Assistance Tool For Conflicts Resolution Through Technical Negotiation

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Abstract

A conflict is a common phenomenon that results from the interaction between both individuals and groups of individuals. For the development of knowledge-based systems, one needs to multiply sources of expertise, so that one may be able to generate several types of conflicts from these sources. The classical approach which avoids dealing with conflicts is not suitable. Therefore, in order to capture the dynamics of the system properly, one needs to develop a model which contains a greater amount of information on all eventual conflicts. In this study, we have opted for the negotiation approach [5], known also as the co-operative approach. We apply the negotiation approach for the conflicts' resolution once the typology of the conflicts has been defined. In order to build a common ontology from different perspectives, we developed an Assistance Tool based on the negotiation method.

Keywords: Cooperative application, multiply expertise sources, conflicts, technical negotiation, common ontology

1. INTRODUCTION

The cooperative applications can be seen as a set of processes involving an exchange of data between several heterogeneous systems. A fundamental aspect of collaborative work is that the individuals are not identical, and will approach the same task with different expectations, goals, and preferred styles of working. They will have different amounts of time to commit towards the resolution of a problem, and even a different understanding of the nature of the problem. These differences usually lead to a conflict.

One solution to theses problems can be achieved at through the use of ontologies which are specifications of conceptualizations that enable the construction of a domain knowledge representation that consists of a hierarchically organized concepts and semantic relations between them. The key feature of ontology is conceptualization, sharing and re-use of knowledge. It is a branch of ontological engineering.

In ontological engineering, one can use multiple sources from different experts. One of them is the expert or the group of experts. Generally, the expert is a specialist socially recognized in a discipline in a given domain. The competences of several experts may be necessary to solve a problem. The knowledge acquisition process is not the main model of the expert's behaviour, but a synthesis of a domain model which doesn't resemble any mental model [24]. The method that avoids the conflict is not found to be successful. It is critically important for a specialist in a workgroup to understand the conflict and to know how to manage it constructively. The consensus conflict is not easily obtained, but usually through the expert establishing a dialogue, this leads to accepting alternatives. Throughout the expert establishing a negotiation, a common ontology of the domain is produced. This ontology building process cannot be fully automated.

This article presents an assistance tool for the management of conflicts within engineering systems from the contribution of multiple experts working in the negotiation process [5]. The article is organized in five parts. In the first part, we present ontological engineering and the ontology of a domain. In the second part, we give an overview of the definition of conflicts and their typologies. In the third part, we present our modelling of the conflict. In the fourth part, we explicit the study process of negotiation through the description of its different stages. In the fifth part, we illustrate the methodology for building a cooperative ontology, followed by a description of our RCN (Resolution of Conflicts by Negotiation) tool. We conclude by presenting the perspectives.

2. ONTOLOGICAL ENGINEERING AND ONTOLOGY

2.1. Ontological engineering

Ontological engineering has emerged from the engineering of knowledge. This latter is considered as the domain of predilection of expertise development in the conception of knowledge based systems. In spite of the fact that the engineering of knowledge has contributed to the increase this expertise by organizing it in a computational perspective, some members of the community of AI (Artificial Intelligence) have felt the need to move to an engineering based more solidly on theoretical and methodological foundations, hence improving the design of intelligent systems.

Ontological engineering's role is not to model knowledge for problem-solving as in Artificial Intelligence, but rather to model knowledge to help human solve problems with computers as mediators. Ontological Engineering has an important role to play in the creation of consensus about the modelling of the field's theoretical and practical knowledge.

The ontological engineer takes into account the various sources of knowledge which have been classified in 3 ways [20], the knowledge of common sense, the expertise acquired through specialized experiments and the theoretical knowledge. The source "expertise" is used when there is not enough information in applications, such as those on "genotype", "nanotechnology ", etc.

2.2. Ontology

An ontology supplies a system of fundamental concepts, that is to say, a knowledge system which constitutes the background knowledge of a knowledge base. An ontology offers a conceptualization of the target world as well as a solid base on which knowledge is widely shared and more largely used than a conventional knowledge base. The role of an ontology with respect to a knowledge-basis is to provide definitions of concepts used in the representation of knowledge; it is also in the specification of the constraints between the concepts, in order to make the knowledge-basis consistent and transparent, two necessary properties for the sharing and reuse of the knowledge.

An ontology must be developed by a community in which the members share the necessity to possess a common ontology. The developers of ontology must associate themselves with a high-level ontology capable of guiding them to build "reasonable" ontologies. There exist two distinct types of ontologies [20]:

- An ontology semantic Web oriented which is a vocabulary understandable by a computer and which defines the meaning of meta-data. This type of ontology may be qualified as an ontology of surface since it does not necessarily deal with conceptual structure of the target world.
- An ontology concept oriented which deals with fundamental concepts of the target world and which require to be examined in depth.

In what follows, we will be interested with the first type of ontology.

3. CONFLICTS

The literature concerned by conflicts is drawn from a number of areas of research. It concerns disciplines as: S*ociology*, *social psychology*, *cognitive science* and *theoretical paradigms* [6]. In this work, we concentrated mainly on a part of cognitive science. This latter is concerned with developing computational models of processes, systems and principles that make behaviour possible. We are interested in the conflict that can arise in the process of knowledge acquisition from human expert.

Different definitions of conflict existed in literature [29], [3], [19] etc. A definition which seems to be particularly interesting is that of Thomas: *Conflict is the process which begins when one party perceives that the other has frustrated, or is about to frustrate, some concern of his.* This definition deals with the type of conflict that occurs between individuals, and groups, but it is general. We adopt the definition of conflict in [5] because a conflict is not the opposite of cooperation, but a phenomenon that may arise whether people are cooperating or not. Successful cooperation depends on how the conflicts are handled.

3.1. Causes of conflict

The conflicts may arise from the following situations:

- Divergences in interpretation, formulating explanations associated with the same phenomenon, result, model, etc.

- Differences in viewpoints in the resolution of a problem.
- A personal disagreement related to a personal factor, including individual value systems and the characteristics of personality.
- The recognitions of the expertise upon the equal level of hierarchic that brings us back to the notion of competence.

In what follows, we summarize what can make a conflict possible. It is the confrontation of contradictory knowledge, the confrontation of viewpoints, the opposition of interests whether organisational or personal, and also in the interpretation of results, phenomena or theories. In fact, conflicts occur in the expression of intentions, believes, perceptions, plans, behaviours and/or of experts goals. From here, we classify the conflicts within three categories:

a-Propositional attitudes [3] as stated in desires, intentions, beliefs, hopes, dreads, wishes etc. They can all be identified by their propositional contents.

b- Knowledge of control as defined in terms of goals, compatibility of group's members, leadership style.

c- Competence which is linked to the cognitive resource, i.e. expertise. The hierarchical position of experts may give rise to conflicts. But by using authoritative arguments, the conflict can be solved; and the expert's charisma may be able to influence the resolution. The study of social psychology of group work can be useful to analyse the different behaviours. Within the software application, it seems possible to ignore the conflict's competence.

3.2. Conflict typology

The conflict occurs during the utilisation of a resource. It may be of a physical nature as in the case of a shared printer used simultaneously by several experts, or of a cognitive nature relating to the expertise itself.

The first type of conflict occurs in multi-agents systems, in distributed systems, as for example, in applications of Distributed Artificial Intelligence (DAI). Conflicting knowledge is handled by allowing different agents to develop and maintain alternative hypothesis, with the premise which declares that intelligence is an emergent feature of cooperative behaviour. In real world of situations, perfect cooperation never happens, as the goals of any two agents will never coincide exactly. The second type is found in knowledge based systems. At the end, our classification is based on the distinction between knowledge conflicts and reasoning conflicts.

3.2.1. Conflicts of knowledge

Experts, for instance, due to their different trainings, may use different wording for designating concepts of a domain. In [12], the authors identify four (4) forms of conflicts of terminology which they designate as follows:

Conflict-experts: the same concept is referenced under two different names.

Correspondence-experts: two different concepts use the same terminology.

Consensus experts: the use of the same terminology for the same concepts. Consensus exists when all attributes and objects of a concept in one viewpoint match with a concept in another viewpoint.

Contrast-experts: use of different terminology to describe different concepts. Contrast can be a viewpoint as the opposite of consensus.

A concept is not in a state of consensus (match found in another viewpoint) or contrast (completely different to all concepts in another viewpoint) so it is in a state of correspondences or conflict.

3.2.2. Conflicts of reasoning

They indicate divergences in expertises of problems' resolution. Experts can, for instance, apply different methods or use plans of different actions to attain goals leading to the resolution of problems. This type of conflict can have consequences on the resolution of problem and can lead to different results. We distinguish three (3) types of reasoning conflicts:

Conflicts of interpreting: By reason of expert's exigencies which are not identical, the experts use different formulations to explain the same phenomenon, result, theory, etc. This conflict arises principally from divergences of experts' beliefs.

Conflicts of conception: The divergence of conflicts appears when suggestions of experts in the translation of concepts and modelling do not let them to be the same.

Conflict of viewpoints: A viewpoint is a structuring of the expert's knowledge respecting a given goal. For a problematic, two experts can have two different viewpoints:

- M*utually exclusive:* as their combination does not satisfy. It might not even be possible.
- *Partially immiscible:* i.e. combined but with some loss of optimality for each party.
- *Not immiscible:* i.e. directly combined.

4. THE MODELING

In this part, we are going to present a method which is based on the definition of a whole model that will serve as a guide for the cognition on the phase of knowledge acquisition. Those models will be instanced and refined by the full cognition of the realization phase of the final system. The identification, the modelling of expert and conflict are assured respectively by the agent model and the conflict model.

4.1. The model organisation

The model structure is a simplified version of [13] (Fig 1, Fig 2). The definition of our agent model and conflict model stem is taken from the work Distributed Artificial Intelligence (DAI) and multi-agent systems. Still, our model is rather oriented for knowledge acquisition than towards the development of multi-agent systems. One agent can be in conflict with another.

4.1.1. Agent model

An agent (Fig 1) has some intrinsic characteristics such as: identification, occupation and his speciality. He is also described by his intentional attitudes regrouping his belief,

wish, intention and his behaviour mode in group. Studies in organization of behaviour have shown that each group member is disposed to tackle conflict in a certain way, according to their character rather than the context of the conflict [23]. A useful model of conflict response modes is given by [24] who described five dominant orientations or modes for dealing with conflicts (Competing, accommodating, collaborating, avoiding, compromising):

Competitive **-** one participant seeks for the domination of the process, without any regard to others. A competitive mode may be useful for quick decisive action, or where unpopular actions are perceived as necessary for important issues.

Accommodative **-** a party becomes self-sacrificing to appease another, and places the interests of the other above their own. It may be useful when issues are more important in one party than another, where one party is losing and needs to minimise the loss, or where there is a desire to build harmony and gain social credits.

Collaborative **–** participants seek to understand their differences and achieve a mutually beneficial solution. This may be appropriate where participant's insights and commitment are important and need to be merged rather than compromised.

Avoidant **–** the conflict is recognized to exist but, it is suppressed by one or more parties, or handled by withdrawal. It may be useful when an issue is unimportant, when the potential disruption would outweigh the benefits of resolution, or when information gathering is more important.

Compromising (Sharing or bargaining) is an intermediate in both assertiveness and cooperativeness. Each party makes some concessions in order to reach a compromise. It is appropriate when the temporary settlements or expedient solutions are needed especially under time pressure, or when goals are directly opposed.

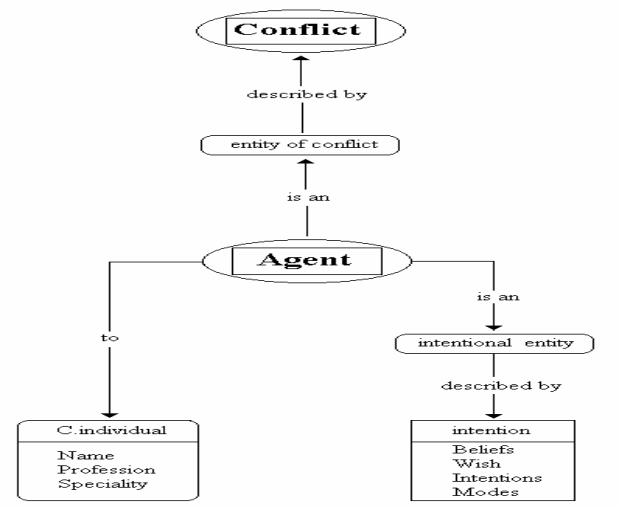

Fig 1: Agent model

4.1.2. Conflict model

A conflict (Fig 2) comes on an initiative of agent when there is a co-operation with one or several agents. First, it is described by some characteristics as a type, severity, causes

and descriptions and the second by annotations of free text (questions, justifications, commentaries) which are called conflict of control. Characteristics of conflicts can be summed up in the following:
Type: conflict of terminology, interpretation, conception and viewpoints.
Causes: they correspond to the emergence of conflicts described in **§2**.
Description: a commentary is made up on the conflict.
Severity: The combination of different viewpoints may lead to the occurrence of several combination possibilities. In this case, a scale de the severity of conflict combinations is used.

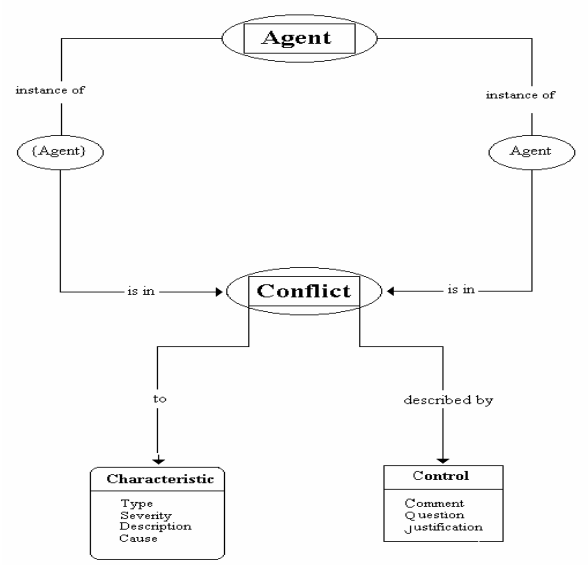

Fig 2: Model of conflict

4.2. Concept Model

The concepts can have several different definitions, where each one of them corresponding to a different point of view. A concept can be also situated in different places in the hierarchy. In case where we cannot resolve conflicts of point of views, it would be useful to keep track of the various observations of conflict. However, if several schools of thought/conception are in dispute inside the domain, we think that it is preferable to treat them, later on, as separated domains: the purpose is not to force at all costs an artificial consensus on the definitions of the concepts. The ontology's role is not to normalize a domain but to give a representation of the existing.

The KRL, LOOPS, ROME, VIEWS and TROPES [18] models propose different kinds of solutions for the management of multi viewpoints. However, all these models rely on the hypothesis that viewpoints are partial representations of a unique coherent set of objects. We consider a viewpoint as a structuring of the expert's knowledge. When building an ontology, two essential yet reciprocal problems occur: Has do define the concept corresponding to a term? What term to use to name a concept with this or

that definition? In collaborative work, the situations corresponding to these two types of problems appear.

The resolution solution is situated in a context of multi viewpoints. The resolution of the conflicts ends with the following situations:

1. Accepting two definitions for the same concept and each one is connected with a viewpoint.
2. Trying to create a definition from both conflicting definitions through negotiation.
3. Agreeing on the creation of two different concepts through negotiation.

The concept model corresponds to that proposed by the group of the university of Geneva [8] to which we have added annotations. These latter ones correspond to comments and observations brought about by the experts on all the terms, the concepts as well as their definitions during the negotiation. It structure is illustrated in figures n° 3 in UML-link notation:

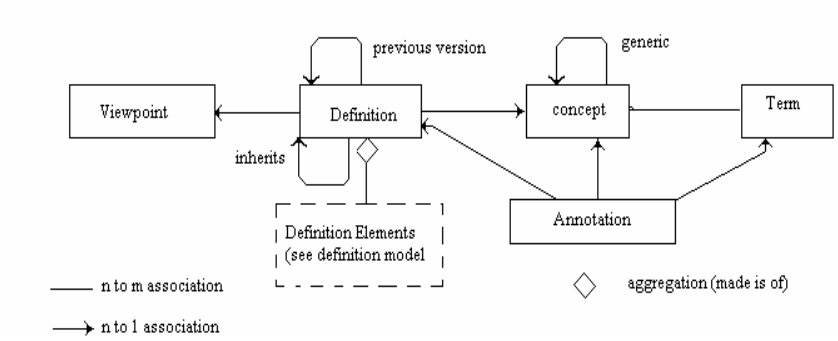

Fig 3: model of concept

A definition is a specialization of a more general definition: it is composed of a set of characteristics. A characteristic has a name, a quantifier or a number restriction and a value definition. A value definition is itself a definition. It specifies which object categories are allowed for a given characteristic.

4.3. Negotiation process

The negotiation process is a collaborative method of resolution. It emphasizes communication can lead to an increased conflict. The method consists of two steps. The first is the collection of expertises. The second corresponds to the resolution process, which is described by three phases: The exploration, the generation of options and the evaluation.

If we want to know through the web the state of a book (available or not, in repair, excluded from communication between participants and greatly makes easier the conflicts based on communication problems. As [22] notes, that increased communication leads to decreasing conflict down to a certain level, but too much the loan, etc.) which is a physical resource, we can make it via metadata device. Again, there may be many existing metadata schemes that are destined to describe the state of the resource. However, in the case of an application for the specification of a library system, we may find two different perspectives to describe the state of a book.

After collecting the expertises, a state transition diagram of the book is drawn. Two perspectives are worked out, the first one is based on the "physical position of the book", and the second is based on the "access to the book" (Fig 4).

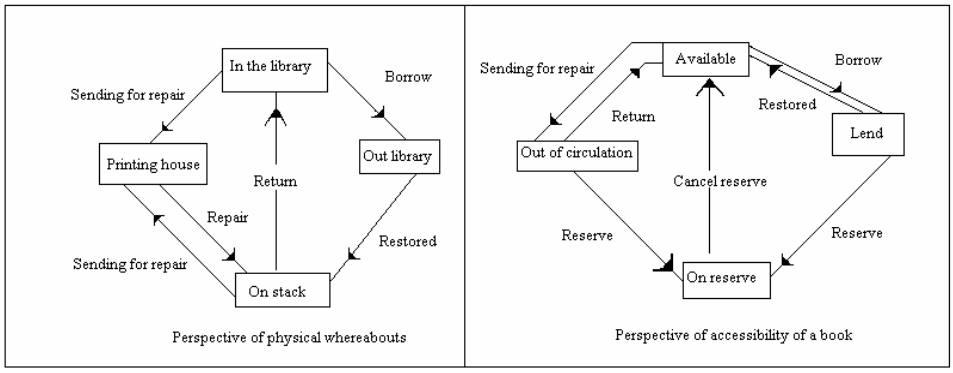

Fig 4: Possible states of the book in the library

4.3.1. The exploration

The aim of this phase is to arrive at the best understanding of the conflict. Essentially, this is a process of knowledge acquisition. This phase is subdivided into three steps: Establishing correspondences, identifying the conflict issues and agreeing resolution criteria.

A/ Establishing correspondences

The first problem is to establish some common ground between the descriptions and to identify correspondences between the items in the descriptions. Such correspondences may be *exact, approximate or non-existent:*

- *Exact correspondence*: Items are agreed as having the same definition.
- *Approximate correspondence*: Meanings are similar, but differ in a certain details. Many terminological differences will be discovered in this point.
- *Non-existent correspondence*: The item of description doesn't have much correspondence with the other description.

Description a	Type	Description b
Borrow	Exact	Borrow
In the library + On stack + Return + Out of library + Borrow + Restored	Approximate	Available + Lend + Borrow + Restored
Printing house	Approximate	Out of circulation
Ø	Non –existent	On reserve

Table1: Example of correspondences

B/ Identifying the conflict issues

Negotiations begin by discussions between experts. To assist with the elicitation of issues, four types of free-text annotations may be attached to the items in the descriptions, and the correspondence links between them:
- *Comment*s: These are general purpose annotations which can be attached to any item or group of items in the conflict.
- *Assumptions*: These are link comments, but allow the expert to note where a description appears to make some instated assumption.
- *Issues:* these are points that need to be addressed. There are many circumstances under which issues arise, but often comments and assumptions will result in an issue.
- *Justifications:* These are added to support a particular viewpoint or proposal.

C/ Agreeing resolution criteria

The final part is the establishment of criteria which allows the potential resolutions to be judged and compared. As the measures by which experts evaluate their satisfaction, they represent the participant goals to the resolution process.

If the expert proposes some opposed criteria, they are registered and the discussion is added to the list of conflict items.

4.3.2. Generative phase

The confrontations of several viewpoints can produce certainly consensually viewpoints. The latters satisfy partially, totally or not at all the experts in the problems resolution. This consensually viewpoints are called *options of resolution*. The options are not intended to be complete resolutions, but might be combined in various ways to arrive at one.

A/ Types of conflict and severity

It is useful to characterize the type of each component of the conflict revealed by the exploration process. The viewpoints combination according to severity products several configurations:
a- The viewpoints A and B are *mutual exclusive* and their combinations do not satisfy any expert.
b- The viewpoints A and B can be combined but with the desistance from each expert.
c- The viewpoints A and B can be combined directly.
d- The viewpoints A and B satisfy the interests of another viewpoint.
In the configurations (c) and (d), the conflict can be eliminated to be replaced by the combination of the viewpoints A and B. For the configurations (a) and (b), the new resolutions are produced by the experts.

In our application (Fig 4), we observe these conflicts:
The conflict of terminology: RETURN to the first description which is identical in RESTORED in the second description.
The conflict of interpretation: The state REPAIR is not completely compatible with the second description.

The conflict of conception: The idea of RESERVATION is not conveyed in the first description.

B/ Generating resolution options

The type of conflict described previously assist in determining which form the resolution must take. This corresponds to one or several resolution options. Example of generated options:
- IN THE LIBRARY and AVAILABLE, the same action is applied. Here, we can eliminate the less significant term.
- A set of states or links can be added to the same description to introduce the concept of RESERVATION.

The viewpoints conflicts are ignored during the generation of options since, from the start, we begin with two different expertises originating from two different viewpoints. We obtain the product of two different viewpoints with different types and severities of conflict. The configurations of options are established in these phase. This description is presented in table 2 [5] as follows:

	Conflicting Interpretations	Conflicting Designs	Conflicting Terminology
Non interfering	Either interpretation can be used without affecting the other (need to find out which to use)	The designs can be directly combined without compromising either	Different terms are used for the same concept (need to find out which to use)
Partially interfering	Interpretations are not wholly consistent, and if both are to be used, some resolution is required	Design can be combined but interfere, and the direct combination may not be the ideal resolution	The same labels have been used for similar concepts. The differences need to be resolved.
Mutually exclusive	Interpretations totally contradict one another, and cannot be used in conjunction	Designs are completely incompatible, or tend to negate one another when combined	The same labels have been used for different concepts, and some distinguishing terms are needed

Table 2: Different types and severities of conflict

4.3.3. The evaluation

This consists in taking the produced options and making them conciliate with the conflict map produced during the exploration phase. When a sufficient number of options has been obtained, a resolution to problems related to the conflict is launched. Two steps summarize the evaluation:

A/ Matching the options with the questions

We need to define the degrees of satisfaction when matching the options with the questions produced by the experts. The degrees of satisfaction are expressed through the means of a simple numerical scale or a qualitative scale with explaining notes (Table 3). Two matching choices exist: for each option, we choose the question that relates suitably to it or take a question and choose the options which relate suitably to it.

Qualitative scale	Numerical scale
Completely satisfying	2
Partially satisfying	1
Not effect	0
Partially thwarting	-1
Totally thwarting	-2

Table 3: Scale of degrees of satisfaction

B/ Bring the options with themselves

The options are combined with themselves to produce the resolution, which satisfy a group of questions rather than satisfying each question individually. This combination between the options is possible, since their degrees of satisfaction have the same sign for each question. The combination is realized by grouping the options, the states and the links. For example: we have three questions Q1, Q2, Q3 and three options O1, O2, O3 with a degree of satisfaction. We obtain the result below:

Opti.\Ques.	Q1	Q2	Q3
O1	1	0	-1
O2	2	1	-2
O3	-1	2	0

Opti.\Ques	Q1	Q2	Q3	∑
(O1, O2)	2	1	-1	2
O3	-1	2	0	1

Table 4:Combination Questions-Options

Only the combination between the option (O1) and (O2) is possible. Thus, the optimal solution is the solution that satisfies more questions and which has a great value before adding degrees for each option.

5. IMPLEMENTATION

First, we present the method used for the building of the ontology. Then, we give an overview of each part of the tool RCN (Resolution of Conflicts by Negotiation) developed.

5.1. Global architecture

For the constitution of the common ontology, we followed a progressive integration of ontology based on the method of negotiation [5]. When there is a conflict in the

terminology or in the reasoning, this process consists in generating viewpoints corresponding to resolution options. In the case of possibility, the combination of these options is obtained from discussion between the experts. The global architecture of the tool includes:
- A lexicon of all the concepts defined by all the experts and their definition.
- A common hat which corresponds to a set of generic concepts obtained after negotiation allowing the construction of the common ontology.
- Different ontologies corresponding to the case where viewpoints cannot be combined.

A relational database has been built in order to store information from a library system. It is complemented by a conceptual graph knowledge base, which is used to store information that does not conform to the structure of the relational database.

5.2. Presentation of tool RCN (Resolution of Conflict by Negotiation)

Our application shows the possibility of comparing between two conceptual graphs and detecting the conflict which can possibly exist. We have used the following steps:
1- Introduction of the name of the expert and his expertise.
2- Choice of Agent model of the couple of expertise models.
3- Comparison between two conceptual graphs.
4- If there is a conflict terminology (consensus, conflict) we resolve the conflict.
5- Establishing correspondences.
6- Agreeing resolution criteria, types and severity.
7- If there is a conflict terminology (correspondence, contrast) we resolve the conflict.
8- Bringing the options.
9- Comparing the options of questions.
10- Comparing the options with themselves.
11- Choice of options.
12- If not exist the solution repeat step 5.
13- If not the final solution of all expertises, repeat step 2.

We illustrate in what follows the main steps mentioned previously in the application of the library system. For example:
How the expert introduces his expertise through this interface (Fig 5).

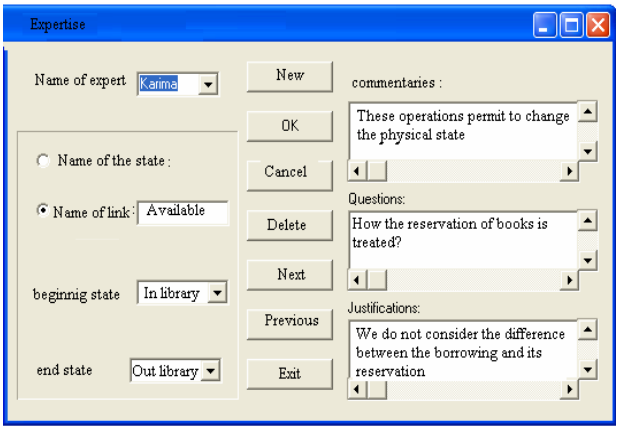

Fig 5: Introducing the module of expertise

Two expertises (Fig 6, Fig 7) are obtained. The model of conceptual graphs introduced by Sowa [26] is used in our modelling. These graphs are a system of logic based on the existential graphs and the semantic networks of artificial intelligence. They express meaning in a form that is logically precise, humanly readable, and computationally tractable. They are a formalism of representation made up of two types of nodes. The first represents the concept and the second the relation.

- *A concept* represents an object, an idea or any other perceptible notion of the universe.
- *A conceptual relation* connecting concepts is labelled by a type of relation. Each type of relation has a signature expressing the constraints of the type of concepts which can take part in this relation. The principal role of conceptual relation is to assemble concepts to build a sentence, an idea or a proposal.

The comparison of these two graphs is carried out. Our program detects automatically identical terms used in these two expertises.

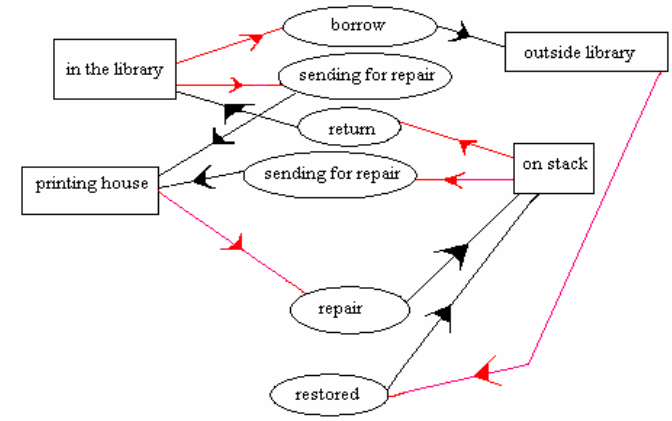

Fig 6: The conceptual graph of a perspective of physical whereabouts

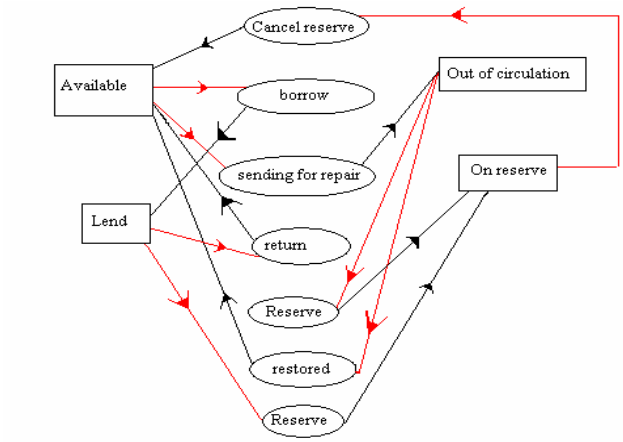

Fig 7: The conceptual graph of a perspective of accessibility of a book

The matching is observed between two expertises before resolving the conflicts of terminology. The experts establish correspondences by selecting all the states or links of conceptual graphs so as to define a type of conflicts (Fig 8).

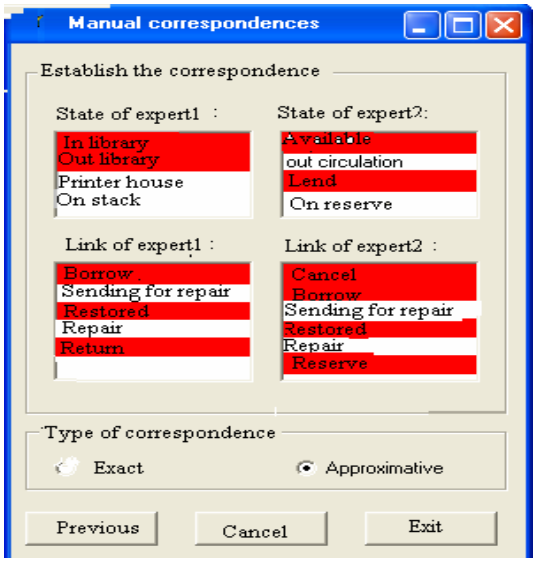

Fig 8: Extracting correspondences

In the generative phase, experts start by specifying each correspondence, the type and the degree of satisfaction. Different options of resolution show up (Fig 9).

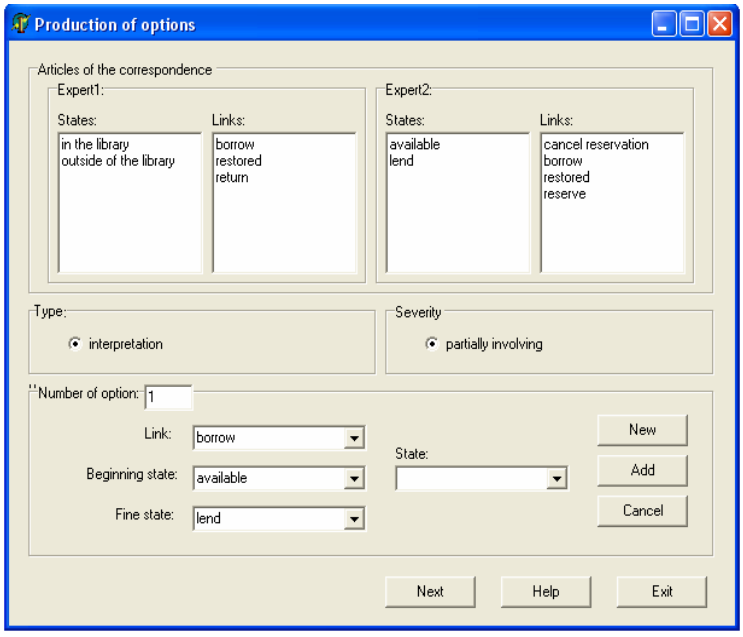

Fig 9: Production of options

After the production of options, the experts evaluate the relation between these options and the questions which are asked by introducing its degrees of satisfaction (Fig 10).

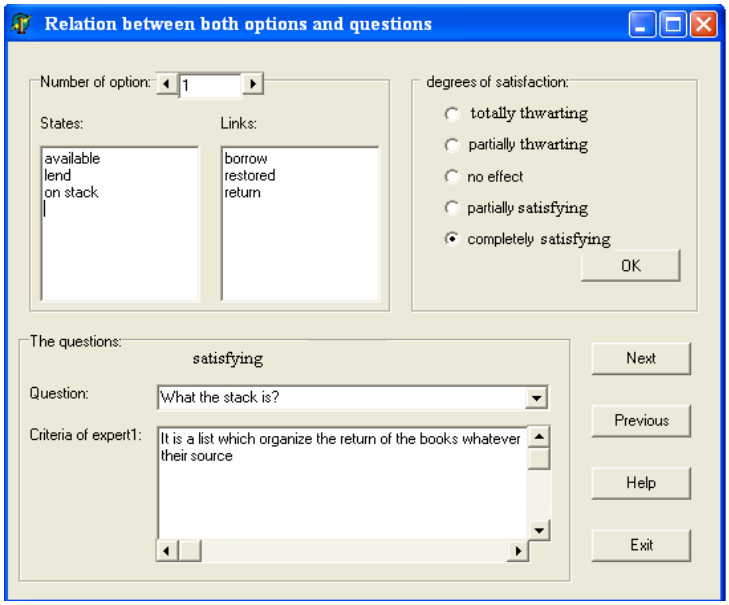

Fig 10: Relation between both options and questions

The negotiation continues between experts about the choice of options obtained from the combinations. The option choice (Fig 11) replaces the states and the links of the current correspondence. The change is brought to the expertise.

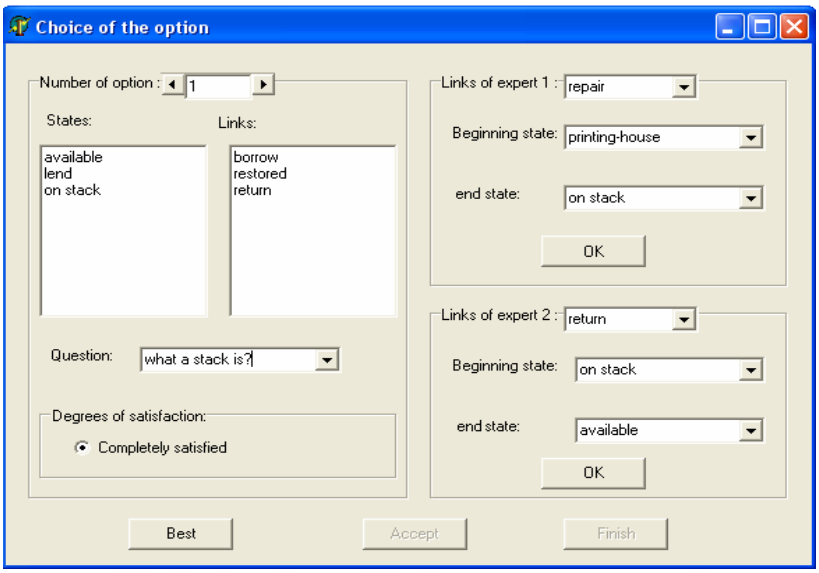

Fig 11: Choice of options

The process repeated is also obtained from a common conceptual graph (Fig 12):

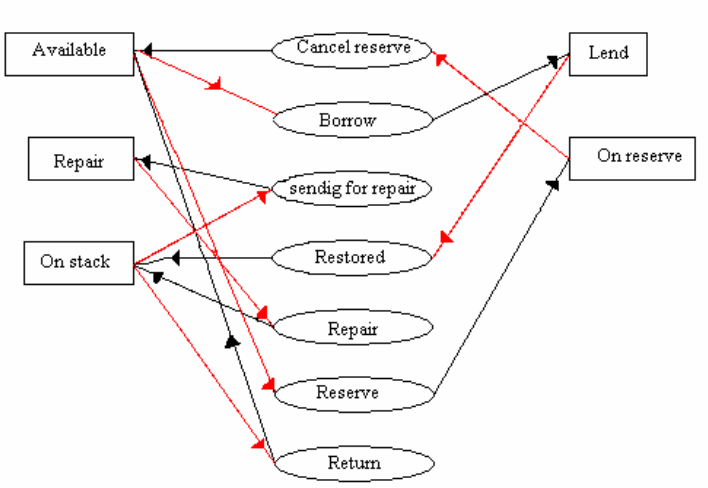

Fig 12: The Common expertise

6. CONCLUSION

We define here a preliminary implementation of the negotiation approach by using the conceptual graphs. The tool developed is a good guide for the cognition. Our tool helps us to negotiate the experts. It's attractive to realize the process by using many experts through a local network or a distance. This developed process can be used for the collaborative design of multi viewpoints terminological knowledge bases [8], [9]. However, the negotiation can not result. The use of new methods assists the experts to search for the solution. This method is the mediation [10]. It defines a response element which is useful in the interactions between the experts. Indeed, the experts in conflict can have a barrier of communication. Well, they have often needed to element to assist in the communication and to resolve efficiently the conflict. A third party or the mediator intervenes in the *communication* and the cooperation between the experts.

Actually, the model of the proposed concept does not take into account conflicts of viewpoints, given that the resolution of the conflicts is made in the case of consensual negotiation. A monolithic ontology is obtained. The consideration of the various definitions of a concept as well as a different structuring from the knowledge will be the object of the continuation of our work. Our future objective is being the building of the ontology with taking into consideration the options of resolution corresponding to mutually exclusive viewpoints.

We use these results in semantic Web, by taking into consideration expressions of the natural language such as: the notion of uncertainty and vagueness for the concept. The first work is realized. It concerns:

- A study of the conceptual graphs which are extended to the fuzzy notions (GCF) [15].
- An automatic interface which permit to spend GCF around one of language of semantic Web, RDF, RDF(S).

It remains only to see again the process of negotiation for extended fuzzy notions.

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