practicable, because

the act is organised in structures that the computer can recognize. In particular, two lines of action will be feasible, both relevant for the evaluation and control of normative impact:

d - the increased transparency of the legislative data bases, as a result of the adoption of the method illustrated here, will permit retrieval strategies in addition to the current ones;

e - diagnostic investigations will be practicable, which have as their objective the special relations between provisions, using above all the functional profile of the model.

Apart from the use of the functional structure method, analysis and formalization of the laws, for the implementation of systems that require calculation of normative elements, would be facilitated. The process of legal interpretation constitutes a basic factor in the process of judicial decision-making and, also, in a smaller way, concerns the legislator, with diagnostic objectives. The process of judicial decision-making has mainly attracted the attention of studies and experimentations in artificial intelligence applied to the law. The promise was great but, unfortunately, results were few. There were difficulties of various kinds, not the least in the formalization of the laws: too much distance between the norm, in its current expression, and the norm, in its logical representation, with inevitable forcing in interpretation, as has already been mentioned.

The determination of a typology of legal norms and provisions and of their structural components, can be, in my opinion, of some help in attempting formal legal knowledge representation. "Formal languages of general use (like logic, programming logic, frames, etc.) have, in fact, the advantage of flexibility, but do not facilitate the typical representation of normative language. Knowledge engineering is, therefore, led to represent the same normative structure, with expressions that are different on each occasion; often, only partially picking up the content expressed by this structure. This causes obvious problems, as far as the expressive capacity of knowledge bases, their consistency, the possibility for their updating and as far as their maintenance are concerned. This situation cannot be remedied simply by resorting to specialized languages, proposed for purposes foreign to the legal world. On the one hand, these languages may be still too general, with regard to the normative structure; on the other, they may be too specific, preventing us from understanding some of the typical aspects of the normative language. Careful identification of the typical normative structures and the determination of formal structures aimed at expressing each of them, could, instead, allow us to reach the highest degree of uniformity and strictness in legal knowledge representation, to fully adapt this representation to the structure of the object, to easily gather the greatest amount of information" [7].

The proposal of a new "legimatics" tool, like that of functional structuralization, could, it seems to me, open new prospects in the direction of an "isomorphic" representation of legislative language; that is, a representation that respects the features of the original legal texts. We may hope that laws expressed in natural language, but more clearly and consistently, more uniformly and strictly, thanks to the functional structure method, make it easier and less arbitrary to extract logic rules from them.

It would be legitimate, in this regard, to imagine an assisted-automated translation from the normative text, that has been standardized in this way, into a formalized text. This could be used as a knowledge base for legal expert systems and be placed, as another more refined work tool, in a "law-making environment". Here the draftsman, the authentic interpreter, would provide

the text of the law and, at the same time, a formalized version of the relevant aspects of it, to be used as legislative monitoring systems for the public administration and as decision-support systems in general.

Designing computer-aided tools for legal evaluation and, therefore, for normative interpretation, would be of great assistance to the efforts being made in legal artificial intelligence, for the creation of decision-support systems. But not only. The law-maker himself, as noted by Kowalski and Sergot [25], great supporters of the logical computation of norms, may, for example, wish to investigate in detail what would happen if a certain interpretation of the drafted law were applied to a specific case, just as an engineer, using a model of a bridge he is building, can calculate the stress that can be supported by its various components.

Normative interpretation is central in the legal decision-making process, while, in spite of this, it is all of limited interest with regard to the legislative process. I have mentioned this topic for two reasons: firstly, because interpretation may, nevertheless, have some role in the legislative process, even if with purely diagnostic ends. Secondly, in order to highlight the indirect contribution that "legimatics" for drafting may give to other legal-informatics processes, like that of legal decision-making, improving the quality of the normative text, through tools such as functional structuralization.

In conclusion, the thesis that has been argued here, is that the method of the analytical functional structuralization of normative texts, inserted in tools for computer-aided drafting, constitutes the centre of any computer-based action on the norm. This method may have direct and indirect positive effects in any process regarding the law: on drafting, on legislative documentation, and on normative diagnosis, as well as, to some degree, on normative interpretation, and therefore on judicial decision-making and on the designing of aids for it.

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