DIAGNOST; a microworld in the healthcare for elderly people

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Abstract

DIAGNOST is a policy exercise based on a gaming/simulation in which managers and directors of institutions for the care of the elderly in a region of the Netherlands are given the opportunity to anticipate the coming changes in health care in general and in the care of the elderly in particular. A *microworld* is created in which the participants can safely experiment with various policy options. This paper describes the methods by which the game was constructed. Apart from the more or less customary gaming techniques, also system analysis and tools from participative model building are used. The results of the test runs and of the first official run are reviewed and evaluated along with the methods and techniques applied during construction.

DIAGNOST[1]: a microworld in the healthcare for elderly people

1.   Introduction
Participative model building is an important concept in system dynamics (SD). See for example Vennix (1991) and Verburgh (1994). Participative model building is, however, more widely applied than only in system dynamics. It is also used within other traditions such as gaming (Duke; 1980, Geurts; 1993) and in Strategic Decision Analysis (SDA) (Geurts & Weggeman; 1992, Howard & Matheson; 1983, Rzasa, Faulkner & Sousa; 1990). All these approaches have a number of aspects in common. The different participative model building traditions basically aim at the same objectives:
*   the stimulation of communication and learning,
*   the achievement of an 'holistic' view of problems,
*   integration of multiple perspectives.
However, the approaches also differ in a number of aspects. Firstly, each of the traditions has a particular way of observing and interpreting the world. Distinction can, for example, be made between approaches that emphasize probabilities and risks (SDA) versus the traditions that stress the importance of feedback mechanisms (SD). A second difference lies in the application of tools with which model-deductions are undertaken. Thus the SD and SDA traditions make significant use of computer facilities and the proponents of the gaming/ simulation tradition regard players-in-role as the most important tool for simulating processes.

Geurts & Vennix (1989[a,b]) have formulated a general framework for participative model building which can accomodate several modelling traditions. This article is an illustration of one form of participative model building that unfolds <u>not</u> into a system dynamics model but into a gaming/simulation.

2.   Problem background
In the Dutch health care system some fundamental changes are taking place. The costs of the Dutch health care system are considered to be too high. Therefore the government is aiming at the creation of a flexible, efficient and affordable health care system of excellent quality. Amongst others this means a shift form government imposed regulations to more regulation by the market. This is supposed to lead, more then before, to direct negotiations between health care providers and insurers, and to less government rules for these negotiations. In establishing the Dekker Commission in 1986, the Dutch government began to develop a new structure for health care. Central to the discussion of this are two elements: *restricting of the financing system* and *administrative deregulation*.

More recently, the Dutch government announced a number of measures that apply specifically to the care of the elderly. The government stated that it wishes chronic care of the elderly to be regarded, more than previously, as a regional chain of care in which several organisations, both together and partly in competition with each other, provide related forms of care to the target group. Proper care provision along the complete chain is the collective responsibility of all parties and the delivery of high-quality care by the whole chain is a condition for the continuity of individual organisations. In addition, the minister established the Welschen Committee to develop a plan for a new scheme for the care of the elderly, which in all probability will have major consequences for the relationships between the players involved. It is therefore also of great importance to all parties that they prepare themselves for these new relationships.

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[1] The Diagnost project is an initiative of the Foundation for the Advancement of University Education and Research in Health Care (SWOOG) and the Tilburg Institute for Academic Studies (TIAS) and was undertaken by the Catholic University of Tilburg and IVA, Institute for Applied Social Research.

3. Goals of DIAGNOST

If the parties included in the chain of care wish to control their individual continuity and at the same time achieve proper care provision, they must, both individually and collectively, anticipate and react to the above changes. A policy exercise is a potential tool for the management of organisations in a regional chain of care to explore the possible structural changes within its chain and to find ways it to adapt to these changes. It was decided to test this idea of 'regional chains of care' by instigating a policy exercise for the chronic care of the elderly. The theme of the game is thus 'the chronic care of the elderly in a Dutch region, from 1990 to 2000 as provided along the full chain of care'. Participants in this policy exercise are representatives of care institutions for the care of the elderly as well as insurers and members of provincial and municipal government.

The aim of this simulation project is to provide the participants with a motivating learning and discussion environment. The following considerations concern the goals that formed the basis for the policy exercise.

DIAGNOST must offer managers, directors and professionals in health care the opportunity to gain insight into the consequences that the structural renewal for health care will have in a region and stimulate the participants to cooperate productively with each other in the new relationships. The danger exists that many essential initiatives will not be taken as a result of a reactive rather than pro-active attitude of important parties in the field. The game should confront the intended target group with the consequences of such an attitude. The game should stimulate the participants to be entrepreneurial, to anticipate, to react and to evaluate. The game should teach the participants the trends that are important in the care of the elderly and that are the boundary conditions for developing new cooperative relationships. For the purposes of the game, a safe environment for the participants will be created such that no negative consequences from the game will be taken back to the 'real world'. Finally, the gaming/simulation should also be a tool for education and training in health care in the Netherlands.

No simulation, the DIAGNOST game included, is ever completely neutral. A simulation is an instrument designed for a purpose. The game aims to bring about the following learning experiences:
1. the participants must come to realise that the care will, also in the future, be complementary and interdependent, so that cooperation in the chain of care will remain essential;
2. the participants must act more than before as entrepreneurs: to preserve their own continuity they must continually ask themselves what their consumers want now and in the future and constantly adapt their services, in short, they must to an increasing degree approach their work with the awareness that they have become a player in a market;
3. the participants must have learned that the (new) market-driven system provides a number of threats but also certain opportunities for innovative action within and between organisations;
4. the participants should be able to evaluate during the game the advantages and disadvantages of various strategic options from the perspective of the individual organisation and from the perspective of the complete chain.

In broad terms, the managers in health care face two problems. Firstly, they have to find the balance between *entrepreneuring* on the one side and *cooperation* on the other (see figure 1a) and, secondly, they have to discover the optimal allocation of *funds, personnel* and *infrastructure* to arrive at *tailor-made care* (see figure 1b).

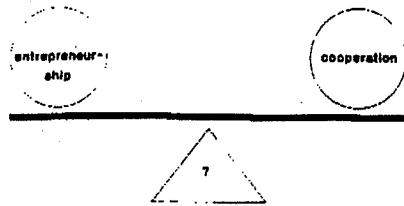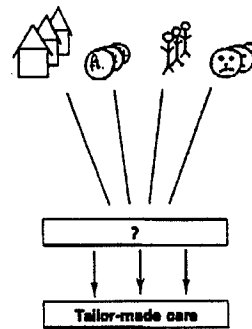Figure 1a: Puzzle 1   Figure 1b: Puzzle 2

A number of specifications which the final game had to satisfy had been formulated by the client of this project. DIAGNOST elaborates on a previously developed gaming/simulation (ZORG!MARKT), which had been produced by the National Care Federation (NZF) (see Wenzler a.o.; 1993). The most important criticism of this earlier gaming/simulation was that the game structure was too rigid and based on only one scenario of the future. The actions that the participants wished to carry out were limited too much by the content and structure of the game. For this reason, it was determined at the outset of the DIAGNOST project that a gaming/simulation with an `open' nature should be sought.

4.   System analysis and policy exercises

Health care is widely studied using system theory methods. Vennix (1991) for example, has done a great deal of system dynamics work in this field. In contrast, the Office of Public Management in the UK has approached health care from a gaming perspective (see: Office of Public Management; 1993). If we analyse both approaches, then it is apparent that there is a common framework behind all these projects. Geurts & Vennix (1989a) have illustrated this in a framework for participative model building (see figure 2).

Figure 2: Participative Modelcycle (source: Geurts & Vennix, 1989a)
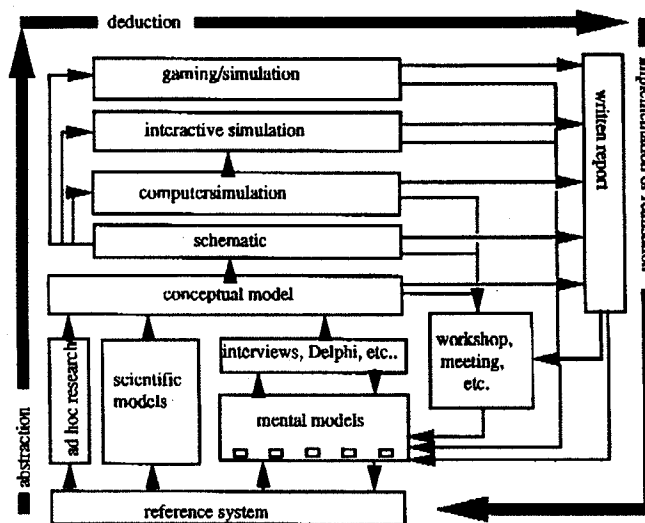
There are various ways in which the modelcycle can be completed in a participatory manner. The various schools (SD, SDA, gaming) make different choices at certain places in the cycle, particularly in the deduction phase. With this article we wish to illustrate to the SD world the way in which researchers who work from the gaming tradition move through this scheme. The rest of this article is concerned with this illustration. At the end we return to the question of whether it would have made a difference if the participative model building had followed an SD approach.

Geurts & Vennix (1989a) distinguish eight criteria for testing if during the system analysis account is kept of the cognitive and social complexity of problems that are hard to structure. The criteria for a successful analysis of complex policy problems are as follows:

1.   the policy analysis methods must be *decision orientated* and stimulate a *broad problem definition*. Knowledge of the future must be translated into consequences for decisions in the present. In addition, the problem must be approached from as many different disciplines and perspectives as possible;

2.   the methods must be based on as *complete* and well evaluated an inventory of existing scientific insights as possible;

3.   the methods must stimulate the design of policy options that are *creatively different, relevant, doable and internally consistent*;

4.   the methods must be *hybrid* from the empirical analysis point of view since 'hard' and 'soft' data must be integrated;

5.   the methods must allow the manipulation of complex information from a policy perspective. This means that they must lead to *logically undisputable statements* on the relationships between policy options and their consequences;

6.   this also means that the policy analysis process must be *participative*;

7.   policy analysis of complex problems must allow *step-by-step learning*: the methods must be so flexible that they approach a problem in various learning loops;

8.   the *stimulation of the communication* between a multiform gathering of those involved is of great importance in reducing uncertainty as much as possible.

The first five criteria can be considered as analytical criteria; the last three as process-criteria.

Gaming/simulation is a methodology that can meet these criteria. It is a form of participative modelling and structured communication on models. To capture the complexities of a decision problem, gaming/simulation, like SD, starts with a phase of system analytical conceptual modelling. On the basis of the system analysis, a *simulation model* or *microworld* is made. In this microworld, the participants experiment with the gamed structure and jointly explore alternative strategies. Brewer (quoted by Geurts, 1993) has called these experiments *policy exercises*.

According to Geurts (1993), policy exercises are *"endeavours with a group of motivated and informed people to `observe' the future"*. He defines policy exercises as those *"structured group processes in which a multiform assembly of policy players and researchers, on the basis of up-to-date knowledge, enter into a discussion for the purposes of preparing for effective participation in institutional processes of decision making"*. This discussion is aimed at:

1.   making objectives and policy alternatives explicit;

2.   determining future outcomes of these alternatives;

3.   deriving from this, discussions on the desirability and achievability of the alternatives;

4.   identifying areas in which further knowledge gathering is urgently desired.

5. The development of Diagnost

The Diagnost project was started in January 1993. The system analysis was completed in October 1993. The first test run of the game took place on 17 and 18 February 1994, the second run on 10 March 1994. The première was on 31 March 1994. The system analysis is reported in more detail in §5.1, the game construction in §5.2.

5.1 System analysis

In broad terms, there are two phases to be distinguished in the construction of DIAGNOST. Firstly the system analysis and secondly the actual game construction. The system analysis is undertaken in intensive dialogue with the client organisation and prominent stakeholders in the field. The outcome of the system analysis, a final *schematic*, is the blueprint for the game to be constructed. The schematic portrays:

- the most important stakeholders,
- the objectives, responsibilities, tasks and options of each actor,
- the positions of the actors in the field (e.g. in the centre or on the periphery),
- the relationships between the various actors, expressed as exchange of information, money, care, etc.

On the basis of the final schematic, a selection of the most important elements is made in close consultation with the client. These form the building blocks of the game.

Geurts, Wenzler & Van Kuppevelt, in their contribution to the 1993 System Dynamics Conference, explain in detail and with examples the importance of the schematic as a visual and integrative aid to participatory modelling. For a detailed description of the steps in system-analysis and the end-product, the schematic, we refer to their paper.

As stated above, the close involvement of (representatives of) the client is one of the most important process criteria that a system analysis must satisfy. In many cases this means that one or several policy makers, directors or other staff in an organisation function as a 'think tank' for the game constructors.

The situation was somewhat different for the DIAGNOST project. The SWOOG, the client for *Diagnost*, is an 'umbrella' organisation. Parties in the field of health care are members of the SWOOG. A small staff of two persons man the SWOOG offices, while the board of the SWOOG takes the most important policy decisions. The board comprises important players in the field of health care (directors of institutions, insurers, etc.). Part of this board functioned as the steering committee in the Diagnost project. Three members from the committee constituted the most important permanent source of information for the researchers. In addition, they functioned as a sounding board and they verified the way in which the researchers had structured the compiled information and processed it into the system analytical schematic.

Due to the fact that these informants were extremely busy fulfilling management functions, efficient and effective communication was not always possible. This led amongst other things to the model building being less *participative* than was intended. This means that the developed schematic is only partly a result of intensive interaction and feedback with the client. It is an interpretation of the researchers, based on information from the members of the steering committee, other players in the field and an extensive review of literature and documents. Figure 3 shows a simplified version of the final schematic.

A detailed research-report (Heyne c.s., 1994a) accompanies the schematic. After approval of the schematic and the report by the steering committee, work moved on to the next phase; the construction of the game.

Figure 3: Simplified schematic
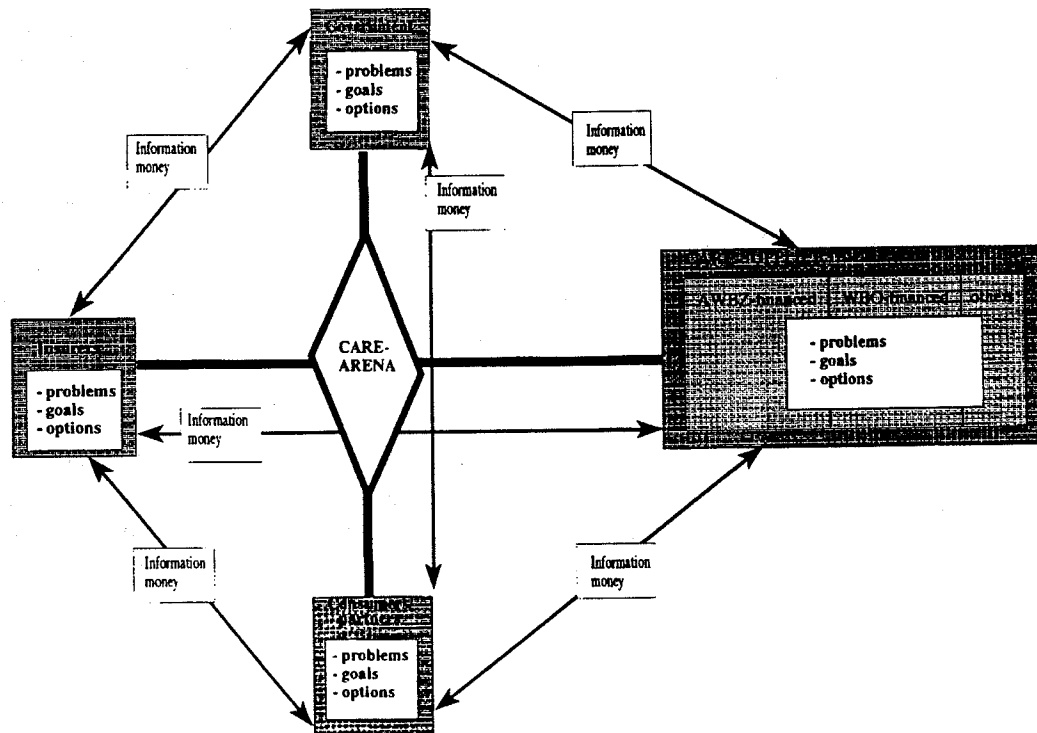
5.2 Game development

The input for the game construction comprised:
- the schematic and the accompanying information,
- a number of previously formulated specifications.

The first phase of the game construction[2] led to a `concept report' (Heyne c.s., 1994b). In this concept report, the analysis of the system is translated into a `game on paper'. This report defines the scenario that acts as the foundation of the game and defines the various roles that will be in the game. In addition, the various steps of play and the decisions that must be taken by each of the players (roles) are described.

After discussion of this concept report with the client, the project team went further with the development and greater detailing of the game and the construction of the prototype. This prototype was tried out for the first time at a two-day meeting by participants who all came from the field of `health care'. The results of this first test run were encouraging. The structure of the game was workable and required only marginal adaptation. Emphasis was put on perfecting the game facilities, such as computer facilities (a spreadsheet to make calculation processes easier), forms, scoreboards, etc. The second test run took place a number of weeks later, and was played by board members of the SWOOG. The results then were also in general positive.

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[2] In the literature there are several methodologies for the construction of games. We followed the procedure developed by Duke (1980)

6.   The result: an `open' game.

An important specification for DIAGNOST is that it must be an `open' game. Before being able to explain the need and nature of this characteristic, it is important to describe the most important roles in the game and the steps of play.

6.1   Roles

First of all there are simulated roles played actively in the game by the participants (active roles - real participants who take decisions). Secondly, there are the roles that are introduced into the game and played by the game operator, or they appear in the written material (simulated role - theoretical participants). The third type is the pseudo role, which is temporarily introduced into the game by experts from the field of health care or care of the elderly, or by the participants themselves via a temporary exchange of roles (Duke; 1980).

Active roles

In the game there are three rest homes, two nursing homes, a home-nursing organisation, a home-care organisation, an insurer, and the lower government (a combination of local and provincial government). The lower government role is played by two participants; all the other roles are played by three participants. So, in in total there are twenty-six active participants.

Simulated roles

The simulated national government and hospital roles are `paper' roles. If request be made by one of the participants, the role of any societal group or public individual may (just like the other simulated roles), be activated and played by the game operator.

Pseudo roles

In this game the 'assessment committee' comprises a group of three experts in the field who give their opinion on the decisions taken by the participants and thereby create a starting situation for the next round. The consumers of care are included in the game in two ways, namely, via their patient characteristics on paper in the game materials and as a simulated role played by the 'assessment committee'.

6.2   Scenario and steps-of-play

In the simulation, a fictitious country and a fictitious district are brought to life. The data are derived from a real district in the Netherlands. The players in the game are responsible for the provision and execution of chronic care for the elderly. In the game they must negotiate budgets with the financers for the following period. The insurers are responsible for financing the AWBZ institutions; the lower government for financing the WBO institutions (see table 1).

Table 1: The suppliers, their products and their financers

ORGANISATION	PRODUCT	FINANCED BY	FINANCERS
rest home	care, intramural	WBO³	provincial govern- ment
home-care organisation	care, extramural	AWBZ⁴	insurer
nursing home	nursing, intramural	AWBZ	insurer
home-nursing organisation	nursing, extramural	AWBZ	insurer

Apart from these negotiations (in figure 4 we have named this the *primary process*) the participants take part in different policy committees set up by the government (the *secondary process*). In these groups the players debate current policy issues. The results of the committee work have consequences for the negotiations between the suppliers and the financers. The negotiations and their implications as well as the findings of the committees are discussed and (quantitatively and qualitatively) assessed.

Figure 4: The steps-of-play

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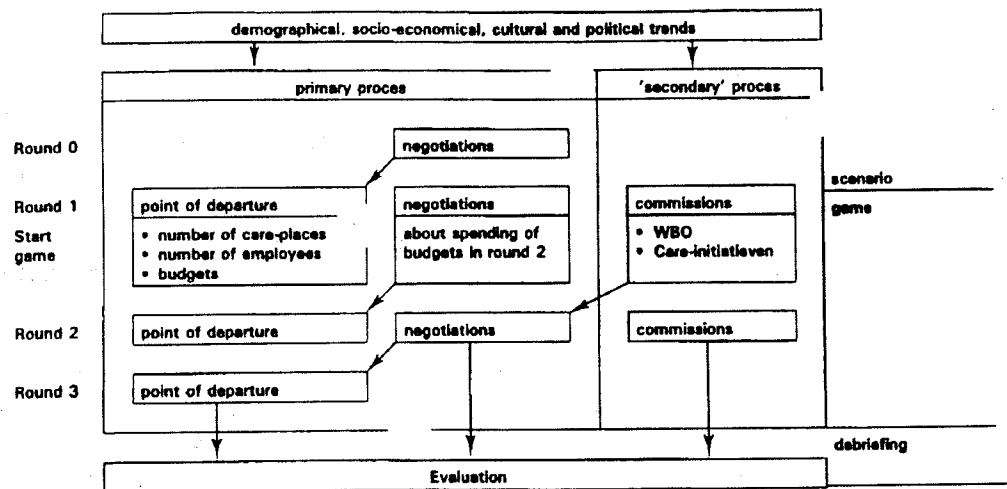
3 The WBO (the Law on Rest Homes) implies a system of top-down allocation of financial resources, based on which the provinces receive a budget in order to finance the rest homes, as far as the contributions of the inhabitants are not sufficient.

4 The AWBZ (the General Law of Special Medical Expenses) has as goal to insure the total population against the risks of special medical expenses. It concerns heavy medical risks that can not be covered by the National Health Service or the regular medical insurance. One can only stay in an AWBZ-institution when the institution is acknowledged and when the insured has a so called 'indication' for this particular institution.

The primary and secondary processes take place in the light of a number of demographic (e.g. ageing population) and socio-economic (e.g. shrinking budgets) trends. The most important political event is the announced abolition of the WBO act. In brief, this means that in the third period the lower government will no longer have budgets to finance the rest homes. The rest homes (and the other players in the chain) must prepare themselves for this.

The question is in what way the open character of the game is guaranteed. This is done in two ways; firstly, there is a gradual move from the game to discussions of the actual situation. This is accomplished in particular by the growing importance of the committees in the game. In outline this is shown in figure 5.

Figure 5: From simulation to discussion
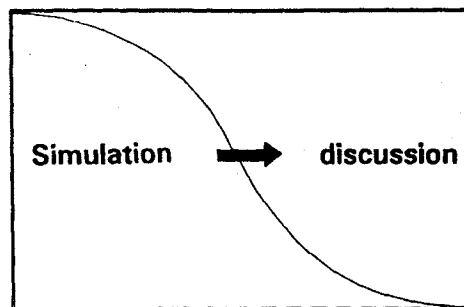
Secondly, the participants were allowed to change the steps of the second game cycle. In the first cycle, the game structure defined how the various negotiations had to take place. In view of the changing relationships (abolition of WBO), the existing cooperative structures might be ineffective. That is why the game should allow a new cooperative structure (and thereby a new sequence of game steps) to emerge. To be prepared for this, the design-team had previously developed six alternative steps-of-play. At the time that the participants made their choice known, the accompanying new steps-of-play (who must do what, at what time, and where) were easy to implement.

6.3 The première

A total of 30 persons took part in the première. The roles of the care providers were played by directors of similar institutions from the Dutch province of North Brabant. The role of the insurer was played by two directors from insurance companies. The government was played by a high official from the province of North Brabant, supplemented by the secretary of SWOOG. Board members of the SWOOG had taken seats on the assessment committee. Also participating in this was the alderman for health care for the province of North Brabant. Playing the game took about 12 hours.

7. DIAGNOST performance: results and conclusions

In this closing paragraph we will present our conclusions along four lines. First of all, we briefly state a number of conclusions about the quality of the game and the evaluation by the participants based on a questionnaire (§7.1). We then formulate some observations on the policies which emerged during the game (§7.2). In relation to this, we formulate a number of conclusions about the structure of the game (§7.3). Finally, we discuss participative model building as applied within a gaming project and the relationship to system dynamics (§7.4).

7.1 Conclusions on the game process

A short questionnaire was handed out immediately after the game. This comprised two parts. The first part aimed to measure what the participants in Diagnost thought of the organisation of health care in North Brabant. The second part evaluated the way in which Diagnost had simulated this situation and the degree to which it had contributed to increasing insight and to generating new, relevant policy options. A few results of this second part are given in table 3.

Table 2: Some evaluation results

The simulation:	yes	to some degree	hardly	no
• is an adequate representation of reality	10	10	2	
• makes clear that players are in thought and deed dependent on each other	20	2		
• has increased my insight into issues, strategies and ideas	16	4	2	
• makes clear that development of a common vision is important	20	2		
• has increased my insight into anticipated developments	9	9	4	
• has demonstrated that an enterprising institution is essential	17	5		
• has provided options that are valuable to actual policy	11	10	1	

In an open question, the participants were able to give, in a number of key words, what their general impression of Diagnost was. The results were exceptionally positive. A short compilation:

> "*very well put together, penetrating, intensive, gripping, informative, enlightening, hectic, provocative, good thing if this gets off the ground for a larger number of participants, good tool to get the regional cooperation process going, fairly provoking, confrontational, good up to date problem setting with realistic boundaries for future situation, exceptional model to test proposed policy on its consequences beforehand*", etc.

The most important criticism of the simulation was directed towards the fierce time pressure under which the participants had to work.

7.2 Policy conclusions

The conclusions below are based on the questionnaire as they were completed by the participants and on the basis of observations by the researchers.

a. As is made clear in figure 4, decisions in the game concerned a primary process (the actual negotiations between the parties involved) and a secondary process (the workshops with committees). There were discussions in the workshops at general and theoretical level on future strategies and on such themes as *entrepreneuring, cooperation and care renewal*.

What came to the fore very sharply during the game was the discrepancy between the more or less idealised principles formulated in the joint workshops and the hard reality of the negotiations, in which the parties, almost with daggers drawn, attempted to solve the question of resource distribution. The formulation of well-intended joint strategies and resolutions clearly appears to be subject to other laws of communication than the actual realisation and implementation of these.

b.   The game offered sufficient reason to assume that it is not self-evident that *market forces* in a sector such as this offer sufficient guarantee of optimal allocation of (scarce) resources. There was absolutely no question of an ˋinvisible hand' or another hidden mechanism that regulated the allocation by itself. In the discussion after the game it was also stressed a number of times that it is essential that one party takes on the management role, the government for example. Infact, in the new system the partial withdrawal of the government resulted in a very strong position of the insurance-organisation. It acted more or less as the new central authority.

c.   Following more or less naturally from a. and referring to the policy problem ˋbalance between entrepreneuring and cooperation' (figure 1a), we find that the parties had great difficulty in achieving sufficient balance. When undertaking the negotiations, the acts of the individual parties initially appeared to be based on the intention to cooperate. However, under pressure of circumstances, the eventual acts were, to a significant degree, dictated by political self-interest and self-preservation.

7.3   Conclusions on game-structuring

Many games emphasise strategic policy as a part of an integral policy cycle. In such a game, the participants must have the chance to experience what it means to put strategic decisions into operation by actually implementing decisions. This means that in this type of game actual operational processes are an important part of the simulated policy cycle (i.e. the putting into practice of the decisions taken, the implementation of these and the evaluation of the policy effects). In many games, such a cycle is repeated a number of times and much of the participants time and energy is spend putting decisions into actual operation.

For DIAGNOST a different format was chosen. In the Diagnost game, the participants must create a vision of the future with each other. In addition, they must be able to experiment with new behaviour in relation to each other, and not so much in relation to their ˋclient system'. However, in defining new realities, the players should not forget what is feasible. We did not bring this 'reminder' into the game by explicitly simulating and quantifying the policy effects, but by making use of and building on the views of the participants themselves and of several experts present. This construction allowed more time in the game to be occupied with policy formulation and exploring shared visions on the future.

Another consequence of this was that the way in which the game was constructed offered the players the opportunity to influence the paths along which decisions had to be made. So instead of a ˋrigid rule game' in which the same decision-making cycle and rituals have to be gone through again and again, the rituals were themselves a subject for discussion by the participants. In gaming terms: the players encounter a number of steps of play but can change these. Following Duke (1980), we introduced a distinction between two types of game rules; firstly, rules in the narrow sense (they remain unchanged throughout the whole game) and, secondly, the policies, or the rules that can be subject to discussion.

7.4 Conclusions on participative model building, gaming and System Dynamics

Had the researchers adopted for DIAGNOST the 'world view' of SD (feedback loops, delays, non-linearity) then the 'framing of the problem' would have been different and the focus of the game would have lain elsewhere. The 'world view' behind gaming very strongly emphasises the role of multiple actors and perspectives, while SD emphasises more the 'whole' and the mechanics by which a system functions.

In conclusion, an observation on the tools. After the first test run, the game developers decided to provide computer support to assist the primary processes. This was a reaction to the complaint of the test-players on the amount of energy spend on 'getting the numbers right'. With the aid of a spreadsheet, financial and budgeting models were introduced. It was remarkable that during the première the actual target group used the computer hardly or not at all. The game developed much more at the strategic level, with the implementation of the decisions being undertaken more or less intuitively by the participants. Whilst in the second test run the participants, who were less at home in the field, certainly used the computers to explore quantitative consequences of decision-options.

We intend to redesign Diagnost as *Mental* (aimed at the mental health care sector) with particular attention to be paid to the application of information technology for supporting strategic decision making. We believe that in a situation where several parties tune their strategies to each other through dialogue with each other, information technology has the greatest potential advantage if this technology is integrated with interactive and process support for group oriented strategy development. A gaming/simulation can offer such a combination of technology and process support.

References

Duke, R., 'A paradigm for game design', in: *Simulation and games*, nr.11, p.364-377, 1980.

Geurts, J. & J. Vennix, *Verkenningen in beleidsanalyse: theorie en praktijk van modelbouw en   Simulatie.* Zeist: Kerckebosch BV, 1989a.

Geurts, J. & J. Vennix, 'Beleidsanalyse van complexe problemen; voorwaarden en kansen', in: J. Geurts   & J. Vennix (eds.), *Verkenningen in beleidsanalyse: theorie en praktijk van modelbouw en   Simulatie,*   p.27-55. Zeist: Kerckebosch BV, 1989b.

Geurts, J. & M. Weggeman, 'Strategische beslissingsanalyse voor R&D-projecten', in: *Bedrijfskunde,* vol.64/nr.1, p.68-80, 1992.

Geurts, J, *Omkijken naar de toekomst. Lange termijn verkenningen in beleidsexercities,* inaugurale- reden. Alphen aan de Rijn: Samson H.D. Tjeenk Willink, 1993.

Geurts, J., I. Wenzler & H. van Kuppevelt, *Communication complexity through visualization: the use   of schematics in gaming/simulation,* paper for the 1993 System Dynamics Conference, Mexico   City.

Heyne, G., J. Vermaas, C. Wüstefeld, C. Joldersma & J. Geurts, *Chronische ouderenzorg in Brabant*   (in preperation). Tilburg: SWOOG, 1994a.

Heyne, G., J. Vermaas, C. Wüstefeld, C. Joldersma & J. Geurts, *Diagnost; the simulation in concept*   (in preperation). Tilburg: IVA, 1994b.

Howard, R & J. Matheson, *Readings on the principles and applications of decision analysis.*   California: Strategic Decisions Group, 1983.

Office for Public Management, *Learning from the future.* London, 1993.

Rzasa, P., T. Faulkner & N. Sousa, 'Analyzing R&D Portfolios at Eastman Kodak', in: *Research Technology Management,* january/february 1990.

Vennix, J, *Mental models and computer models, design and evaluation of a computerbased learning environment for policymaking,* PhD-dissertation. University of Nijmegen, 1991.

Verburgh, L., *Participative policy modelling applied to the health care insurance industry,* PhD- dissertation. University of Nijmegen, 1994.

Wenzler, I., R.D. Duke, Jac.L. Geurts & P. v.d. Lugt, 'Health Care Negotiations Policy Exercise', in: F. Percival, S. Lodge & D. Saunders (eds.), *The simulation and gaming yearbook 1993.* London: Kogan Page, p.275-284.