Ideological systems and its validation: a neutrosophic approach

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Abstract. Ideologies face two critical problems in the reality, the problem of commitment and the problem of validation. Commitment and validation are two separate phenomena, in spite of the near universal myth that the human is committed because his beliefs are valid. Ideologies not only seem external and valid but also worth whatever discomforts believing entails. In this paper the authors develop a theory of social commitment and social validation using concepts of validation of neutrosophic logic.

Keywords: Commitment, Ideology, Neutrosophic logic, Social systems, Superstructure, Validation.

1 INTRODUCTION

Ideologies are systems of abstract thought applied to public matters and thus make this concept central to politics. *Ideology* is not the same thing as Philosophy. Philosophy is a way of living life, while ideology is an almost ideal way of life for society. Some attribute to ideology positive characteristics like vigor and fervor, or negative features like excessive certitude and fundamentalist rigor. The word *ideology* is most often found in political discourse; there are many different kinds of ideology: political, social, epistemic, ethical, and so on.

Karl Marx [1] proposes an economic base superstructure model of society (See Figure 1). The *base* refers to the means of production of society. The *superstructure* is formed on top of the base, and comprises that society's ideology, as well as its legal system, political system, and religions. For Marx, the base determines the superstructure. Because the ruling class controls the society's means of production, the superstructure of society, including its ideology, will be determined according to what is in the ruling class's best interests. Therefore the ideology of a society is of enormous importance since it confuses the alienated groups and can create false consciousness. Minar [2] describes six different ways in which the word "ideology" has been used:

1. As a collection of certain ideas with certain kinds of *content*, usually normative;

2. As the *form or internal logical structure* that ideas have within a set;

3. By the role in which ideas play in *human-social interaction*;

4. By the role that ideas play in the *structure of an organization*;

5. As meaning, whose purpose is *persuasion*; and

6. As the *locus* of social interaction, possibly.

Althusser [3] proposed a materialistic conception of ideology. A number of propositions, which are never untrue, suggest a number of other propositions, which are, in this way, the essence of the lacunar discourse is what is *not* told (but is suggested). For example, the statement *all are equal before the law*, which is a theoretical groundwork of current legal systems, suggests that all people may be of equal worth or have equal opportunities. This is not true, for the concept of private property over the means of production results in some people being able to own more than others, and their property brings power and influence. Marxism itself is frequently described as ideology, in the sense in which a negative connotation is attached to the word; that is, that Marxism

is a *closed system* of ideas which maintains itself in the face of contrary experience. Any social view must contain an element of ideology, since an entirely objective and supra-historical view of the world is unattainable. Further, by its very scope and strength, Marxism lends itself to transformation into a closed and self-justifying system of assertions.

For Mullins [4], an ideology is composed of four basic characteristics:

1. It must have power over cognitions;

2. It must be capable of guiding one's evaluations;

3. It must provide guidance towards action;

4. And, as stated above, must be logically coherent.

Mullins emphasizes that an ideology should be contrasted with the related (but different) issues of *utopia* and *historical myth*. For Zvi Lamm [5] an ideology is a system of assumptions with which people identify. These assumptions organize, direct and sustain people's volitional and purposive behaviour. The assumptions on which an ideology is based are not collected at random but constitute an organized and systematic structure. An ideology is a belief system which explains the nature of the world and man's place in it. It explains the nature of man and the derivative relationships of humans to one another.

Mi Park [6] writes, *"Ideology is the main medium with which conscious human beings frame and re-frame their lived experience. Accumulated memories and experiences of struggle, success and failure in the past influence one's choice of ideological frame"*. In according to Cranston [7] an ideology is a form of social or political philosophy in which practical elements are as prominent as theoretical ones. A system of ideas aspires both to explain the world and to change it. Therefore, the main purpose behind an ideology is to offer change in society through a normative thought process. For Duncker [8] the term ideology is defined in terms of a system of presentations that explicitly or implicitly claim to absolute truth.

Ideas may be good, true, or beautiful in some context of meaning but their goodness, truth, or beauty is not sufficient explanation for its existence, sharedness, or perpetuation through time. *Ideology* is the ground and texture of cultural consensus. In its narrowest sense, this may be a consensus of a marginal or maverick group. In the broad sense in which we use the term ideology is the system of interlinked ideas, symbols, and beliefs by which any culture seeks to justify and perpetuate itself; the web of rhetoric, ritual, and assumption through which society coerces, persuades, and coheres. Therefore:

1) An Ideology is a system of related ideas (learned and shared) related to each other, which has some permanence, and to which individuals and/or human groups exhibit some commitment.

2) Ideology is a system of concepts and views, which serves to make sense of the world while obscuring the social interest that are expressed therein, and by completeness and relative internal consistency tends to form a closed belief system and maintain itself in the face of contradictory or inconsistent experience.

3) All ideology has the function of constituting concrete individuals as subjects (Althusser, [3]).

Conventional conceptions of author (authority, originator) and individual agent are replaced by the ideologically constituted actor subject. Stereotypes, that actor subject rely on to understand and respond to events. As much if the Philosophy, Political or Religion is doxical reflected of economic relations as if they express in a specific language certain mental model of human relations, or an update of a certain field of a common structure to society, only be closed the debate after a theoretical treatment.

Nevertheless, theoretical treatment of all ideology firstly has to be located to synchronism level. Relation between synchronous and diachronic order is complicated when we are located in a unique level: the structure of a social system and transformations are homogenous among them. In the case of synchrony are constructed static or dynamic models. In the diachronic case we will have to consider History, content multiform movement making take part heterogeneous elements. Ideology emerges spontaneously at every level of society, and simply expresses the existing structure of the Social System. Members of every class construct their own understanding of the social system, based on their personal experiences. Since those experiences are primarily of capitalist social relations, their ideology tends to reflect the norms of capitalist society. The individual subject is faced, not with the problem of differentiating the *ideological* from the *real*, but with the problem of choosing between competing ideological versions of the *real*. Drawing on Jaques Lacan's theory in which human subjectivity is formed through a process of misrecognition of the ideology in the *mirror* of language.

This is far from the only theory of economics to be raised to ideology status - some notable economically-based ideologies include *mercantilism, mixed economy, social Darwinism, communism, laissez-faire economics, free trade, ecologism, Islamic fundamentalism*, etc. *Science* is an ideology in itself. Therefore, while the scientific method is itself an ideology, as it is a collection of ideas, there is nothing particularly wrong or bad about it. In everything what affects the study of the ideologies the problem has a double sense:

1) *Homogeneity:* each discourse informs a content previously given and that puts under its own syntaxes.

2) *Heterogeneity:* passage of the reality to languages introduces a complete displacement of all the notions, fact that excludes the cause that they are conceived like simple duplicates.

In Deontical Impure Systems (DIS)[1] approach, the Superstructure of Social System has been divided in two ([9-20]):

1) *Doxical Superstructure (DS)* is formed by values in fact, political and religious ideologies and culture of a human society in a certain historical time.

2) *Mythical Superstructure (MS)* also has been divides in two parts:

   a) MS_1 containing the mythical components or primigenial bases of the ideologies and cultures with the ideal values.

   b) MS_2 containing ideal values and utopias that are ideal wished and unattaina-

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[1] *Impure sets* are sets whose referential elements (absolute beings) are not counted as abstract objects and have the following conditions: a) They are real (material or energetic absolute beings). b) They exist independently of the Subject. c) S develops p-significances on them. d) True things can be said about them. e) Subject can know these true things about them. f) They have properties that support a robust notion of mathematical truth. A *simple impure system-linkage* $\Sigma \equiv (M, R)$ is a semiotic system consisting of the pair formed by an impure object set M the elements of which are p-significances (relative beings) of entities belonging to Reality (absolute beings) or certain attributes of these, and a set of binary relations, such that $R \subset P(M \times M) = P(M^2)$. That is $\forall r \in R/r \subset M$ XM being $r = \left\{ \left(x_i, y_j \right) \in M \times M \, / \, x_i, y_j \in M \right\}$. An *impure system-linkage* defined within an impure object set M is a simple system $S = (M, R)$ or a finite union of simple systems-linkage $\Sigma = \cup^n_{i=1} \Sigma_i$ such that Σ_i are simple systems. This shall be denoted as $\Sigma \equiv (M, R)$ such that $R \subset P(\cup_{finite} M^2)$. A *Deontical system* is an organization of knowledge on the part of the subject S that fulfils the following ones: a) Other subjects (human beings) are elements of the system. b) Some existing relations between elements have Deontic modalities. c) There is purpose (purposes) ([9-17], [20]).

ble goals of belief systems of the Doxical Superstructure (DS).

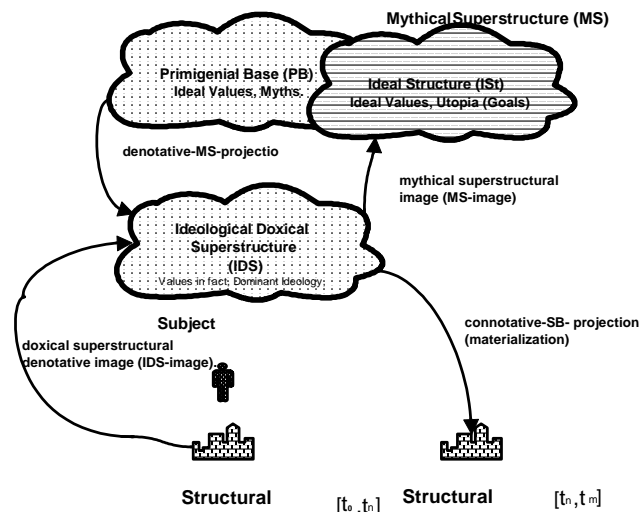It is summarized these ideas in the following diagram (Figure 1):

Figure 1: Deontical Impure Systems (DIS) approach

The following elements ([20-21]) are listed in the order that would be logically required for the understanding a first approach of an ideology. This does not imply priority in value or in causal or historical sense.

1) *Values.* Implicitly or explicitly, ideologies define what is good or valuable. We refer to ideal values belonging to Mythical Superstructure (MS). They are goals in the sense that they are the values in terms of which values in fact belonging to Doxical Superstructure (DS) are justified. Ideal values tend to be abstract summaries of the behavioral attributes which social system rewards, formulated after the fact. Social groups think of themselves, however, as setting out to various things in order to implement their values. Values are perceived as a priori, when they are in fact a posteriori to action. Having abstracted a ideal value from social experience in SB, a social group may then reverse the process by deriving a new course of action from the principle. At the collective level of social structure (SB), this is analogous to the capacity for abstract thought in individual subjects and allows great (or not) flexibility in adapting to events. Concrete ideologies often substitute observable social events for the immeasurable abstract ideal values to give the values in fact immediate social utility.

2) *Substantive beliefs (Sb)* [2]. They are the more important and basic beliefs of an ideology. Statements such as: *all the power for the people, God exists, Black is Beautiful*, and so on, comprise the actual content of the ideologies and may take almost any form. For the believers, substantive beliefs are the focus of interest.

3) *Orientation*. The believer may assume the existence of a framework of assumptions around his thought, it may not actually exist. The orientation he shares with other believers may be illusory. For example, consider almost any politic and sociologic ideology. Such system evolves highly detailed and highly systematic doctrines long after they come into existence and that they came into existence of rather specific substantive beliefs. The believers interact, share specific consensuses, and give themselves a specific name: Marxism, socialism, Nazism, etc. Then, professionals of this ideology work out an orientation, logic, sets of criteria of validity, and so forth.

4) *Language*. It is the logic of an ideology. Language **L** of an ideology is the logical rules which relates one substantive[2] belief ([12-17], [20]) to another within the ideology. Language must be inferred from regularities in the way of a set of substantives beliefs in the way a set of beliefs is used. The language will be implicit, and it may not be consistently applied. Let Sb be a substantive belief. We propose the following rules of generation of ideologies:

$$R1 \rightarrow \Pr ed \rightarrow substan\,tive \quad beliefs \rightarrow \bigcup_{k=1}^{n} Sb_k = Sb_j$$

$$R2 \rightarrow Arg \rightarrow hypothesis + goal \rightarrow why \quad and \quad what \quad for?$$

$$R3 \rightarrow T \rightarrow \Pr ed \wedge Arg$$

$$R4 \rightarrow T \rightarrow T[(\&)]^n, n \geq \emptyset$$

$$R5 \rightarrow \& = \begin{cases} \wedge \\ \vee \\ \equiv \end{cases}$$

Argument is formed by the sum of two characteristics: hypothesis, that is to say, so that this physical and social reality? And goal: as we

want is this society to reach its "perfection" (utopia).

5) *Perspective*. Perspective of an ideology or their cognitive map, is the set of conceptual tools. Central in most perspectives is some statement of where the ideology and/or social group that carries it stands in relation to other things, specially nature, social events or other social groups. *Are we equals? Enemies? Rulers? Friends?* Perspective as description of the social environment is a description of the social group itself, and the place of each individual in it. The perspective may be stated as a myth in the Mythical Superstructure ([16-17], [20]). It explains not only who subjects are and how subjects came to be in cognitive terms, but also why subject exist in terms of ideal values.

Meaning (d-significances $s_{\Sigma}^{\overrightarrow{D}}$)[3] and identification are provided along with cognitive orientation.

6) *Prescriptions and proscriptions*. This includes action alternatives or policy recommendations as well as deontical norms for behavior. They are the connotative-SB-projection from IDS to SB (see figure 1). Historical examples of prescriptions are the Marx's *Communist Manifesto*, the Lenin's *What is To Be Done* or the Hitler's *Mein Kampf*. Deontical norms represent the cleanest connection through of MS-image and SB-projections between the abstract idea (in Ideal Structure belonging to Mythical Superstructure) and the concrete applied belief because they refer to behavior that is observable. They are the most responsive conditions in being directly carried by the social group through the mechanisms of social reward and punishment.

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[2] Substantive beliefs ([14-15], [20]) constitute the axioms of the system, while many of derived beliefs will constitute their theorems.

[3] Denotation (d-s) is the literal, obvious definition or the common sense of the significance of a sign. We denote s to the systemic significance being a denotative significance. ζ is the set of significant (signs) of Reality and ζ_{Σ} to the set of systemic significants, e.g. the part of signs that have been limited by the Subject when establishing the borders of the system, and so that $\zeta_{\Sigma} \subset \zeta$. Denotative systemic significance (d-s) s_{Σ} *is a function defined in* ξ *so that if* $\xi_{\Sigma} \subset \xi$ *then* $s_{\Sigma}(\xi_{\Sigma}) \subseteq \xi_{\Sigma}$. Denotative systemic significance (d-significance) is the significance of the absolute beings. Denotative systemic significance (d-significance) agrees with relative beings.

7) *Ideological Technology*. In according Borhek and Curtis (1983) every ideology contains associated beliefs concerning means to attain ideal values. Some such associated beliefs concern the subjective legitimacy or appropriateness of d-significances, while others concern only the effectiveness of various d-significances. For example, political activists and organizational strategy and tactics are properly called technology of the ideology. Ideological Technology is the associated beliefs and material tools providing means for the immediate (in Structural Base) or far (In Ideal Structure as Utopia) goals of an ideology. Ideological Technology is not used to justify or validated other elements of an ideology, although the existence of ideological technologies may limit alternative among substantive beliefs. Ideological Technology commands less commitment from believers than do the other elements. A change in Ideological Technology (*strategy*) may be responsible for changes in logical prior elements of an ideology. Ideological Technology, like belonging to Structural Base and having a series of prescriptions concerning *doing* can influence the life conditions of believers, thus forcing an adaptation in the ideology itself. Eurocomunism in Western Europe gives to a good historical example. Ideological Technology may become symbolic through DS-image and an inverse MS-image on Primigenial Base belonging to Mythical Superstructure, and it can cause of more fundamental differences between ideologies and, therefore, a source of conflict. Conflicts between anarchists and Communists in the Spanish Civil War or the ideas of Trotsky and those of Stalin in the USSR are examples of it. Much blood has been shed between Muslims and Hindus over the fact that their religions have different dietary restrictions (deontical prohibitions).

Then:
1) Conflicts are not over Ideological Technology but over what technological difference symbolizes in the Primigenial Base of the Mythical Superstructure.
2) Substantive beliefs are understood only in terms of ideal values, criteria of validity, language and perspective.
3) The believer is usually better able to verbalize substantive beliefs than he is values, criteria, logical principles or orientation, which is apt to be the unquestioned bases from which he proceeds.
4) Ideal values, criteria of validity, language and perspective may have been built up around a

substantive belief to give it significance and justification.

Based on these criteria and our DIS approach, we are able to propose the following definition of ideology:

Definition 1 *We define systemically as* ideology *and we represent as* $Id = \langle Sb, IR \rangle$ *to the system formed by an object set Sb whose elements are substantive beliefs* $Sb = \{Sb_i\}, i = 1,...,n$ *and whose relational ser IR is formed by the set of binary logical abstract relations between substantive beliefs.*

2 VALIDATION OF IDEOLOGIES

Ideologies face two critical problems in the reality, the problem of commitment and the problem of validation. Ideologies persist because they and/or the social vehicle that carry them are able to generate and maintain commitment. For commitment to be maintained, however, an ideology must also, independently, seem to valid. Commitment and validation are two separate phenomena, in spite of the near universal myth that the human is committed because his beliefs are valid. Ideologies not only seem external and valid but also worth whatever discomforts believing entails. Humans often take the trouble to validate their beliefs because they are committed to them. An ideology with high utility limits available alternative ideology by excluding them, and limitation of alternatives increases the utility of whatever one has left. Utility for a group is not always identical to individual utility that motivates group reinforcement. Insofar as humans must collaborate to attain specific goals, they must compromise with collective utilities. Groups retain or change ideologies according to the history of reinforcement.

By virtue of its structure (within the Doxical Superstructure DS), an ideology may be able to fend off negative evidence in a given stimuli social environment H' but experience difficulty as social conditions (within Structural Base SB) change (See figure 1). Ideologies may respond to a changing social environment not only with adjustments in the social vehicles that carry those (Social States), but also with changes in the ideological logic (Semiotic States). Consider the possibilities that are open when an ideology is challenged by stimuli:
1) The ideology may be discarded, or at least the level commitment reduced.

2) The ideology may be affirmed in the very teeth of stimuli (*the triumph of faith*).

3) The believers may deny that the stimuli (events) were relevant to the ideology, or that the substantive belief that was changelled was importantly related to the rest of ideology.

The validation of belief is a largely social process. The social power of ideology depends on its external quality. Ideologies seem, to believers, to transcend the social groups that carry them, to have an independent existence of their own ([21-22]). For ideologies to persist must not only motivate commitment through collective utility but also through making the ideology itself seem to be valid in its own right. Perceived consensus is a necessary but not sufficient condition for the social power of ideologies. Therefore ideological validation is not simply a matter of organizational devices for the maintenance of believer commitment, but also of the social arrangements wherever the abstract system of ideology is accorded validity in terms of its own criteria. The appropriate criteria for determining validity or invalidity are socially defined. Logic and proofs are just as much social products as the ideologies they validate.

Cyclical principle of validation: *An idea is valid if it objectively passes the criterion of validity itself.*

Conditions of validation:
1) *Social condition*: Criterion of validity is chosen consensually and it is applied through a series of social conventions (Berger and Luckmann, 1966).

2) *First nonsocial condition*: Ideology has a logic of its own, which may not lead where powerful members of the social group wanted to.

3) *Second nonsocial condition*: The pressure of events (physical or semiotic stimuli coming from the stimulus social environment H') that may be pressure on believers to relinquish an ideology. For an ideology to survive the pressure of events with enough member commitment to make it powerful it must receive validation beyond the level of more consensuses.

The pressure of the events is translated in form denotative significances as DS-images on the component subjects of the Dogmatic System of the set of believers belonging to Structural Base.

Main Principle of validation: *The power of an ideology depends on its ability to validate itself in the face of reason for doubt.*

The *internal evidence* of an ideology (IE) is the data which derive from the ideology itself or from a social group or organization to which is attached. For highly systematic belief system (an ideology), any attack upon any of its principles is an attack upon the system itself. Then:

1) If one of the basic propositions (substantive beliefs) of an ideology is brought under attack, then so the entire ideology. In consequence, an ideology is at the mercy of its weakest elements.

2) An ideology has powerful conceptual properties, but those very properties highlight the smallest disagreement and give it importance in its logical connections with other items of ideology.

3) Even if an ideology is entirely nonempirical, it is vulnerable because even one shaken belief can lead to the loss of commitment to the entire ideological structure.

4) An ideology as the religious ideologies, with relatively little reference to the empirical world cannot be much affected by external empirical relevance, simply because the events do not bear upon it. The essential substantive belief in the mercy of God can scarcely be challenged by the continued wretchedness of life.

5) Nevertheless, concrete ideologies are directly subject to both internal and external evidence.

6) The abstract ideology is protected from external evidence by its very nature. A cult under fire may be able to preserve its ideology only by retreating to abstraction. Negative external evidence may motivate system-building at the level of the abstract ideology, where internal evidence is far more important.

7) The separability of the abstract ideology from its concrete expression depends on the ability of believers no affiliated with the association (cult and/or concern) that carried it socially to understand and use it, that is to say, subjects belonging to the Structural Base.

8) If the validation of an ideology comes from empirical events and the ability to systematically relate propositions according to an internally consistent logic, it can be reconstructed and perpetual by any social group with only a few hints.

9) The adaptation of an ideology is some sort of compromise between the need of *consensual*

validation and the need for independence from the associations that carries it.

Consensual validation is the confirmation of reality by comparison of one's own perceptions and concerns with those of others, including the recognition and modification of distortions. Consensual validation, describes the process by which human being realize that their perceptions of the world are shared by others. This bolsters their self-confidence since the confirmation of their observations normalizes their experience. Consensual validation also applies to our meanings and definitions. Arriving at a consensus of what things mean facilitates communication and understanding. When we all agree what something is, the definition of that something has integrity. Reality is a matter of consensual validation ([23]). Our exact internal interpretations of all objects may differ somewhat, but we agree on the generic class enough to communicate meaningfully with each other. Phantasy can be, and often is, as real as the "*real world*." Reality is distorted by strong, conflicted needs. People seek affiliations with groups that enable them to maintain an ideal balance between the desires to fit in and stand out. These motives operate in dialectical opposition to each other, such that meeting one signal a deficit in the other and instigate increased efforts to reduce this deficit. Thus, whereas feelings of belonging instigate attempts to individuate one, feelings of uniqueness instigate attempts to re-embed oneself in the collective. The physicalistic accretion to this rule of consensual validation is that, physical data being the only "real" data, internal phenomena must be reduced to physiological or behavioural data to become reliable or they will be ignored entirely. Public observation, then, always refers to a limited, specially trained public. It is only by basic agreement among those specially trained people that data become accepted as a foundation for the development of a science. That laymen cannot replicate the observations is of little relevance. What is so deceptive about the state of mind of the members of a society is the "consensual validation" of their concepts. It is naively assumed that the fact that the majority of people share certain ideas and feelings proves the validity of these ideas and feelings. Nothing is further from the truth.

Consensual validation as such has no bearing whatsoever on human reason. Just as there is a "*folie a deux*" there is a "*folie a millions*." The fact that millions of people share the same vices does not make these vices virtues and the fact that they share so many errors does not make the errors to be truths ([25]). On the other hand, when the ideology is identified with the community (or with a consensus), and this community, as well, it is not truly identified with a true socio-political institution based on the land (nation), but with a transcendental principle, personified in the norms of a church, sect or

another type of messianic organization, its effects on the secular political body, within as it prospers but with which it is not identified, they are inevitable and predictable destructive. The process of consensual validation, then ties the content of ideological beliefs to the social order (existing in the Structural Base) itself. It is established a feedback process: 1) If the social order remains, then the ideological beliefs must somehow be valid, regardless of the pressure of the events. 2) If the ideological beliefs are agreed upon by all, then the social order is safe.

Commitment of believers is the resultant of two opposite forces.

1) Social support (associations and no militant people), which maintains ideology.

2) Problems posed by pressure of events, which threaten ideology.

When ideology is shaken, further evidence of consensus is required. This can provide by social rituals of various sorts, which may have any manifest content, but which act to convey the additional messages ([23]). Each member of a believer group, in publicly himself through ritual is rewarded by the public commitment of the others. Patriotic ceremonies, political meetings, manifestations by the streets of the cities, transfers and public religious ceremonies are classic examples of this. Such ceremonies typically involve a formal restatement of the ideal ideology in speeches, as well as rituals that give opportunities for individual reaffirmation of commitment. For Durkheim ([21]) ideological behaviour could be rendered sociologically intelligible by assuming an identity between societies and the object of worship. The ideal of all totalitarian ideology is the total identity between the civil society and the ideological thought, that is to say, the establishment of the unique thought without fissures. Thus consensual validation and validation according to abstract ideal (Ideal Mythical Superstructure) are indistinguishable in the extreme case. If a certain ideology has a sole raison d'être affirmation of group membership (fundamentalist ideologies), no amount of logical or empirical proof is even relevant to validation, though proofs may in fact be emphasized as part of the ritual of group life.

We have the following examples of consensual validation in actual ideologies. :

1) F*alse patriotism* is the belief that whatever government says goes.

2) *Neo-conservatism* is the belief that the *status quo* should be maintained.

3) *Radical Progressism* is the belief that the social reality can change undermining the foundations of a millenarian culture.

4) *Shallow utilitarianism* is whatever the majority says goes, and since the majority, that's what shallow utilitarian believe in. This is often called *groupthink*. Erich Fromm ([25]) called it "*the pathology of normalcy*" and claimed it was brought about through consensual validation.

5) *Islamic fundamentalism*. From the perspective of the Islamists, his Islamic behaviour makes him a moral person. Living the dictates of Islam makes him "*good*." He does well, and he is good. His ethical beliefs and actions find consensual validation and continuous reinforcement in any and every geographical area of the *umma*. He no longer doubts, no longer even wonders. In a crude sense, he knows who he is, where he belongs, and what his purpose in life is. He knows never to doubt. His is not to reason why. Besides, he has lost the will, if not the capacity. By Islamic standards, the most virulent jihad is good. Jihadism is the ethical life of Islam. The Islamist embraces it right down to the last mitochondrion in the last cell of his body. He could not give up Islam even if he wanted, and he never commits the perditious sin of wanting.

2.1 Neutrosophic logic approach to validation

For a logical approach to the validation of ideologies, we will use the Neutrosophic logic ([20], [26-32]) (See figure 1).

Definition 2: True IDS-image is the *IDS-image which is permitted syntactically and semantically and whose external evidence provides with a degree of truth value in its existence.*

Considering the neutrosophic principles we shall establish the following Axioms:

Axiom 1: *Any IDS-image IDSi is provided with a neutrosophic truth value $\wp$, element of a neutrosophic set $E =]$ $^{-}0, 1^{+}[^{3}$. non enumerable and stable for multiplication.*

Axiom 2: *Any IDS-image IDSi is provided with a neutrosophic veritative value $v \in \left]^{-}0,1^{+}\right[^{3}$ such that $v = V(\wp) = V((T, I, F))$, V reciprocal application of E in $\left]^{-}0,1^{+}\right[^{3}$ and which possesses the following properties:*

1) $V(0) = {}^{-}0.$

2) $V(\wp_1, \wp_2) = V(\wp_1) \cdot V(\wp_2).$

If $T = 1^{+}$ it will designate absolute truth and if $T = {}^{-}0 \equiv F = 1^{+}$ it will designate the absolute falseness of the IDS-image. If complementariness is designated by M, the principle of complementariness between two IDs-images: IDSi and $\widehat{IDSi}$, it there is iff $(\wp_1 + \wp_2) \in \left]^{-}0,1^{+}\right[^{3}$. When $\wp_1 \neq 0$ y $\wp_2 \neq 0$, such that v $(\wp_i^{k}$ M $IDSi_{kj}) = 0$, it is necessary that $\wp_1 + \wp_2 = {}^{-}0$, as the sum of veracities does not admit opposing elements.

Axiom 3: *If $\neg IDSi$ designates the non-IDS-image $IDSi$, with the neutrosophic truth value $\neg \wp$, we will have to $V(\wp + \neg \wp) = 1^{+}$.*

Axiom 4: $\forall IDSi \in L$ /
$$v = V(\wp) = V((T, I, F)) = ((1^{+}, {}^{-}0, {}^{-}0))$$

Definition 3: Absolute true IDS-image TIDSi *is the IDS-image that fulfill*
$$v = V(\wp) = V((T, I, F)) = ((1^{+}, {}^{-}0, {}^{-}0))$$

Let S be a Believer Subject. Let IDSi be a IDS-image. We denote as Δ the operator *a priori and the equivalence operator as $\equiv$.* We shall designate as $(\Delta \equiv)$ the *equivalence a priori* operator and as $(\Box \equiv)$ the necessarily *equivalent operator*. We shall designate as V the *true being* operator and as $\Box$V the necessarily *true* operator. We designate as F the *false being* operator. We shall designate the *equivalent a posteriori* operator as $\nabla \equiv$. We may establish the following Theorems:

Theorem 1: *Each absolute true IDS-image IDSi considered by S is equivalent a priori to a necessary IDs-image $*IDSi$, that is, $\forall IDSi \exists *IDSi (IDSi(\Delta \equiv) \Box *IDSi).$*

Proof:

We shall consider the neutrosophic veritative value $v \in \left]^{-}0,1^{+}\right[^{3}$ of a specific IDS-image IDSi which shall be $T = 1^{+}$ if it is true and $T = {}^{-}0 \equiv F = 1^{+}$ if it is false. Therefore $IDSi \leftrightarrow T = 1^{+}$ is a priori by stipulation, and $T = 1^{+}$ is necessary if IDSi is true and necessarily

false F = 1^+ if r_{ij} is false. That is $IDSi(\Delta \equiv) * \wp_i^k$ and $(\square * IDS_i \vee \square \neg * IDSi)$.

Theorem 2: *Each absolute true IDS-image IDSi considered by S is necessarily equivalent to an a priori S-image* $* IDSi$: $\forall IDSi \exists * IDSi$ ($r_{ij} IDSi (\square \equiv)$ $\Delta * IDSi$).

Proof:

a) Given a true IDS-image IDSi we establish the IDS-image $^A IDSi$ for T = 1^+ and such that $IDSi(\Delta \equiv)^A IDSi$ VIDSi $\Rightarrow \square V ^A IDSi$. If IDSi has as neutrosophic veritative value T = 1^+, then $IDSi \equiv ^A IDSi$ will have the same neutrosophic veritative value, therefore IDSi($\square \equiv$) $IDSi \equiv ^A IDSi$. Thus, we have demonstrated that each true IDS-image is necessarily equivalent IDS-image a priori, specifically $IDSi \equiv ^A IDSi$.

b) In the case of F r_{ij}, the existence of a IDS-image $* IDSi$ will be necessary such that $(IDSi(\square \equiv) * IDSi \wedge \Delta \neg * IDSi)$. For FIDSi $\Rightarrow$ F $^A IDSi$ as ($IDSi \equiv ^A IDSi$)($\square \equiv$) $\neg IDSi$ and therefore, due to this selection of $* IDSi$ there cannot be (IDSi ($\square \equiv$) $* IDSi$. For FIDSi, $* IDSi$ is chosen, that is $\neg$ ($IDSi \equiv ^A IDSi$). Thus, clearly there is (IDSi ($\square \equiv$) $* IDSi \wedge \Delta \neg * IDSi$) due to the selection of $* IDSi$. Therefore, Theorem 2 is demonstrated.

Theorem 3: *Each necessary IDS-image IDSi considered by S is equivalent a posteriori to an absolute true IDS-image* $* IDSi$, *that is,* $\forall IDSi \exists * IDSi$ ($\square IDSi(\nabla \equiv) * IDSi$).

Proof:

If IDSi V $(\wp) = v = (1^+, {}^-0, {}^-0)$ is necessary.

$\square$
$$IDSi \Rightarrow (\nabla \equiv)(* IDSi / v = (1^+, {}^-0, {}^-0) \vee * IDSi / v = ({}^-0, {}^-0,1^+))$$

. The second term $* r_{ij} / v = ({}^-0, {}^-0,1^+)$ implies F $* r_{ij}$ which contradicts Theorem 1 as the IDS-image IDSi is true, being equivalent a priori to $* IDSi$ which is necessary and therefore $v = (1^+, {}^-0, {}^-0)$.

Theorem 4: *Each a posteriori IDS-image IDSi considered by S is necessarily equivalent to an absolute true IDS-image* $* IDSi$: $\forall IDi \exists * IDSi$ ($\nabla IDSi(\square \equiv) * IDSi$).

Proof.

If $* IDSi$ has $v = (1^+, {}^-0, {}^-0)$ as being true, it will imply that
$$\left(IDSi / v = (1^+, {}^-0, {}^-0) \vee IDSi / v = ({}^-0, {}^-0,1^+) \right)$$
. For $v = (1^+, {}^-0, {}^-0)$ it is obvious. For $v = ({}^-0, {}^-0,1^+)$ it contradicts Theorem 2.

3 VARIABLES OF AN IDEOLOGY

Ideologies "are" in the Superstructure, but far from our intention to think about neoplatonic ideas that beliefs exist *per se*, without material support. Without believers there is no belief system; but the belief system itself is not coextensive with any given individual Subject or set of Subjects. Ideologies as belief system have longer lives than Subjects and are capable of such complexity that they would exceed the capacity of a given Subject to detail. Ideologies have the quality of being real and having strong consequences but having no specific location, because Superstructure has not a physical place. In according to Rokeach ([33]), people make their inner feelings become real for others by expressing them in such cases as votes, statements, etc. they built or tear dhow, which in turn form the basis of cooperative (or uncooperative) activity for humans, the result of which is "Reality". Ideology is one kind of Reality although not all of it. Ideologies, like units of energy (information), should be thought of as things which have variable, abstract characteristics, not as members of platonic categories based on similarity. The ideological variables are:

1) Interrelatedness of their substantive beliefs defines the *degree of an ideology* (DId) and it is defined like the number m of their logical abstract relations. Logically, some belief systems ideologies are more tightly interrelated than others. We suppose the ideologies and belief sys-

tems forming a continuum: $\left[Id_l,...,Id_r\right]$.
Then: a) At the right end of the continuum are ideologies that consist of a few highly linked general statements from which a fairly large number of specific propositions can be derived. Confronted by a new situation, the believer may refer to the general rule to determine the stance he should take. Science considered as ideology is an example. b) At the left end of the continuum are ideologies that consists of sets of rather specific prescriptions and proscriptions (deontical norms) between which there are only weak functional links, although they may be loosely based on one or more assumptions. Confronted by a new situation, the believer receives little guidance from the belief system because there are no general rules to apply, only specific behavioral deontical norms that may not be relevant to the problem at hand. Agrarian religions are typically of this type. They are not true ideologies but proto-ideologies. If DId is defined by m or number of logical abstract relations between substantive beliefs, then m = 0 defines the non existence of belief system and $m = \infty$ an ideal ideology that it contemplated understanding of the totality, that is to say, of the own Reality. Consequences: a) High DId may inhibit diffusion. It may make an otherwise useful trait inaccessible or too costly by virtue of baggage that must accompany it. Scientific theories are understood by a small number of experts. b) To DId is high, social control may be affected on the basis of sanctions and may be taught and learned. Ideologies with a relative high DId seem to rely on rather general internalized deontical norms to maintain social control.

2) The *empirical relevance* (ER) is the degree to which individual substantive belief Sb_i confront the empirical world (Reality). The proposition that the velocity is the space crossed by a mobile divided by the time that takes in crossing that space has high empirical relevance. The proposition God's existence has low empirical relevance. $ER \subset \left[0,1\right]$, being 0 null empirical relevance (*Homo neaderthalensis* lives at the moment) and 1 total empirical relevance (a + b = c). When beliefs lacking empirical relevance arise in response to pressing strain in the economic or political structures (SB), collective action to solve economic or political problems becomes unlikely. Lack of ER protects the ideology and the social vehicle from controversies arising between the highly differentiated populations of believers.

3) The *ideological function* is the actual utility for a group of believing subjects. Ideological function conditions the persistence of the ideology, or time that is useful or influences social structure.

4) The *degree of the willingness* of an ideology (WD) is the degree to which an ideology accepts or rejects innovations. $WD \subset \left[0,1\right]$ being WD = 0 null acceptance and WD = 1 total acceptance. To major consequence of WD to take innovations is the ease with which ideologies adapt changes in their social environment. Beliefs with $WD \approx 1$, accepting innovations of all ideological degrees survive extreme changes in social structure: Shinto in Japan or Roman Catholicism is examples.

5) The *degree of tolerance* of an ideology (TD) is the degree with an ideology accepts or rejects competing ideologies or beliefs systems. $TD \subset \left[0,1\right]$ being TD = 0 total rejection and TD = 1 total acceptance. Some accepts *all* others as equally valid but simply different explanations of reality $TD \approx 1$. Others reject all other ideology as evil $TD \approx 0$, and maintain a position such as one found in revolutionary or fundamentalist movements. Then: a) High TD seems to be independent of ideological system and the degree of the willingness (WD). b) Low TD is fairly strong related with WD. c) Low TD is fairly strong related with a high ER. Relevance of highly empirical beliefs to each other is so clear. Therefore $TD = f\left(\dfrac{1}{WD}, ER\right)$. TD has consequences for the ideology: 1) It affects the case with the organizational vehicle (social structure) may take alignments with other social structures. 2) It affects the social relationships of the believers.

6) The *degree of commitment* demanded by an ideology (DCD) is the intensity of commitment demanded to the believer by the part of the ideology or the type of social vehicle by which the ideology is carried. $DCD \subset \left[0,1\right]$ being DCD = 0 null commitment demanded and DCD = 1 total adhesion. Then: a) DCD is not dependent of ideological system ID, empirical relevance (ER), acceptance or innovation (WD) and tolerance (TD). b) The degree of commitment demanded (DCD) has consequences for the persistence of the ideology. If an ideology has $DCD \approx 1$ and cannot motivate the believers to make this commitment, it is not likely to persist

for very long. Intentional communities having like immediate objective utopias have typically failed in large part for this reason. Revolutionary and fundamentalist ideologies typically demand DCD = 1 of their believers and typically institute procedures, such as party names to both ensure and symbolize that commitment (Crossman, [34]). c) DCD depends of invalidation. Ideological systems with low DCD fail or are invalidated slowly as beliefs drops from the believers' repertoire one by one or are relegated to some inactive status. Invalidation of ideological systems with high DCD produces apostates. High DCD ideological systems seem to become invalidated in a painful explosion for their believers, and such ideologies are replaced by an equally high DCD to an ideology opposing the original one. But reality is not constructed. Reality is encountered and then modified. Human Subjects do, in fact, encounter each other in pairs or groups in situations that require them to interact and to develop beliefs and ideologies in the process. They do so, however, as socialized beings with language, including all its values in fact, logic, prescriptions and proscriptions; in the context of the previous work of others; and constrained by endless social restrictions on alternative courses of action. *Commitment* is focus of ideologies, because is focus Ideas may be good, true, or beautiful in some context of meaning but their goodness, truth, or beauty is not sufficient explanation for its existence, sharedness, or perpetuation through time. *Ideology* is the ground and texture of cultural consensus. In its narrowest sense, this may be a consensus of a marginal or maverick group. In the broad sense in which we use the term ideology is the system of interlinked ideas, symbols, and beliefs by which any culture seeks to justify and perpetuate itself; the web of rhetoric, ritual, and assumption through which society coerces, persuades, and coheres on those aspects of social structure which maintain or create commitment: limitation of alternatives, social isolation, and social insulation through strategies that dictate heavy involvement of the individual Subject in group-centered activities. Individual commitment is view as stemming either from learning and reinforcements for what is learned, or from the fact that ideological functions (actual utility) to maintain personality either by compensating for some feeling of inadequacy, by providing an object for dependence, or by producing order out of disorder (Fromm, 1941; Wallace, 1966). Commitments are validated (or made legitimate) by mechanisms that make them subjectively meaningful to Subjects (Berger and Luckmann, 1966).

7) The *external quality* (EQ) of an ideology ([21]) is the property by which ideologies seem to believers, to transcend the social groups that carry them, to have an independent existence of their own.

Then we propose the following definition:

Definition 3: *Ideological system Id during the time of its actual utility* $[t_0, t_w]$ *or* historical time *is a non-linear function of its main characteristics, such as Id = f(DId, ER, WD, TD, DCD) = f(DId, ER, WD, f'(1/WD, ER), DCD) = F(DId, ER,WD, DCD).*

An ideology varies in the ideological degree (IdD) and its empirical relevance (ER) or the extent to which this ideology pertain directly o empirical reality. The apparent elusiveness of an ideology derives from four characteristics, all of which result from the fact that while beliefs are created and used by humans, they also have properties that are independent of their human use. In according with Borhek and Curtis ([23])

1) Ideologies appear to their believers to have a stability, immutability, coherence and independence. Ideologies to appear to social group members as a suprasocial set of eternal verities, unchangeable thorough mere human action and agreed upon by all right-thinking people not because the verities belong to a believers but because they are true ([21]). In reality, beliefs are changeable.

2) Similarities among substantive beliefs are not necessary parallel structural similarities among ideologies.

3) The historic source of beliefs (the myth) may, by virtue of their original use, endow them with features that remain through millennia of change and particularly fit them to use in novel context.

4) The most important commonality among a set of substantive beliefs is the social structure.

3 CONCLUSIONS

We can draw the following conclusions:
1) Therefore an ideology is a set of beliefs, aims and ideas.

2) Ideologies are not a collection of accidental facts considered separately and referred an underlying history and it is: a) Thoughts about our own behaviors, lives and courses of action. b) A mental impression – something that is abstract in our heads – rather than a concrete thing. c) A system of belief. Just beliefs –non-unchangeable ultimate truths about the way the world should be.

3) Ideology has different meanings:

    1) The process of production of meanings, signs and values in social life.

    2) A body of ideas characteristic of a particular social group or class.

    3) Ideas that help to legitimate a dominant political power.

    4) Socially necessary illusion; the conjecture of discourse and power.

    5) The medium in which conscious social actors make sense of their reality.

    6) Action oriented set of beliefs.

    7) The confusion of linguistic and phenomenal reality.

    8) Semiotic closure.

    9) The indispensable medium in which individuals live out their relations to a social structure.

    10) The confusion of the process whereby social life is converted to a natural.

4) The greater is the ideological degree (Id), the greater is the negative evidence for the whole ideology.

5) The less the degree of empirical relevance, the less the importance of external evidence (pressure of events, but the greater the importance of external evidence.

6) The suprasocial form of an ideology derives most significantly from its abstract ideal form belonging to Mythical Superstructure. The current social influence of an ideology derives of its concrete form belonging to Doxical Superstructure.

7) The more systematic and empirically relevant an ideology is, the greater the feasibility of preserving it as an abstract ideal apart from a given concrete expression.

8) The greater the Ideological degree (DId) and the greater the degree of empiricism, the less the reliance on internal evidence and the greater the reliance of external evidence.

9) The extent of commitment to ideology varies directly with the amount of consensual validation available, and inversely with the pressure of events.

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Modeling and analyzing non-functional requirements interdependencies with neutrosofic logic

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Abstract.

Nonfunctional requirements refer to global properties of software. They are an important part of the requirement engineering process and play a key role in software quality. Current approaches for modelling nonfunctional requiments interdependencies have limitations. In this work we proposed a new method to model interdependencies in nonfunctional requirements using neutrosophic logic. This proposal has many advantages for dealing with indeterminacy making easy the elicitation of knowledge. A case study is shown to demonstrate the applicability of the proposed method.

Keywords: Nonfunctional requirements, requirement engineering neutrosophic logic.

1 Introduction

Software engineers are involved in complex decisions that require multiples points of view. One frequent reason that cause low quality software is associated to problems related to analyse requirements [1]. Nonfunctional requirement (NFR) also known as nonfunctional-concerns [2] refer to global properties and usually to quality of functional requirements. It is generally recognized that NFR are an important and difficult part of the requirement engineering process. They play a key role in software quality, and that is considered a critical problem [3].

The current approach is based solely in modeling interdependencies using only numerical Fuzzy Cognitive Maps (FCM). In this work we propose a new framework for processing uncertainty and indeterminacy in mental models.

This paper is structured as follows: Section 2 reviews some important concepts about Non-functional requirements interdependencies and neutrosofic logic. In Section 3, we present a framework for modelling nonfunctional requirements interdependencies with neutrosophic logic. Section 4 shows an illustrative example of the proposed model. The paper ends with conclusions and further work recommendations in.

2 Non-functional requirements interdependencies and neutrosofic logic

Nonfunctional requirements are difficult to evaluate particularly because they are subjective, relative and interdependent [4]. In order to analyse NFR, uncertainty arises, making desirable to compute with qualitative information. In software development projects analyst must identify and specify relationships between NFR. Current approaches differentiate three types of relationships: negative (-), positive (+) or null (no contribution). The opportunity to evaluate NFR depends on the type of these relationships.

Softgoal Interdependency Graphs [4] is a technique used for modelling non-functional requirements and interdependencies between them. Bendjenna [2] proposed the use on fuzzy cognitive maps (FCM) relationships between NFCs and the weight of these relationships expressed with fuzzy weights in the range 0 to 1. This model lacks additional techniques for analysing the resulting FCM.

Neutrosophic logic is a generalization of fuzzy logic based on neutrosophy [5]. When indeterminacy is introduced in cognitive mapping it is called Neutrosophic Cognitive Map (NCM) [6]. NCM are based on neutrosophic logic to represent uncertainty and indeterminacy in cognitive maps [5] extending FCM. A NCM is a directed graph in which at least one edge is an indeterminacy one denoted by dotted lines [7]. Building a NCM allows dealing with indeterminacy,   making   easy   the   elicitation   of interdependencies among NFR.

3 A framework for modelling non-functional requirements interdependencies

The following steps will be used to establish a framework for modeling non-functional requirements interdependencies NCM (Fig. 1).
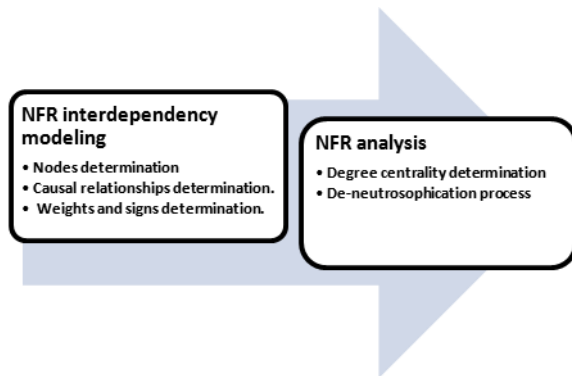
Figure 1: Proposed framework.

- **NFR interdependency modeling**

   The first step is the identification of non-functional concern in a system (nodes). In this framework we propose the approach of Chong based on a catalogue of NFR [4]. Causal relationships, its weights and signs are elicited finally [8].

- **NFR analysis**

   Static analysis is develop to define the importance of NFR based on the degree centrality measure [9]. A de-neutrosophication process gives an interval number for centrality. Finally the nodes are ordered and a global order of NFR is given.

5 Illustrative example

   In this section, an illustrative example in order to show the applicability of the proposed model is presented. Five non-functional concerns $R = (NFR_1, ..., NFR_5)$ are identified (Table 3).

Table 3 Non-functional requirements

Node	Description
NFR_1	Quality
NFR_2	Reliability
NFR_3	Functionality
NFR_4	Competitiveness
NFR_5	Cost

Table 1 Non-functional requirements

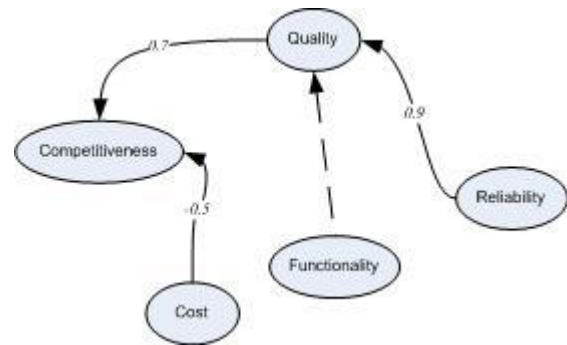The experts provide the following causal relations (Fig 2) .

Figure 2. NCM representing NFR interdependencies.

   The neutrosophic score of each NFR based on the centralitydegree measure [10] is as follows:

NFR_1	1.6I
NFR_2	0.9
NFR_3	I
NFR_4	1.2
NFR_5	0.5

The next step is the de-neutrosophication process as proposes by Salmeron and Smarandache [11]. $I \in [0,1]$ is repalaced by both maximum and minimum values.

NFR_1	[1.6, 2.6]
NFR_2	0.9
NFR_3	[0, 1]
NFR_4	1.2
NFR_5	0.5

The final we work with extreme values [12] for giving a total order:

$$NFR_1 \succ NFR_4 \succ NFR_2 \succ NFR_3 \sim NFR_5$$

Quality, competitiveness and reliability are the more important concern in this case.

Conclusion

   This paper proposes a new framework to model interdependencies in NFR using NCM. Neutrosophic logic is used for representing causal relation among NFR.
   Building a NCM allows dealing with indeterminacy, making easy the elicitation of knowledge from experts. An illustrative example showed the applicability of the pro-

posal. Further works will concentrate on two objectives: developing a consensus model and developing an expert system based.

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