The Generic Metamodel, the Conflict Modelling Cycle and Decision Support

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Metamodels provide a mechanism for guidance in modelling. They offer a structured approach, which is appropriate for the modelling of situations and processes. An example of a metamodel is a modelling cycle, and one is proposed suitable for conflict processes in groups with critical size. The way in which such a modelling cycle can be implemented on a computer system for decision support is discussed.

1. Introduction

This paper is concerned with the modelling process of conflict which arises from change, and the simulation of that process. The modelling of modelling processes is a metamodelling process, providing guidance and structured reasoning to situations that may be somewhat messy in the way in which they are defined. Thus, this paper is concerned with metamodelling, and in particular it concerns the structured modelling of conflict arising from change for large groups. It also has interest in the computerisation of such modelling.

When attempting to model, and thus examining the conflict processes of groups, it is appropriate to differentiate between those which are small and those which are large: small groups tend to be ill-structured in their communications and decision processes, that is they do not conform to a predeterminable pattern or relate group entities in a predeterminable way. Larger groups tend to be more structured, having formalised processes and entity relationships that are better known and more predeterminable. Thus, the structural nature of groups under change itself changes according to the size of the group within which it occurs. Small group processes tend to operate differently from those of large groups. They mostly operate informally and are unstructured. A group can be thought of as becoming a large group when it has acquired a critical mass of people. Like so many examples in real life that can be described as having an instantaneous metamorphosis [Thom, 1975], the critical change that distinguishes small group processes from large group ones may well appear to be sudden and distinct. However, as groups get larger, so group norms start to appear; as they increase in size, so too does the complexity of their relationships, communications, and other processes. With this formalised processes start to develop, and the group thus becomes more structured and more easily representable by formal models.

Models can be classified on a *hard* to *soft* continuum. In hard models *things* tend to dominate a problem and its setting, while in soft models it is *people* and their psychological needs that dominate. In very soft contexts, the model may become the activity. For example the named conceptual domains of Systems Engineering, Project Management, Systems Analysis, and Operational Research are closer to the hard end of the continuum while Management Cybernetics, Soft Systems Methodology, and Organisational Development are closer to the soft end. Harder approaches tend to adopt more externally structured elements within their operational frameworks than the softer approaches which tend to be more unstructured. Domains that are highly structured have elements that are explicitly well defined and can more easily be modelled. Thus, in systems engineering it is the norm to model and where possible test a solution before implementing it, while in Organisational Development, the only way to test a model is to experience it.

The approach to modelling conflict processes is frequently better undertaken when guidance in creating and validating models is provided. This represents a structured approach. In particular, it is important that the approach to a problem being modelled is to be well structured. This can often be accomplished through the use of a modelling cycle, and modelling cycles are representative of metamodels. One purpose of this paper is to consider a modelling cycle which is directed at large group conflicts.

When considering computer aided application of a metamodel to a problem domain, the softer the problem, the more difficult it is to generate a computer system able to adequately deal with general modelling and simulation requirements because of the need for machine intelligence, level of knowledge, and decision making facility needed.

2. Modelling Cycles

Simon [1960] was a major contributor to Management Science. His concern lay in the development of a decision science, and in order to do this he expressed the prevalent ideas on modelling development as a general cycle for decision making processes under goal seeking behaviour. Its three phases are *Intelligence, Design*, and *Choice* which can be iterated through to progress a problem. The cycle provides guidance in modelling decision problems which tells us that problem domains must be properly examined, options identified, and models generated and applied to the domains.

The Simon cycle has provided guidance to the process of decision making. However, it does not provide model builders with direction about model building techniques or approaches, nor provide a philosophical orientation for so doing. A development of this cycle was suggested by Rubenstein and Haberstroh [1965], and a variation designed for computer software developers was later produced [Sprague, 1986] in order to tackle well structured problem domains. The latter hard approach come out of the stable of Systems Development Life Cycle, and this type of approach has been used in situations in which the analyst does not envisage the involvement of people while addressing the problem domain. It therefore provides for a highly structured modelling approach that can be represented in terms of well defined harder modelling techniques. To tackle more unstructured processes involving people a different need arises.

One well known metamodel [Checkland, 1981; Checkland, Scholes, 1990] called Soft Systems Methodology (SSM) has been used to solve unstructured small group dynamic change problems.

Flood and Jackson [1990] have defined their more flexible metamodel which introduces the idea of a "metaphor" to represent an analogous concept to the problem in hand. The metaphor thus helps to identify the context of a situation. This approach has been called Total Systems Intervention (TSI), and consists of a cycle of three phases: *Creativity*: use system metaphors as organising structures; e.g. see an organisation as a machine (closed system), an organism (open system), a brain (learning system), culture (norms, values), team (unitary political system), coalition (pluralist political system), or prison (coercive political system). Outcome is the dominant metaphor. *Choice*: select an intervention strategy or set of methodologies as appropriate. Use any of the tools available from the hard-soft continuum of techniques. A dominant technology may be found. *Implementation*: employs a particular system methodology to translate the dominant vision of the organisation, its structure, and the general orientation adopted to concerns and problems into specific proposals for change.

Common to the above metamodels, and indeed others, it is possible to generate a definition for a generic modelling cycle. The three phases that are defined are *Analysis, Synthesis*, and *Choice*. Analysis is the breaking down of a problem into its components, including its context, the identification of its structures, and its orientations. Synthesis is the building up of a set of components into a coherent picture, from the integration of ideas derived from the analysis, to the construction of the prerequisites for a model. Finally, Choice is anything that involves the selection of something, including implementation.

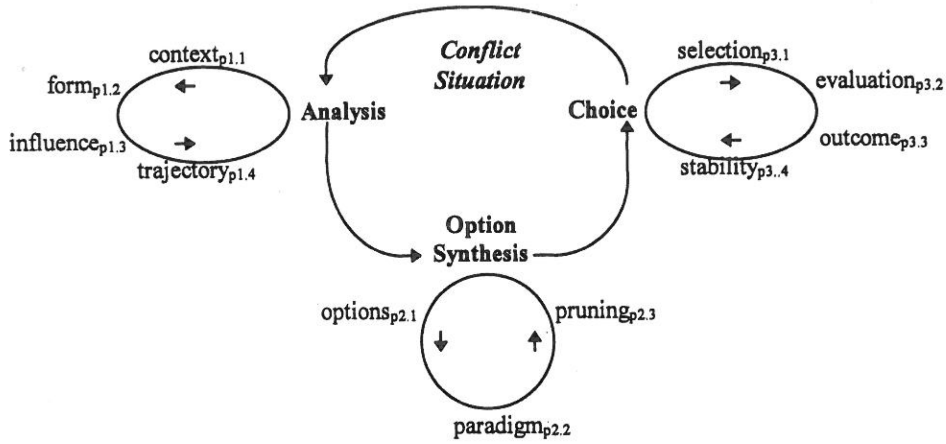

Fig. 1. Conflict Modelling Cycle

It is quite a simple matter to apply the generic model to any modelling cycle from the very hard Systems Development Life Cycle, to the quite soft Organisational Development cycle. The fundamental distinction between the different metamodels then becomes the philosophical approach. In principle, one can consider that the generic metamodel is held on a slide on the hard-soft continuum on which reside a variety of modelling/problem structuring tools, and as it moves it picks up those modelling tools it requires and appropriate philosophical approaches. Having completed a cycle, it is possible to move to another division on the continuum, also perhaps adopting a new philosophical position. This approach must implicitly hold flexibility in its philosophical stance.

3. The Conflict Modelling Cycle

In the social sciences, it is frequently the case that models are built in a way which is not structured. They could therefore benefit from the application of a metamodel. Models for such processes may vary in their position on the hard-soft continuum.

While the TSI approach could be useful here since it provides some level of flexibility, it does not appear to give guidance in providing a way of directly connecting the examination of the problem domain with traditional hard modelling approachesas might be required in the semi-structured problems of large group conflicts.

In an attempt to address this type of problem domain, the conflict modelling cycle (CMC) presented in fig. 1 adopts the three phases of the generic model. It is thus consistent with the Simon cycle, and broadly SSM and TSI, though necessarily the terminology and philosophy have changed.

In CMC, the first phase *Analysis* involves domain examination and evaluation. The second phase is *Option Synthesis*, and involves propositional definition of the unstructured problem domain, and the structuring of decision alternatives. *Choices* is the third phase; it is concerned with the selection/implementation of modelling approaches which may be soft or hard. In the case of soft modelling the model defines the approach to a solution. In the case of hard models then this phase in addition addresses explicit model selection and evaluation, and ensures consistency between the propositional base of each of a possible set of models available for selection, and the propositions defined in phase 2.

3.1. Analysis

Analysis represents the conceptual breaking down of a situation into a set of component parts. It assumes that the a sociological understanding of the situation already exists, so that an appropriate context can be defined. Consideration of analysis, according to CMC, is defined according to phases in the following way:

P1.1 Context. Examine the nature and context of the situation in general terms, and the environment in which it operates. This context will initially be tied to the sociocultural dimension of the situation being inquired into. It will also indicate the paradigm within which the situation exists.

P1.2 Form. The structure and underlying processes of a situation are defined as a form of the situation. Realise that there may be a plurality of situations, which may result in a multiplicity of forms.

P1.3 Influence. Identify the influences on the situation. Establish relationship between entities within the situation and outside it.

P1.4 Trajectory. Trajectory analysis is concerned with problem definition and direction. *Problem definition*: The problem domain is the problem and its set of actors, parameters, variables, and constraints. Clear definition of this can be difficult when there is sufficient complexity. In reducing complexity one might: (a) examine the changes that may have invoked the problem, (b) identify the problem boundaries, parameters, (c) examine problem plurality, and the existence of sub-problems, (d) examine possible problem solving schedules. *Trajectory definition*: Each participant in a situation involving conflict is an actor with a framework of perception, perspectives to the problem, and decisions and actions taken which constitute a pathway through the domain. The pathway will have a direction which, if intended, represents the aim of the process, and identifies trajectories intended to lead to achievable goals. The difference between an intended and an actual trajectory is an indicator of how dynamically stable the situation is.

To undertake analysis, it is essential that actors and their influences are adequately understood. Actors have goals, objectives, strategies, and an external environment with which they interact. They have internal constraints as well as external ones, and variables which include general cultural attributes. This applies to all classes of actor, whether they are individuals, or group actors organisations.

Iteration through this subcycle can occur to enable for example a developing explanation of a situation, and comparison between old and new situations during change, thus for example, enabling different purposes or paradigms to be distinguished.

3.2. Option Synthesis

By synthesis is meant selecting, inventing, or developing options which in themselves are models. The paradigm of these options must be *commensurable* [Yolles, 1995] with that of the situation. That is the paradigms must be structurally and qualitatively similar. Synthesis includes the following elements:

P2.1 Options. Generate a range of options. This involves the modelling of interactive player relationships as definitive scenario possibilities. The models should represent holistic forms that represent solutions to conflictual problems as identified in analysis.

P2.2 Paradigm. Thus, define the propositions upon which will form the basis of the solution options for the problem. and this should be taken together with the experience of exemplars and use of the correct language to describe and communicate the options.

P2.3 Pruning. The purpose of pruning is to seek paradigm commensurablity with the situation, and represents the reduction of the alternatives to a core set of Optional Reality States (ORS). Since options represent solutions to the set of problems, these should be sociologically appropriate so that they satisfy the cultural and social attributes identified in the situation. It is essential that the paradigm associated with the synthesised options is commensurable with that of the problem situation, otherwise they will either be rejected, or they will not work.

Iteration through this subcycle will enable: (a) additional options to be sought, which may themselves be evaluated, (b) greater detail for the ORS.

3.3 Choice

This phase distinguishes the ability of each option model to represent the situation and the constraints under which it operates. Validation of an option only occurs if an evaluation has been successful. The phase includes:

P3.1 Selection. Provide the choice of selecting options. Identify option demands, constraints, perspectives, and implications explicitly, and criteria of selection. Identify commensurability between the modelling paradigm and the paradigm believed to be associated with the real world situation — that is convergence with P2.2. This step might also include identifying methods of prediction, or perhaps more realistically for complex situations, anticipation based on cognitive belief.

P3.2 Activation. This enables the option evaluation. The tools for this should be defined, as should be the assumptions on which they are based. The propositional base of a tool should be commensurable with that of an option. Thus, in a soft modelling environment, a tool might be group discussion or groupthink, or a game. In a hard modelling environment it might involve testing against simulations whose propositions will also have to be examined (e.g. Gaussian distribution models which assume randomness). Options may be activated either for implementation, or by analogue simulations or games etc.

P3.3 Outcome. Comparison of option outcomes or expected outcomes will validate options seclections. This occurs by examining the results of activated options by identifying their consequences in comparison to events identified in the situation. In soft situations, the approach might be to determine through feedback from the actors the utility of the model as a way of thinking about the situation (an analytic tool). In hard models, a match between model outputs and perceived real world events might indicate how "good" the option is.

P3.4 Stability. Investigate dynamic and structural stability of the synthesised system. In a soft approach this might mean evaluating options against their intended or expected purposes. This could occur through a report back from a groupthink or game. In hard situations prediction could indicate whether predefined goals were achievable.

This phase could be iterated. For example a first iteration might confirm that selections where satisfactory, and a second iteration might enable implementation of an option.

3.4 Iteration and Recursion

It has been explained that each subcycle may require to be repeated as an iteration prior to moving on to the next phase. In the same way the cycle of phrases can also be iterated through to confirm the relationship between the situation, the options, and the means of evaluating the options.

When a situation can be seen to be made up of a set of other situations contained within it, then it may be inappropriate to pursue the methodological approach of inquiry as a single iterative cycle, even noting the possibility of the involvement of feedback. It may be necessary to instead interrupt the cycle in order to explore some of the individual subsituations that have been identified. These subsituations may themselves be examined in terms of iterative inquiry, when the cycle is started afresh in relation to each subsituation. When this occurs, then the iteration is said to be recursive. Even recursive iterations may have to be subject to recursion themselves.

At the end of a series of recursive iterations, it may be appropriate to once more resume the overall cycle in order to bring out an integrated interpretation of the explanations that have developed for each subsituation. Recursion is seen to be able to enrich the inquiry process when applied to seemingly simple cyclic methodologies.

4. Modelling Decision Options

The modelling cycle requires a full systemic evaluation of the conflict domain satisfying each phase of the Conflict Modelling Cycle. In Analysis, the problem environment is very strictly viewed as a system which is formally defined in terms of the appropriate theory; thus the constituent elements of the problem environment are defined, including who the participating players are, their attributes, functions, and relationships. It defines the framework of the situation being studied for each player: that is, identification of the nature of a player and its boundaries and influences. This is equivalent to defining the framework of perception of players, and very closely relates to the propositions that determine the way in which they operate.

Correctly, data should be collected from all players within the defined system and differentiation should be made between observations and player perceptions in order to address the next phase.

In the second phase, Synthesis, a formal set of propositions are synthesised which relate to the analysis of the conflictual system. For instance how far can one assume player rationality and within what contexts. The propositional base may include, for instance, consideration of under what conditions players will act against their rationally established preferences.

This can be followed by the creation of a set of decision tables. Each decision table will consist of three connected sub-tables: (a) properties, (b) objectives, and (c) goals [Yolles, 1992]. In the context of social conflicts, properties form the current characteristics of a player, and relate to its power base over each of the social, economic, political, and cultural domains. Goals represent that which each player intends to achieve in the long term. Objectives are the set of decision options available to the players which normally relate to their rationally established preferences. As a result of Decision table analysis, feasible solution can be found for the problem under consideration.

Feasible solutions are those which are logically consistent. *Feasible ORS* are those ORS states which can logically exist, and are determined from the set of system properties. The set of feasible ORSs in an n-player system compose possible scenarios of interaction for examination within a decision making framework. Thus, each scenario becomes a feasible decision making solution of the problem environment. A decision table would be created for each of 4 dimensions of concern in the above example, that is political, social, economic and cultural [Kemp, Yolles, 1992]. Scenarios are established within these tables. A scenario may be a one player identity of ORS that is feasible under defined conditions. These conditions are defined in the first part of the table. A scenario may also represent interaction when at least two players (e.g. an ethnic groups and a host player, or two coincident cultural minority groups) defining a set of states in contraposition to each other across each of the 4 domains. In this case the scenario also represents a set of mutual positions taken by each player on each state in the interaction.

5. Developing a Conflict Tableau

In consultation with a colleague G.Kemp, it was found that the decision table approach can be developed further as a modelling tool in its own right within the conflict modelling cycle. Here, objectives from each player have been assembled in order to form a conflict tableau which can be formulated into a set of feasible interactive scenarios (see fig. 2 and 3).

We may choose ${}^{r}S_{p}$ to represent the rth decision table of player p, and ${}^{r}s_{m}$ to represent the combined objectives tables for all of the players at the rth iteration at the m stable decision options. We can now define a futures trajectory which may occur along any branch of the futures tree.

The future scenario set ${}^{r}s_{j}$ for the rth iteration for the jth scenario is generated by inspection through the initial use of the methodology described below.

Initially the ${}^{r}S_{p}$ decision tables for $r = 0$ are generated within the modelling cycle, and a tableau ${}^{r}s_{j}$ with j scenario possibilities is created. This tableau enables an interactive evaluation of the conflict domain to be attempted. Once this has been pruned, an investigation of how selection can effect the ${}^{1}s_{p}$ decision tables will be examined within the modelling cycle. It may be that there is no difference between ${}^{0}s_{p}$ and ${}^{1}s_{p}$, when a new futures set ${}^{1}s_{j}$ is generated directly.

Consider each objective table as a possible outcome of a decision option. A number of different outcomes can develop which are presented within a conflict tableau. Each of these possible outcomes is as a scenario. For an example of this see [Yolles, 1992a].

6. Choosing a Model

The third phase of the modelling cycle is that of Choice, where the modelling approach is chosen to solve the perceived problem. Two of the features of the approach adopted within this proposal are: 1) use the goals table for examining dynamic stability during iteration within the modelling cycle; 2) use the objectives table within a conflict tableau to examine the structural stability of the system under examination.

The identification of a stable set of ORS reduces the size of the conflict tableau. This reduced set can be used to evaluate the impact of each optional scenario on the original properties table to create a set of possible futures as shown in fig. 2. This in turn enables a dynamic stability evaluation to occur on possible futures.

The need to examine the conflict tableau to investigate the structural stability of the conflict environment requires the use of a methodology, the propositional basis of which conforms to that determined for the system overall. Examples of some of the methodologies that might be appropriate are in particular Conflict Analysis [Fraser, Hipel, 1984], or a variation on Saaty's multivariate decision analysis approach (called Analytic Hierarchy Process [Zahedi, 1986]), or simply expert evaluation.

After identifying the propositional requirements of the methodologies being considered, it may be appropriate to re-examine the overall system within the Analysis phase, reconsidering the player frameworks; this can enable the problem to be differently defined, i.e. whether a difference between expressed and perceived objectives should be identified, or whether the very nature of a given player or player set should be redefined. New propositions may thus develop, and decision tables already determined may in consequence be redefined; thus new objectives tables and a new conflict tableau may develop. In terms of game theory this relates to a redefinition of the game that each player is playing, and even whether it is the same perceived game.

7. Finding Stable ORS

Once a conflict tableau has been generated, it is appropriate to reduce the model to a set of feasible ORSs that are structurally stable. This may occur through human inspection, or through expert system inspection, or by the use of one of the multivariate decision analysis methods (e.g. Zahedi, 1986). It could also, for instance, be accomplished using the method known as Conflict Analysis [Fraser, Hipel, 1984]. This approach provides a useful introduction to the logical qualitative aspects which may be associated with scenario formulation within environments under change and in which there are potentially confrontational components.

A tableau may be generated to represent the objective set of feasible scenarios possible to each conflict situation. Players normally have distinct preferences and biases, and under this condition there will be a distinct and different preference ordering of scenarios which should be considered when undertaking a stability analysis.

The modelling approach can be extended by making a second circuit of the Choices phase; this can occur by making the conflict tableau the determinant for establishing a set of futures, since feasible objectives within the ORS will impact the properties and goals of each player to a degree which may or may not be discernable (fig. 3). Other circuits of the Choices phase might also occur perhaps prior to this.

Throughout the outcome evaluation and systems analysis, the futures can also be examined

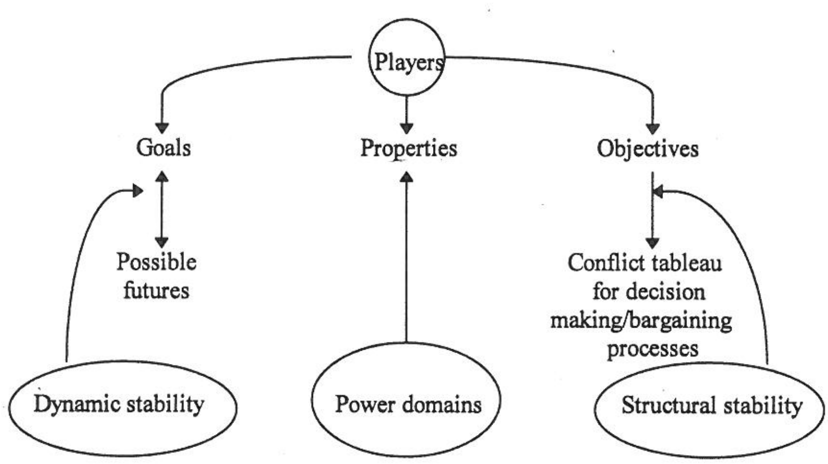

Fig. 2. Relationship between Goals, Objectives, and Properties in the Decision Table Model

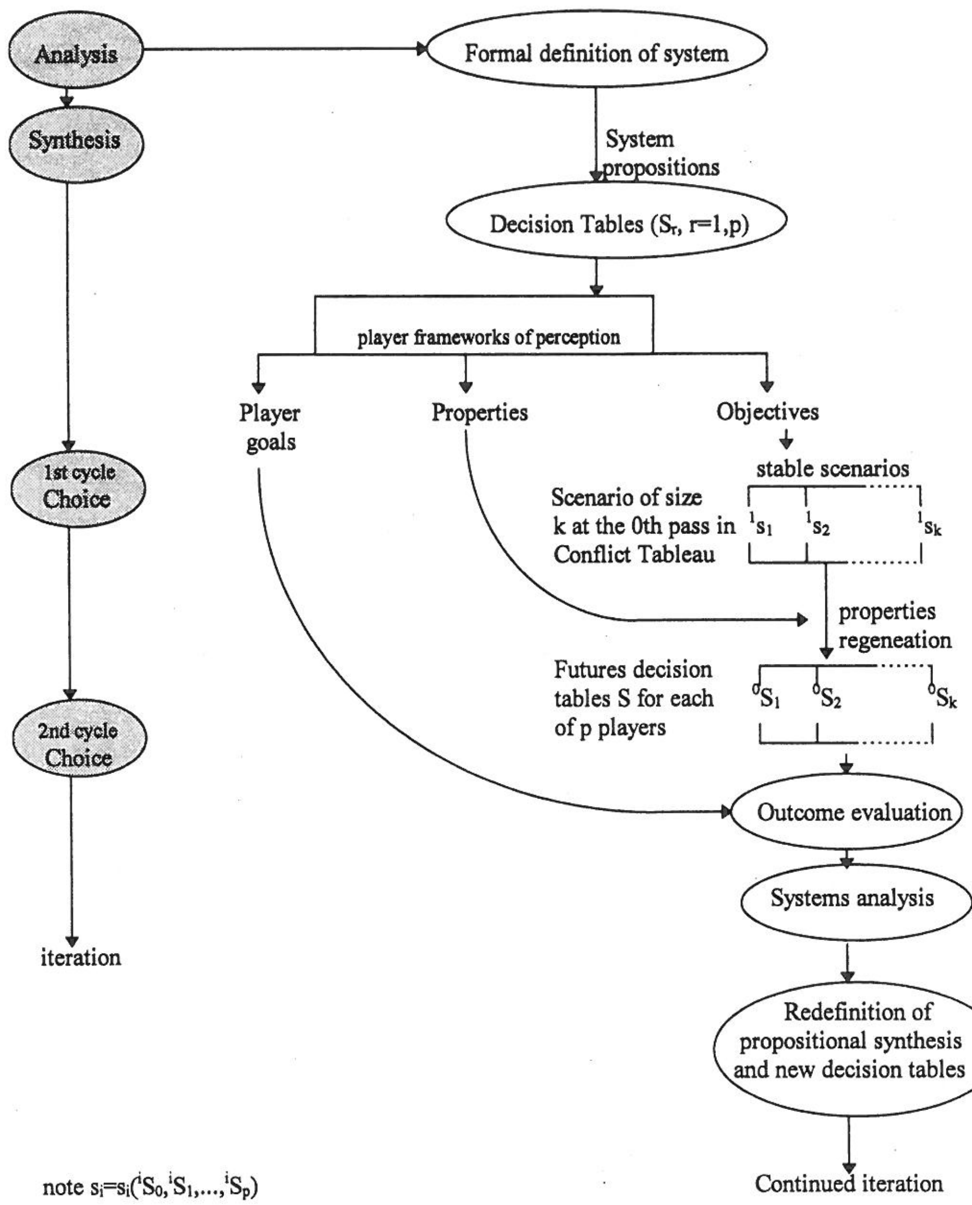

Fig. 3. Futures Decision Table Analysis

against the goals table which can contribute to an investigation of possible divergence, and thus dynamic stability. It should be realised that the selection of scenarios within one iteration represents the investigation of structural stability. The outcome of the iteration will be a redefinition of the propositional synthesis, and the creation of new decision tables.

The methodology is intended to be sufficiently robust to enable the changing environment within the domain of conflict to be satisfactorily represented through examining possible futures. A futures tree of new decision tables models is then created with as many branches as there are possible futures. These futures are then reanalysed in a continued iteration of the full cycle creating a set of possible future trajectories which will best suite the players both individually and interactively. As real events progress within the domain of conflict, the inappropriate branches are shed. Since a branch is a discrete component of a trajectory, inappropriate trajectories are thus also shed.

The evaluation of whether certain scenarios represent stable as well as feasible outcomes is determined by the use of the decimal values generated by each scenario as already explained in the previous section. These are flags which enable a logical investigation of the stable situation to be made according to an algorithmic process, rather than by forced logic alone. Certain scenarios are termed UI's (Unilateral Improvement) enabling a the state conditions of the environment for that player. A computer program is available to generate solutions to certain classes of problem. The whole approach is particularly suitable for computer simulation, since futures can be modelled examined, and evaluated more easily.

8. Simulation and the Modelling Cycle

This section of the paper is concerned with some of architectural needs that should be considered when designing a simulation system capable of helping modellers use the conflict modelling cycle to structure a modelling process.

In order to establish the modelling cycle within a computer system it is essential to take into account a numberof aspects. These include the use of a decision aid to assist in determining the suitability of a modelling approach or technique; applying the concepts of knowledge based systems to guide the modelling process; and monitoring the system to identify where the modelling process is in the modelling cycle, its general progress and conceptual suitability, and how the modelling processes compares with reality.

8.1. Modelling Decision Support

In order to apply computer techniques to the conflict modelling cycle, it is appropriate to discuss the needs of a computer system to enable it to be able to determine what model to select, and how to do so. A Modelling Decision Support System (MDSS) can be thought of to consist of three subsystems, the Information Base subsystem, Database subsystem, and the Modelling subsystem. The three subsystems would be linked together by an interface block composed of: the DGMS — is a Dialogue Generation and Management System which enables the user to use the system in a user oriented way; the SBMS — a Strategy Base Management System connected to a model base subsystem, which enable modelling strategies to be collected, offered to a modeller, and after a modelling selection has been made, applied; in an intelligent system, it will be able to assess the suitability of strategic models according to the characteristics of the modelling domain and the modeller; the MIMS — a Modelling Information Management System part of which is an Information Base Management System (IBMS), connected to the navigation process and generates an audit trail or history of the modelling process (through the database subsystem). Part of the MIMS is a monitoring system (MS) which enables implicit and explicit evaluation of the modelling process to occur.

Suitable modelling DSS environments may not only be able to chart a navigation process through its associated MIMS, it will also be able to guide the modeller through distinct levels of modelling process. In terms of management control, the MIMS can be described as having *strategic models* that will provide alternative strategies and processes of modelling, including media selection, *tactical models* will help the modeller navigate through a modelling domain, *operational models* will help modellers solve a current problem, for instance by directing them from a failed test result to a particular area of test. The subsystem can operate with data from the data subsystem to generate real time problem orientated models through the system interface. An extension of this is the explicit provision of a full monitoring and performance evaluation system with in-built advisor that activates the appropriate assistance required. This is system is shown in fig. 4.

8.2. Other Consideration

Other considerations for the system relate to the use of deep reasoning methods for the evaluation of qualitative aspects of the system. The implementation of a modelling approach as identified within a metamodel has an implicit requirement to undertake qualitative reasoning. This requires a high level of intelligence which few systems have yet been able to introduce. The nature of deep modelling processes is basically qualitative. Some approaches are logically based, identifying appropriate requirements independent of local contexts. Others are rule based, using meta-rules to determine which surface rules of a set (with perhaps contradictory

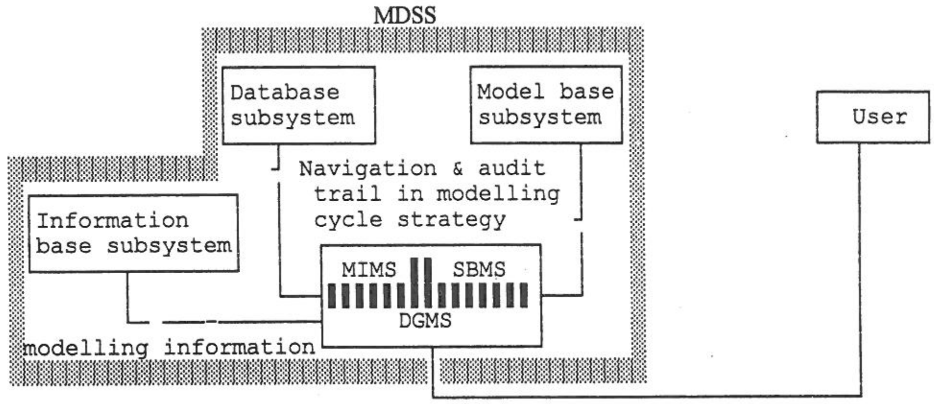

Fig. 4. Relationship between MDSS Subsystems

or competing elements) to select. Other approaches use mathematical methods, or a combination of all three. One approach in determining qualitative evaluations, according to Kuipers, has a history which goes back to the mid 1970's. The investigators of this area of study tend to focus on descriptions of the deep mechanism, capable of representing incomplete knowledge of a structure and behaviour within a process.

A final consideration that shall be made here is that of monitoring. The monitoring of a modelling progress through a particular modelling processes must be an implicit feature of a modelling system. The decision rules are determined by identifying the criteria necessary for making a decision. In a metamodelling environment they are typically determined from the experience of recurrent processes. When monitoring suggests that a modeller has not been successful is modelling a process, then feedback to the system decision maker is required in order that a decision rule relating to the current modeller can be adjusted or a new one introduced. A monitoring system is depicted in fig. 5.

9. Application of the Methodology

At this stage of the conceptualisation of this paper, only the Conflict Modelling Cycle has been put into use. It is only possible to produce an application that takes what we refer to as a brief pre-evaluation of the situation, and the case chosen is the change that occurred in the Central and Eastern Europe after the fall of the Soviet autochracy.

In the examination of this situation, it is appropriate to identify the nature of the paradigm shift within analysis. As a result, two iterations will be undertaken, one for the pre-change situation, and the other through a second iteration to define the nature of the shift. The shape of the change may have some impact on the synthesis stage. There is no space here to do more than a cursory examination of the change through these two iterations. Synthesis would follow on by looking at solutions to the change and examining the relationship between the two paradigms, and the perceived needs of the different groups (government, enterprise, individual) that should be met.

Iteration 1

Context

In Europe, it has been said that Governments operate oligarchically (a country run by the State), rather than democratically (Government by the people directly or by representation). This is supported by the idea that Governments make decisions about social issues in general without reference to the populations it rules, and is only called to account periodically after a number of years. In this sense, the difference between Governments of the old communist States of Europe and the West can be seen as a distinction in respect of factors like the degree of coercion (and terrorism [Ionescu, 1975, p210]) within its instruments of rule. Despite this, the two spheres of ideology represent a similar form of society in that they represent different "species" of the same genus [ibid, p14].

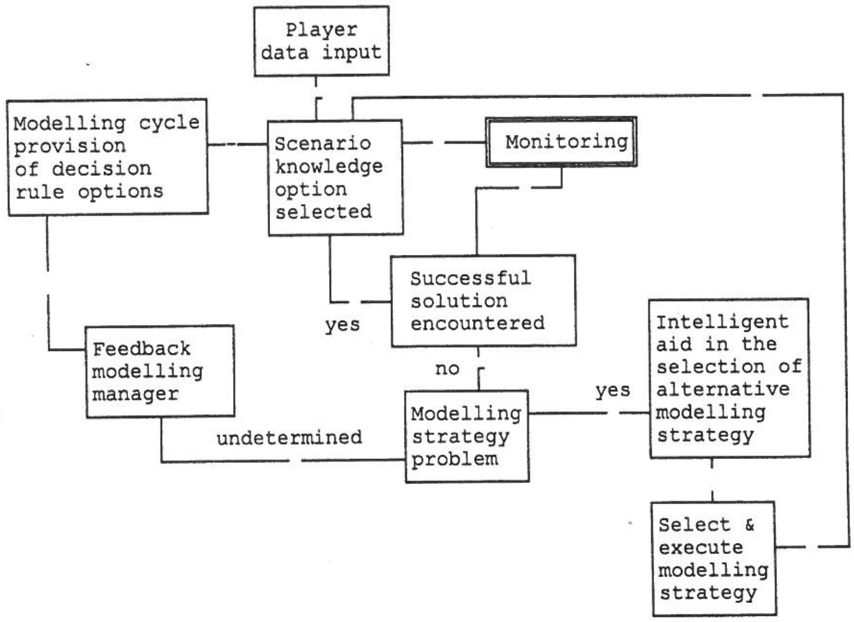

Fig. 5. Modelling system monitor for determining if a selection of another modelling strategy is required

The European recession has led to the search for economic stability by the voting public. As a result voting behaviour has sought what may appear to be stability through the success of parties operating in such a way that they appear to know. This situation is exacerbated by the consideration that both the then communist and non-communist Europe faced the same problem: the incompatibility of their respective degrees of centralism with post-industrial society Ionescu [1975, p16].

In the implementation of policies governing CEE countries, various instruments were used which satisfied Soviet ideology. One was based on the proposition that individual interest was seen as secondary to the social interest, which was itself seen to be representative of the individual interest. The economy was planned, and organisations knew what was expected of them, even if they found difficulty in satisfying those expectations.

Thus, one of these instruments concerned the use of labour. In theory, individuals owned their own force of labour, and could use it according to their wishes. However, under communist party policy implementation, the State, using a variety of legal and other procedures, was able to limit the way in which that right was exercised. Consequently, processes of employment became centrally controlled.

To many observers, communist regimes in CEE were essentially not prone to inflation or industrial unrest, primarily because the population tended to be under less freedom of expression than in other forms of European political regime. In CEE countries, a centralist dependency occurred during communist rule towards the Soviet Union, as also occurred for instance for Iceland, Finland, Egypt, and Afghanistan [Holsti, 1967].

The Soviet paradigm includes consideration of its cultural attributes, and its propositions. Its ideology relates to its cultural attributes, and its mode of operations concerning "strong" centralised government define its paradigm. The propositions will include responsibility for labour (including its state management, and assuring full employment), responsibility for the economy (for instance no inflation), and ways of ensuring these like the use of coercion.

Form

The form of the CEE countries under Soviet domination relates to the nature of its structures, and the way in which the underlying processes occurred which supported these structures.

Influences

While there was committed trade between the communist block countries and the USSR, there was still an interdependency with the West, for example in the need to purchase high technology products and grain. Having a controlled economy did not therefore insulate the CEE from the effects of a major recession in the West.

Trajectory

The problems associated with the CEE related to a stationary political regime and economy, and neither were flexible enough to deal with the impact of recessionary influences on them.

Iteration 2

Context

The dramatic change in CEE occurred because of the socioeconomic pressures that arose, in a similar way to the change that occurred in the UK. It is possible to debate whether the ensuing political change was inevitable, but this is not a purpose of this paper. If the ideas of Sorokin are valid and correctly applied to Europe, and if they represent a situation of structural instability, then appropriate relatively small changes in the CEE social fabric could have had an affect on its whole sociopolitical structure.

The change to a market economy and its anticipated individual freedom was a spring of joy for the populations of the countries of CEE that were loosened from the USSR. Visions of a market economy, freedom of choice and action, and prosperity were abound. In due course, the realities of a market economy would to be a socioeconomic shock.

The new market economy paradigm was centred around principles of competition, which applies not only to sales of products, but also to payments to the labour force. In Germany, for instance, this resulted in structural violence (damage caused to the potential of individuals because of the social structures set up around them) to the East Germans who saw that they were getting paid significantly less than their West German coworkers in the same company. There was also problem in defining and achieving production, now that quotas were no longer defined. Social problems arose, for instance in Russia and Poland, as the expectations of the market economy was not shown to hold the promise expected.

Not only were there difficulties at the governmental and the individual levels, but also at the company level. One of these is Vitkovica, with about 20,000 employees operating from Ostrava in the Czech Republic. It was involved in the manufacture and sales metal prefabricated engineering products in a broad variety of indutrial areas including nuclear energy.

The company was committed to producing quotas for the USSR, and financially supported to do this by the Czech State instruments under encouragement by the USSR itself. It was the major employer in its region. Vitkovica like many other companies in its position, found itself in a social dilemma. It could no longer sell its products to the bankrupt Soviets, nor with ease in the West with its highly recessive market competitive even despite its competitive cost advantage. The company had absolutely no marketing expertise, nor an understanding of the market economy in anything more than a theoretical way. More importantly, there were significant implications of changes in business for these companies, especially for management unused to the dynamics of a market economy. With losses of significant markets in the east, the company was going through a period of retrenchment. Management training was an essential requirement. Senior posts were filled by staff whose background was in science or engineering. There were very small budgets for management training and these tended to be spent on update courses when needs were pressing rather than on widespread management development programmes. University curricula had in the past provided a good grounding, whether in economic or technological disciplines, though not in market economy principles. The retrenchment meant, however, that graduate recruitment was likely to be stalled. Providing suitable adequate management staff are available in the market, and early on in the change this was not the case, one solution to change the management who are able to operate under the market economy paradigm. This has been done.

Form

Typically in CEE countries undergoing change, two centres of powers existed, the central government and the popular movement. The two centres had to accommodate each other. Their interplay generated anomalies, however. For example, in Romania after December 1989, it would seem that a variety of measures were initiated by Government representation, and through the popularist movement of change.

The number of working hours was officially reduced to 6 hours, though it did not change in practice.

Influences

The international community provided a small amount of funding to the CEE countries in order to assist them in developing the market economy organisation. Much of this, however, was fed through existing organisations in the West that had their own commercial interests to cater for. They brought their own paradigms with them that influenced the view of their partners. However, this influence was a two way process as companies learned what could and could not be done, or a language or mode of operations that enabled the implementation of activities.

Trajectory

The propositional base of the market economy was different from that expected or understood by government, individual, or industry. A clear theoretical knowledge of the principles was clearly had, but there was little practical experience except by a few individuals who had been exposed previously. Without an ability to match expectation with practical matters, there would be bound to be some social unrest. New social problems would also be met as the impact of the new paradigm would impact society. Difficulties in Russia with a new power class represented by the Russian Mafia was one more graphic example.

10. Conclusion

This paper began by discussing metamodelling, thus the provision of a structured modelling approach. It examines conflict processes in a systematic way by initially defining a generic metamodel, and thus offering a modelling cycle involving the phases of analysis, synthesis, and choice, and relating model outcomes to the system under change. It is essential that a structured approach is adopted when modelling processes. In particular, individual approaches and mathematical formulations become more meaningful if they are presented in logical association within a modelling cycle.

One approach in modelling conflict was to define decision tables relating to a conflict that had been properly examined and defined according to a set of criteria. After defining the propositional base for the conflict, decision tables are created involving player goals, properties, and objectives. The objectives become the interactive component of the decision tables when combined together in a Conflict tableau. The tableau is pruned to a set of stable scenarios.

In the next phase of the cycle, the stable scenarios lead to possible futures for the conflict which may be constructed by a variety of methods, applying either soft or hard methods. Soft methods in the context of social conflicts may require discussion with participants combined with table inspection, or expert system approaches can be adopted. Alternatively,harder approaches can be used, for example through the estimation of probabilities in Markov Processes.

The result of this choices modelling approach then feeds back into the analysis phase before iteration occurs again, in order to generate a further phase or set of phases within the process. By establishing the linkage between the methodologies the modelling cycle has been shown to have a continuity in the way that these models can be applied to real situations.

Finally, some consideration has been made on how such a modelling process might be established within a computer based system. This rests upon the development of a decision support system with an implicit intelligent knowledge based system able to monitor and examine the modelling process as represented within the modelling cycle.

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