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Practicing the Future: Implementing "The Policy Exercise Concept"

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PRACTICING THE FUTURE:

IMPLEMENTING "THE POLICY EXERCISE CONCEPT"

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ABSTRACT

Methods to synthesize and assess scientific information for use in policy making range from large models to expert committees, from scenario driven free-form gaming sessions to fast and simple model building workshops. Each method has its own merits and shortcomings in general terms and each is better than the other for a particular set of practical problems. In this paper, a new approach called the policy exercise is presented. The procedural roots of this approach are to be found in free-form gaming, the Adaptive Environmental Assessment and Management (AEAM) technique, and operational gaming. A policy exercise is a flexibly structured process designed to act as an interface between academics and policy makers. Its function is to synthesize and assess knowledge accumulated in several relevant fields of science for policy purposes in light of complex practical management problems. Scenario writing of "future histories" and scenario analysis via the interactive formulation and testing of alternative policies that respond to challenges in the scenarios are at the heart of the policy exercise.

After describing the project background and some special concerns about formulating a procedure for a policy exercise, a general overview is provided to define roles, and some of the rules and activities in the process. Scenarios are the most important building blocks of the policy exercise procedure. Four types are defined and discussed in Section 2. This is followed by a detailed outline of the procedure through its three phases: preparations, workshop, and evaluation.

PREFACE and ACKNOWLEDGEMENTS

The development of a new methodology always starts by realizing that there is a need for it. William C. Clark did that when preparing a major international conference and research project on the sustainable development of the biosphere. He commissioned a review paper for the conference on the problem of methods for synthesizing complex but incomplete bodies of scientific knowledge for use in policy studies. The methodological research became part of the project. Many of his ideas were incorporated in the approach described here. Other ideas emerged from a series of meetings in September 1985 with G. Baskerville, C. Binkley, G. Brewer, P. Duinker, P. deLeon, and T. Schelling. Comments on a previous draft by C. S. Holling, R. Serafin, and N. Sonntag were extremely helpful. An evaluation of related methodologies and a first attempt to formulate the procedure was carried out by E. Babbitt, A. Ferguson, P. Lubkert, T. Miller, and R. Serafin during their participation in IIASA's Young Scientists' Summer Program in 1985 (see Ygdrassil et al.:1985).

I am indebted to all named above. It has taken more than a year to move from conceptualization to actually start operational experiments. It is my intention to report on these experiments and to revise this paper regularly in hopes of attracting comments and help from others involved in policy oriented research.

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PRACTICING THE FUTURE:
IMPLEMENTING "THE POLICY EXERCISE CONCEPT"

Ferenc L. Toth

1. Introduction

1.1. Models and projection

Efforts to understand the future implications of present actions have passed through several development phases. The start of the processes we are interested in here is marked by the small-scale, short-term corporate market forecasts followed by industry-level business projections. As a result of rapid development in mathematical statistics, stochastic processes, and linear algebra, national level econometric modeling and forecasting became prevalent and gained momentum with the advent of digital computers. The 1970s saw a boom of global modeling efforts trying to capture the driving forces of past and future development in a few simple equations or describing all "important" relationships in thousands of lines of computer code.

Parallel to these developments, creative thinking, expert estimates, intangible lessons from practical experience and, in general, the "soft" methods seem to have been increasingly neglected. Their contributions have not kept up with formal methodological development. This has led to a situation where methodologists/ modelers play a primary role in the enterprise of futures thinking. Modeling and projection have become an independent art. With the spread of high performance computers, building larger and more sophisticated computer models was assumed to be the route to deeper understanding and better predictions. Demand for data to feed these models has become enormous, often resulting in data being accepted even if they were known to be wrong. More important, too much effort has been wasted to gather data for their own sake at the expense of conceptual and substantive issues.

Feedback and critical evaluation of all these activities from those who are supposed to use them is poor, in part due to the lack of well-established standards or criteria for evaluation, and in part because the models have become far too complex to comprehend and to evaluate for their intended audience. The path from this point is clear: what you cannot comprehend, you are reluctant to believe; what you cannot evaluate, you do not trust; and what you do not believe or trust, you will not use.

The difficulties of forecasting and modeling, together with critical shortcomings in science for policy and the need for new techniques that complement existing synthesis methodologies, define a set of problems calling for resolution. Before discussing an approach that might mitigate some of these problems, I would like to outline how this research fits into IIASA's project on "Ecologically Sustainable Development of the Biosphere".

1.2. **Project background**

Development of the policy exercise approach is taking place in the frame of a wide-angle, complex international research program on the biosphere that "has set as its ultimate goal the identification and evaluation of strategic interventions through which societies might change the long-term, large-scale interactions between development and environment. In particular, we seek to show how important technological, institutional, and research strategies that might be set in place over the next decade could affect the prospects for a sustainable development of the biosphere" (Clark, 1986:12). It is made explicit that the task is neither to predict future nor to prescribe actions.

In his contribution to the biosphere study, Garry Brewer (1986) evaluated current methods and practices in policy analysis. He concluded that a new approach is required to fulfill the above goals of the project. He outlined one such approach which he called a "policy exercise" and suggested that it "finds its procedural roots in scenario based, free-form games" (p.469). Brewer noted that "it is as much artistic as it is scientific in its style and means, a characteristic that in no way denigrates the activity" (p.470). In his commentary on Brewer's essay, Nicholas Sonntag draws attention to a different technique called Adaptive Environmental Assessment and Management (AEAM) (see Holling, 1978) and suggests that "the next

step is to take the best features of the two approaches and develop a hybrid" (Sonntag, 1986:475).

Both these comments are extremely useful in clarifying basic goals and objectives of such an exercise and setting criteria for formulating the procedure. Neither paper focused on details of actually designing a policy exercise. Both of them are correct in noting that we need to "develop a hybrid" (Sonntag) and it "must employ many different methods" (Brewer). It will be easy to see from the following discussion of policy exercise that besides the suggested methods we have integrated ideas from operational gaming (both educational and research versions); elements of scenario writing and analysis; methods from sociology and social psychology (questionnaire, interview, observation, small-group interactions); techniques of negotiations analysis; generic research methods like brain-storming and other heuristics; small and simple computer models as applied in decision support systems; and large and sophisticated ones to facilitate integration and ensure consistency throughout the process. Beyond these borrowings, entirely new techniques and procedures have been devised to enhance the enterprise. An important feature of the policy exercise is that it is an "open" methodology: it can and should integrate methods, models, techniques, and indeed anything useful from the actual field to which it is applied.

Thus the principal foundations on which we are trying to build our policy exercises are free-form strategic games, rigid rule operational games, and the AEAM approach.

Brewer and Shubik (1979:372) define a free-form game as: A scenario-based game in which opposing teams of human participants are confronted with a generally realistic situation or problem and work out responses both to the situation and to moves made by their opponents." The initial development of free-form manual games was directed toward the examination of political, diplomatic and military issues that arise in the course of international conflict. Military games represent an attempt to integrate intangible or nonquantifiable political and social factors into both thinking and analysis. The games are designed to provide a forum for key officials in relevant fields to discuss ideas, and examine approaches to resolving anticipated future problems. The purpose of the games is to help prepare the players for future research, analysis, and operational responsibility, generating creative and innovative thinking about problems that defy treatment with more traditional analytic approaches and methods.

Operational games are wholly or partly designed around players' decisions in simulated contexts where the situation and participants' activities show the characteristics of games: players have goals, rules, and procedures to follow, and their results are direct or indirect consequences of their actions (see, for example, Greenblat and Duke, 1981).

The Adaptive Environmental Assessment and Management approach is organized around a small group of modelers and analysts working on a specific management problem over a longer period. A series of workshops organized by this group involve experts with various perspectives on the problem as well as representatives of those with a direct stake in the problem. The objective of an AEAM workshop is to build a simple computer simulation model. The real purpose of the model construction exercise is, however, to focus discussions on various aspects of the management problem, to create a conceptual framework, and to develop an understanding among workshop participants of each other's views and perspectives (see Holling, 1978).

As in case of any evolving methodology, there is a need for many experiments to develop a mature, working procedure. Our experimental strategy follows two paths. The first tries out different methods independently: one in which meetings and workshops are essential parts and another where the entire exercise is carried out using computer telecommunication facilities. The second applies methods to different problems and case studies within the Biosphere project, also independently. Evaluating the successes and failures of different "experiments" will be an ongoing task rather than a one-shot event.

2. Overview

2.1. Why a policy exercise?

The synoptic perspective of the overall research program on the biosphere requires a method capable of synthesizing a large amount of knowledge already accumulated in studies of specific interactions between development and environment. In recent years two approaches have been used widely to carry out this kind of synthesis work: one involves building large (computer) models, while the other

involves committees of experts. Both approaches have their own merits and shortcomings and there is a considerable amount of experience in applying both of them. Our goal here is to develop new tools that complement these existing synthesis methods. But what should be the ordering principle in our approach to synthesis?

We do not want to set "goals for the mankind". We do not want to produce an integrated set of predictions either, even in if-then forms. As Clark notes (1986:7): "Little is to be gained from just another effort to predict impacts of development on the environment over the broad time and space scales that concern us here. Our challenge is rather to characterize potentially intense interactions between future development efforts and the environment, and to identify specific policies and management actions that could make these interactions more to societies' liking, and less threatening to global life support systems."

We seek to design our policy exercises in such a way that the perspective for synthesis is that of the policy makers: to test the applicability and actual use of scientific knowledge for policy formulation on the one hand, and to get fresh insights and new perspectives from the policy people for future research on the other. They are not aimed to produce actual policy recommendations, especially at the continent to global scale where no legitimate authority exists to implement or enforce them.

This brings up another aspect of integration: policies are formulated at national to regional scale but the consequences are increasingly going beyond these boundaries to the continent and to the global scale. Thus interactions between the global economy and the world's environment are a result of many national and regional policy components. They are difficult to explore and assess for research. Policy exercises may provide some help in this respect by bringing together a peer group of scientists and senior policy makers from appropriate levels of company or national policy making bodies.

A scientific synthesis from policy perspectives requires involvement and active participation of senior scientists and policy people. But do they want to talk to each other at all? Our experience suggests that they already communicate but mainly in an informal and fragmented way: "In carrying out the first phases of the Biosphere study we often found the best scientists and best policy people expressing a growing dissatisfaction over their inability to address each other, except through stultifying layers of reports and bureaucracy or in ritualized and guarded public encounters. Carefully designed policy exercises might provide the channel

and forum of the communication they seek." (Clark, 1986:40).

2.2. What is a policy exercise?

Brewer (1986:468) defines a policy exercise as "a deliberate procedure in which goals and objectives are systematically clarified and strategic alternatives are invented and evaluated in terms of the values at stake. The exercise is a preparatory activity for effective participation in official decision processes; its outcomes are *not* official decisions. Those engaged in a policy exercise may on occasion include those with decision authority, primarily as a means to elicit information from this point of view. However, the core analytic group responsible for the policy exercise must be ever mindful of the nonbinding, unofficial nature of their shared work and its outcomes".

To a large extent, this definition has led our efforts in designing what policy exercises should look like.

For the purposes of our specific project, I would suggest a complementary, perhaps more operational definition: A policy exercise is a flexibly structured process designed as an interface between academics and policy makers. Its function is to synthesize and assess knowledge accumulated in several relevant fields of science for policy purposes in light of complex practical management problems. It is carried out in one or more periods of joint work involving scientists, policy makers, and support staff. A period consists of three phases (preparations, workshop, evaluation) and can be repeated several times. At the heart of the process are scenario writing of "future histories" and scenario analysis via the interactive formulation and testing of alternative policies that respond to challenges in the scenarios. These scenario-based activities take place in an organizational setting reflecting the institutional features of the problem at hand. They are enhanced by a series of complementary activities.

2.3. Who is taking part?*

Chairman and Coordinator: two people are required to start organizing a policy exercise: a Chairman and a Coordinator. The *Chairman* should be an acknowledged scientist with a very good overview of the subject since he is responsible for the content side throughout the whole exercise. The first task is to develop a conceptual framework for the policy exercise, define the key disciplines that could contribute to it, and to invite central participants. The *Coordinator* is someone familiar with the methodology, preferably with experience in the background methods drawn on by the policy exercises. His responsibilities include all the organizational issues and possible modification of the base procedure in order to best serve the purposes of a particular exercise.

In developing the conceptual framework, the Chairman would define three to five disciplines of critical importance to the subject and invite participation of one expert from each field. Also, it has to be clarified at this stage who are the most important actors, influentials, and stakeholders on the policy side. Two to three representatives from this community should also be involved. These 7 to 10 people (including the Chairman and Coordinator) are called the Core group.

The Core group: The Core group would invite experts from other areas to contribute to one or more tasks in the preparation work (e.g. scenario writing, state-of- the-art review, manuals), and would recruit other members of the Control team and Participant teams for the workshop. In general, preparing the workshop would require continuous, although not full time involvement of all Core group. Most members of the Core group would also become member of the Control team at the workshop. Their responsibilities at this second phase will be described later. As the Core group is clarifying and bounding the problem, they have to explore what is the institutional setting in which the issues are dealt with in real life. What are the organizations where actual policies are formulated, how are they influenced by other institutions, what is the hierarchical structure connecting them to each other? Are there any pressure or interest groups influencing policy making directly or indirectly? Is there any sort of organization providing coordination or having the power to give commands? Only after the institutional structure is clear will it be possible to identify which instructions will be represented at the policy exercise, and what form that representation should take (participant or control

* See Figure 2.1 for an organizational chart of all players taking part in a policy exercise.

role). The next step is to find the people to be invited as representing the relevant institutions.

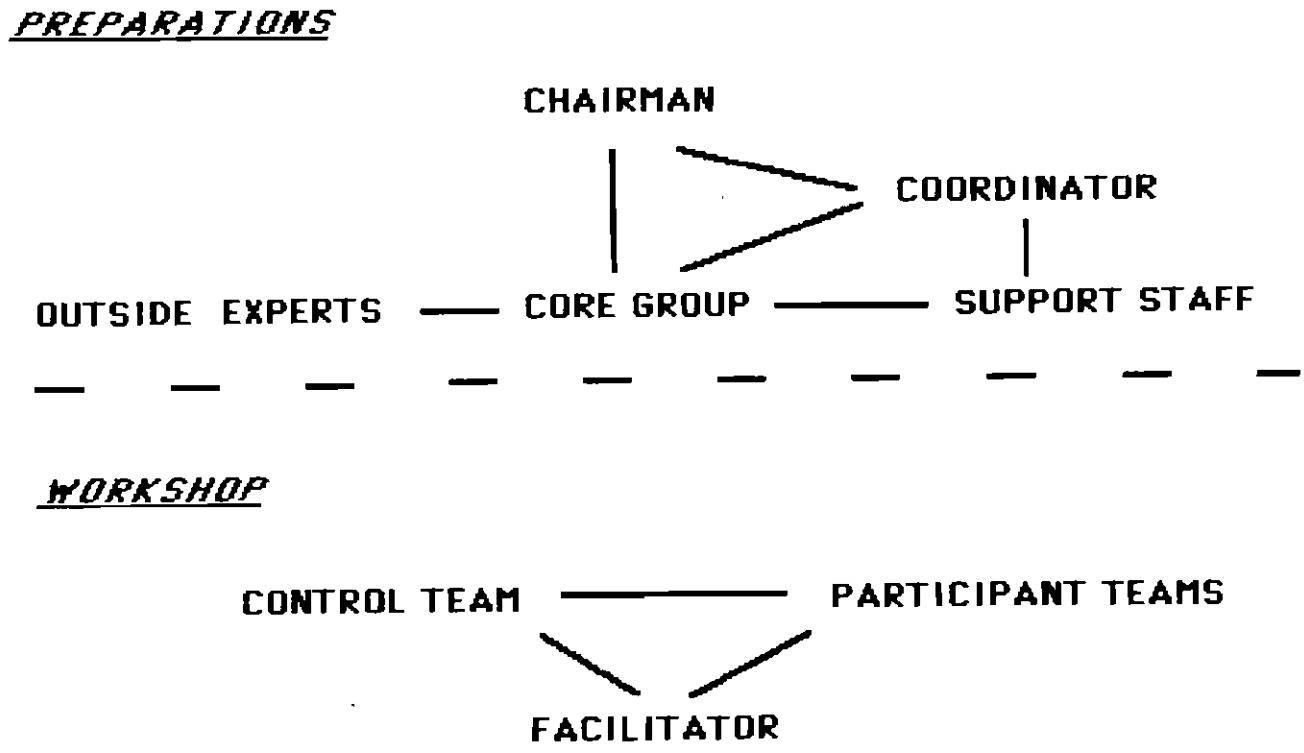

Figure 2.1. Organizational chart of players in a policy exercise

The Control team is a group of experts and policy analysts who play a key role at the scenario analysis workshop. They evaluate the policies submitted by the Participant teams, assess their consequences, and modify the scenarios and the "state of the world" accordingly. Occasionally, they also serve as consultants to the participants.

The Participant teams consist of policy makers who were identified by the Core group as key actors in the subject area of the policy exercise: company CEOs, senior policy advisors, representatives of interest and pressure groups. They provide the principal policy input to the exercises as well as being the most important clients.

The first review by the Core group should reveal whether competition among companies, regions, or nations is centrally important to the question. If so, or in case there is very low level or no coordination at all among the actors, several participant teams would be organized representing this structure. If, however, the opposite is the case, the workshop can be organized around one Control and one Participant team.

Facilitator: Running the workshop part of a policy exercise is a difficult task. Special skills are required to keep the process moving, to create an atmosphere in which hard work, creative thinking, and fun are present all the time. This function is provided by the Facilitator. He should have some experience at running operational games or facilitating workshops. Basic knowledge in the subject matter of the policy exercise is clearly an advantage.

Support Staff: Depending on the nature of the problem at hand, a certain number of support staff may be necessary. Their tasks might include compiling and modifying computer models, collecting data, preparing visual aids in the preparatory phase, quantifying and implementing on the computer policies formulated by participant teams, help control and participant teams to use support tools at the workshop; and preparing the necessary comparisons, sensitivity analyses, and reports in the evaluation phase.

2.4. What are they doing?

As we noted earlier, the substantive centerpiece of a policy exercises is scenario development and analysis. Scenarios provide a special framework in which issues from various fields affecting the practical problem on the table are integrated and bounded, and in which specific policy options are tested during the interactive phase. In this part, I will briefly describe four different versions of scenarios that could be used. (We start experimenting with these four types because they are different enough to be considered as archetypes. We will drop those that do not work and invent something new instead or modify when necessary. Only after a series of experiments will it be possible to judge which scenario type is good for what purposes.)

First, a general remark. In case of each scenario type there is a short intermediate period connecting 'today' with the starting period of the scenario horizon. The importance of this period is to remove participants from the heat of current events and debates, and help them focus on problems in the scenarios. A short history would describe what 'had happened' in the meantime, how would we get to the initial state of the system described in the scenario. It is important to note that no external shock or internal event is introduced in the intermediate period that could exert a major influence on the rest of the scenario horizon. This intermediate scenario is common to each type therefore it will not be mentioned below.

In interactive phases of scenario analysis, the scenario horizon is divided into 4-5 equal time intervals called periods. The set of steps participants and Control team go through to complete processing one period is called a round. The length of the overall time horizon depends on the nature of the problem and the specific purposes of a particular exercise. Similarly, the resolution of time intervals is established by a carefully chosen time constant e.g. the length of an investment cycle, a characteristic lead-time in the system.

2.4.1. Type 1 scenarios

In a "Type 1" scenario, the initial scenario describes projections for the whole scenario horizon. These are, however, forecasts only and not actual events. They are expert judgements in forms like: "Here are some of the opinions, the best we could get. Some experts warn us that such-and-such might happen, with a chance of x per cent. Others tell us, however, that different and more serious problems are possible, and the chance is y per cent. In short, participants face in this scenario type, just as in real life, a set of partially or completely contradicting expert projections. They have to formulate their policies in the light of an uncertain future, a situation they know very well.

The interactive process is then the following. Participants formulate and submit their policies for the first period to the Control team. The Control team will update the scenario (state of the world at the end of the first period, expert judgements for the rest of the time horizon) based on forecast events in the original scenario and the estimated consequences of participants' moves. These steps are repeated several times until the end of the time horizon is reached (Figure 2.2).

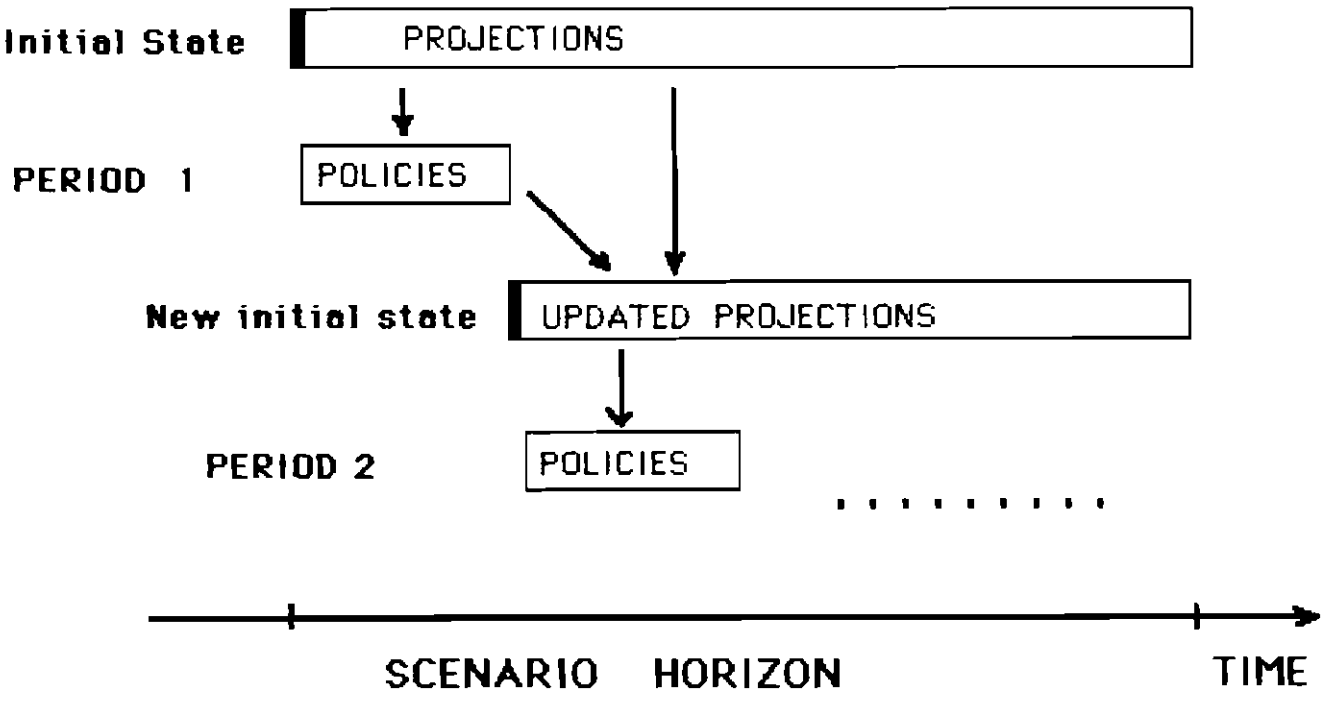

Figure 2.2. Type 1 scenarios

There are several advantages offered by this "Type 1" arrangement. First, the events or developments projected in the original scenario will help focus attention on a few specific problems. Complexity can be gradually increased in consecutive scenarios. Second, the surprises or external shocks do not just come like a rabbit from a hat, but are at least hinted at in the expert projections, although the type or magnitude can be far from what was projected in the scenario. Third, there is a clear feedback from policies implemented by participants to the updated state of the system and the projections of the future. Fourth, special emphasis is given to resilience in this approach: it is not sufficient to prepare for one possible shock in the future; policy options offering the maximum reasonable flexibility and adaptation chances should be explored.

2.4.2. Type 2 scenarios

These scenarios provide a history of past events and a detailed description on the initial state of the system. Since future development through the scenario will largely depend on participants' moves, it is not possible to prepare a detailed scenario for the whole scenario horizon in advance. Scenario writers, however, should define at least 2 to 3 basic directions in which the system could evolve (this means they try to guess how participants might react to the initial scenario) and develop alternative "shadow" scenarios for the second, third, etc. periods based on them. If they can successfully define a "high probability" and two extreme moves then it will be easier for the Control team to use an appropriate combination when they react to participants' moves at the interactive exercise.

The interactive features of Type 2 scenarios are similar to those of Type 1 but the perspectives and especially the information about possible future developments provided to participants is different. The emphasis in this case is more on a detailed description of initial state of the world at the beginning of each time step. The projections that are so important to policy formulation in case of Type 1 are not revealed in this case at all, or if they are, it is only a form of rather vague hints. However, detailed historical data are made available and some of the "surprise events" can be hidden in these data.

Participants are requested to formulate their policies that would best utilize advantages offered by current situation. Although external shocks and surprises introduced in these scenarios should be milder, the performance (that is the success of policies developed) is expected to be much worse than in case of Type 1. (Figure 2.3)

This scenario type would help us to investigate the trade-offs between short-term and long-term optimization and would draw attention to the importance of looking beyond the immediate boundaries of one's field [illegible] at what time scale that trade-off takes place. This type might offer exciting lessons on how expectations about future based on past data and current state, and policies built on them relate to actual developments. It would also help Participant[illegible] Control teams to evaluate existing policies or trends.

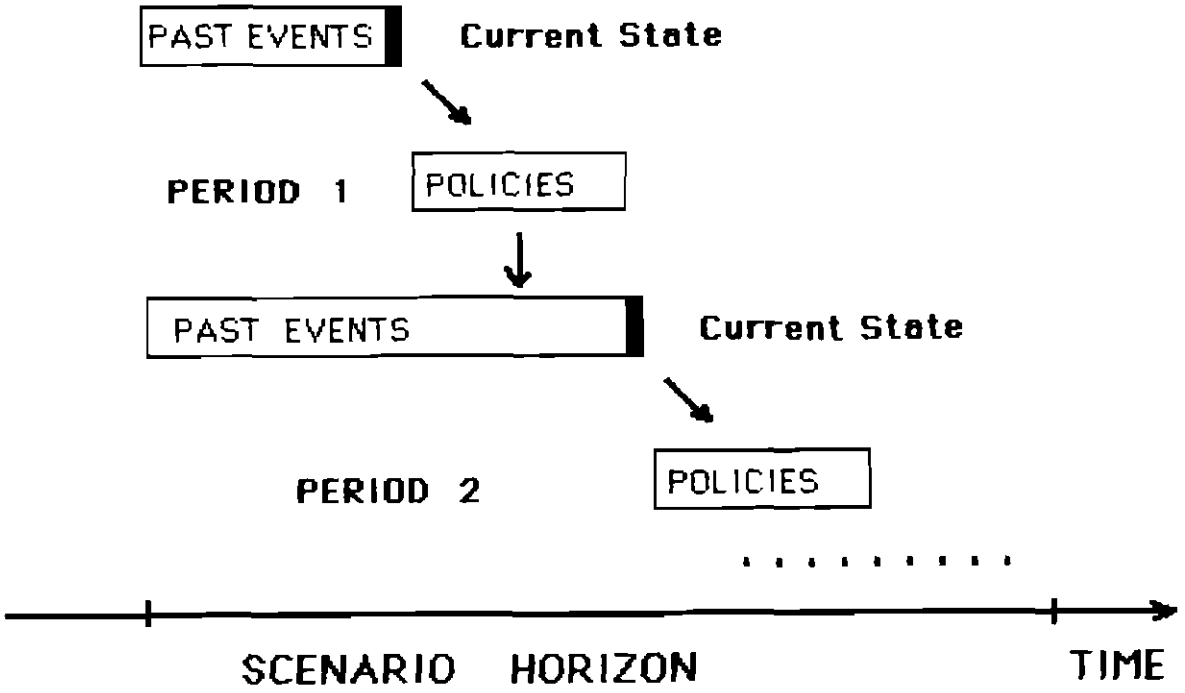

Figure 2.3. Type 2 scenarios

2.4.3. Type 3 scenarios

This scenario describes a "future history" of events and policies which have been implemented during the first half the overall time horizon and have resulted in a mess, a chaotic situation. Participants are asked to manage this crisis in the role of policy makers of a future generation (Figure 2.4).

Since it would require some experimentation to find out how this task would hold participants' attention, it is suggested that besides the first "crisis resolution policy" move and evaluation round, only one other period is played. This should make it clear how much, if any, success participants had at crisis management.

It must be obvious from the scenario that each step and policy implemented in the past was reasonable and justified, In the light of then-current information and that their consequences and other events were also plausible. All this illustrates that no stupid mismanagement, natural disaster, or catastrophic event is necessary

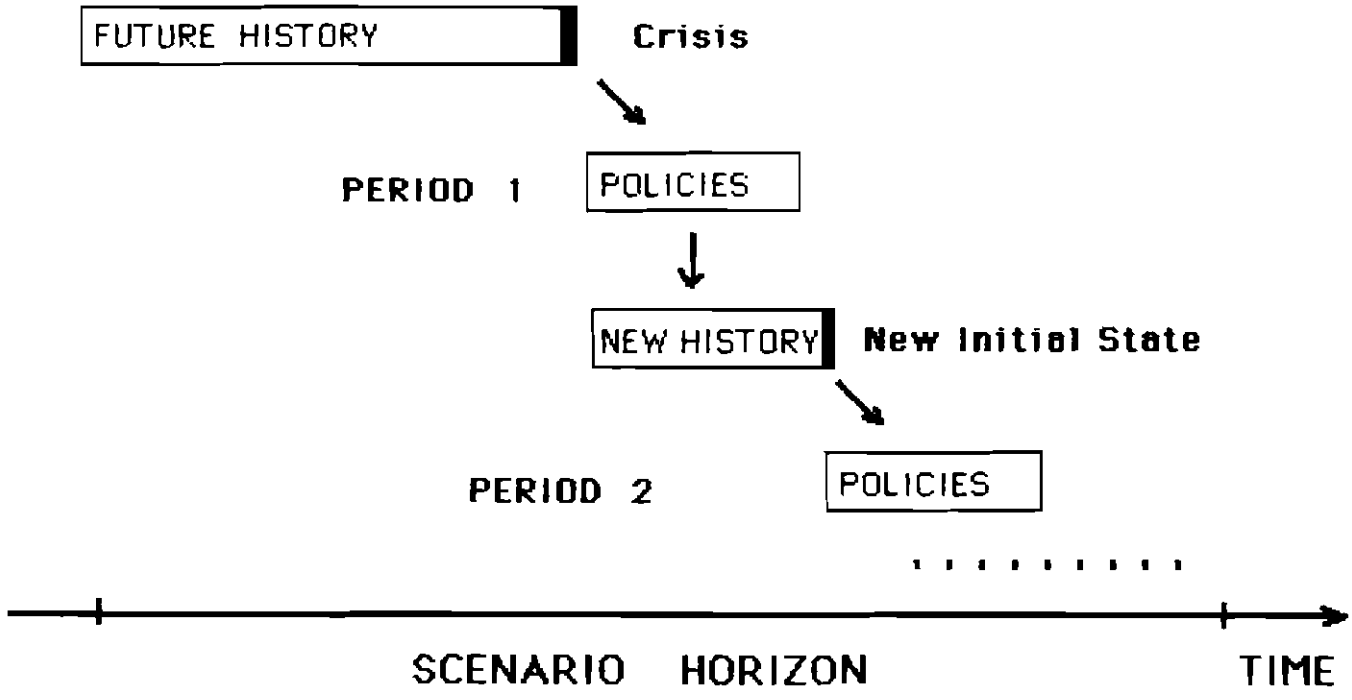

Figure 2.4. Type 3 scenarios

to get into a crisis situation.

Principal lessons from this scenario type are likely to relate to the issues of intergenerational heritage: how our current actions will determine the state of the world and possibilities for actions for future generations. Nice illustrations might be given in the scenarios of how one particular decision limits the range of actions and predetermines the next decision leading to a situation in which no policy is a good policy. Although training crisis managers is not a primary goal of policy exercises, the lessons about pitfalls of crisis management (e.g. solve one problem by creating half-a-dozen more serious ones) might prove useful.

2.4.4. Type 4 scenarios

There is no explicit scenario in this case. The situation is partly similar to Type 3 since here again, a messy, chaotic situation scheduled towards the middle or the end of the scenario horizon is described. But in this case, participants are requested to write the scenario: what they think has led to the crisis; a logic and plausible story of events and management actions. Suggestions to manage the crisis are not requested. Rather, participants are expected to signpost the turning points and assumed policies that have resulted the given situation. This means they have to both invent policies and assess their consequences up to the described situation (Figure 2.5).

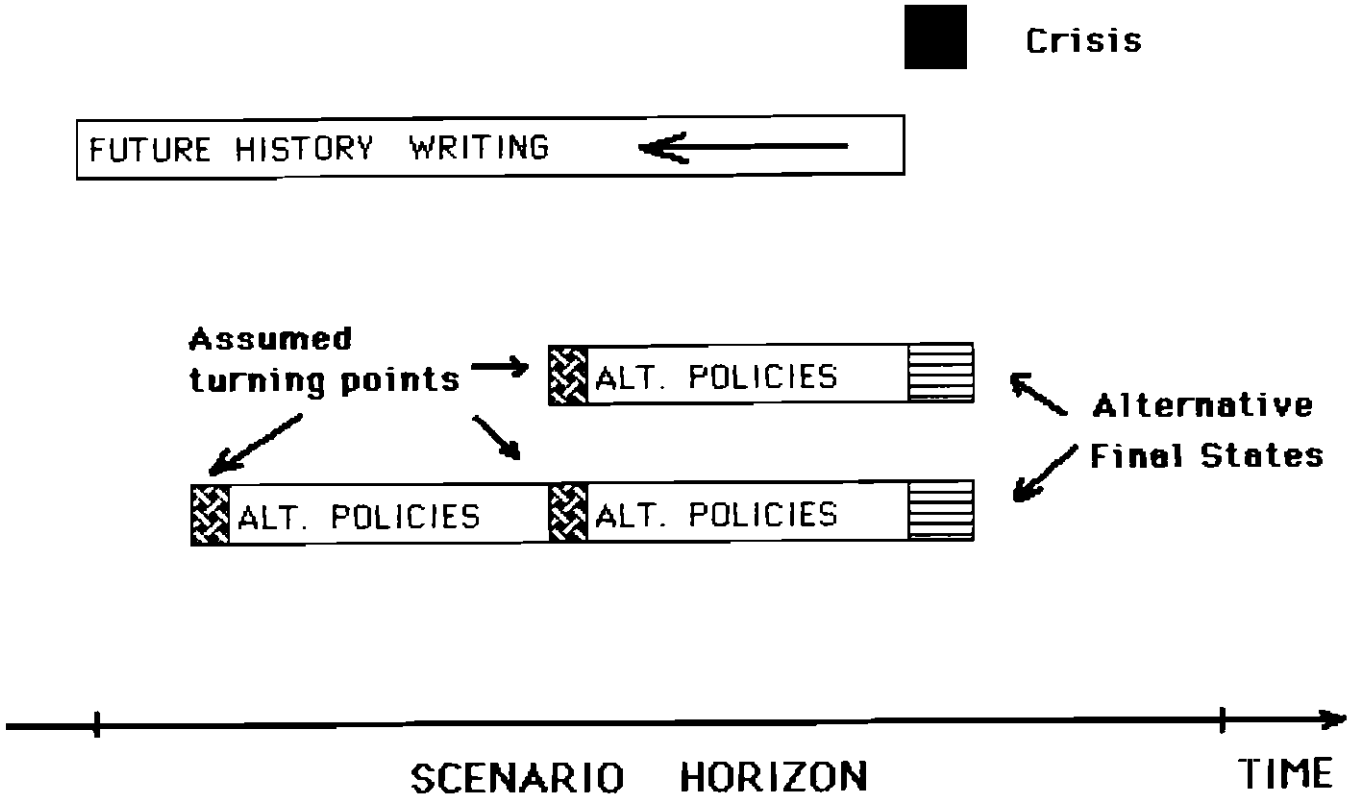

Figure 2.5. Type 4 scenarios

Type 4 scenarios seem to be the most difficult task for participants in a policy exercise. Therefore, it is very important that the crisis situation is characterized in a plausible way to give clues to participants to trace back policies and events to the baseline starting point. As part of their scenario, they should also develop alternative policies that could have been applied and assess what results those would have provided. It is like playing chess with the possibility of taking back one or more moves, and guess again how the opponent would respond to different moves.

The importance of developing robust policies (i.e., robust to unexpected events in the future) is most apparent when working with Type 4 scenarios. A policy that would have been successful only if some "external event" had not happened is obviously not a successful policy. Getting policy people to create scenarios, to write their own versions of the future, should provide us valuable insights on what their major concerns are, what kind of future development are they most worried about, what is their perception on the limits of their own range of action. Type 4 procedure might also help us exploring kinds and sources of future surprises.

3. Outline of Procedural Steps

In order to successfully complete a policy exercise workshop, a lot more is needed than just excellent participants and good scenarios. In order to make the most out of it, those engaged have to go through a series of steps to compile everything useful in an organized way. The procedure is described in this section.

3.1. Preparation

This phase of the policy exercise would usually take 4-10 months depending on the nature of the problem. See Figure 3.1 for an overview of the steps in this phase.

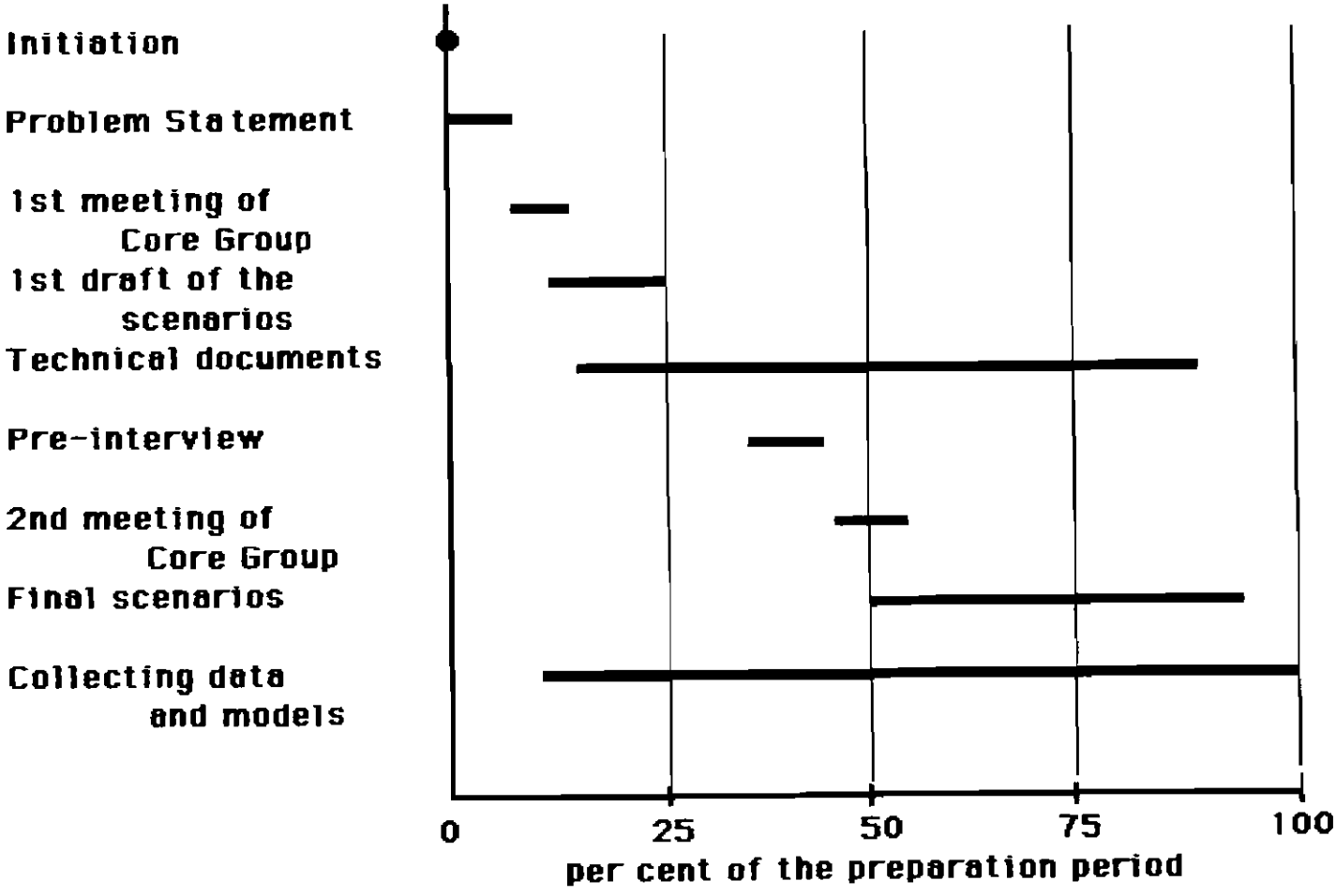

Figure 3.1. Activities in the preparation phase

3.1.1. Problem definition

Although we refer to the focus of a policy exercise as the problem, it is clear that in most cases a complex, unstructured, set of issues is the main reasons behind the decision to apply this approach. For simplicity, I am using the problem, issues, or subject of a policy exercise as synonyms.

The first document to be created in a policy exercise is the Problem Statement. Formulating this document has three purposes. First, to define at the very beginning, what the problem is that will be investigated through the policy exercise, why it is interesting, why does policy exercise seem to be a good approach,

and what is the expected outcome or product. The product is not necessarily new scientific knowledge or a series of explicit policy recommendations, rather a new better structured view of the problem among participants and a delineation of where more research is required to fill existing gaps in knowledge, where institutional changes are needed to better cope with the management problems.

The second purpose of the Problem Statement is to create a guideline, a frame of reference that will prevent diverting attention from the original purposes and help focusing on the original issues throughout the whole exercise. This seems to be more than obvious. But the danger is real, since an important feature of the policy exercise is that it involves many people with different expertise and background and they may have widely different perspectives of the problem. Comments like "this is an important problem, we should devote more time to that" are likely to occur and they may lead to an unmanageable list of problems if the guidelines are not clearly set at the very beginning. In subsequent phases, however, members of the core-group have to be open, listen to any suggestion, and check on the Problem Statement because a basic aim of the policy exercise is to search for new ideas and perspectives. The Problem Statement thus is an evolving document.

The third purpose for creating the Problem Statement is to provide a basis for evaluation. At the end of the preparation-workshop cycle, a critical evaluation is carried out focusing on two sets of criteria. First is the general issue of how useful the policy exercise approach is for investigating the issues at hand. The second concerns the activities in that specific cycle (the conceptual framework, bounding, invited experts and participants, scenario type selections, events and surprises investigated in scenarios). In this respect, functions of the Problem Statement are similar to those of the Concept Report in developing an operational game (see Duke-Greenblatt, 1981:59). Setting evaluation criteria at the very beginning will facilitate implementation throughout the process.

The Problem Statement is initially prepared by the Chairman and the Coordinator or, in case of a consultancy type exercise, by the client with some help from representatives of the consulting team.

3.1.2. First meeting of the Core group

Based on the Problem Statement, the Chairman and the Coordinator have to select the 3-5 most important disciplines with respect to the issues in the policy exercise and to invite participation of the best experts available in each field. Together with the Chairman, the Coordinator, and the representatives of stakeholders, they will become the Core group responsible for the high quality of scientific inputs to the exercise.

Bounding the problem starts in the Problem Statement. The composition of the Core group makes it more explicit. This process is completed when members of the Core group first meet for 2-3 days. Their major task is to prepare a comprehensive survey in the critical areas outlined in the Problem Statement. They review the most important past efforts in the problem area and prepare a critical appraisal of what has been achieved. They summarize the issues where there exists a consensus, and those characterized by major differences in opinion. If there is a "conventional wisdom", they describe it. Finally, they seek to identify the major sources of differences, and to show how these relate to the scientific uncertainties in the relevant fields of research.

The next set of questions the state-of-the-art review has to address relates to institutional and organizational aspects. Who are the key interest-holders and actors? Is there any sort of formal coordination among them? If so, at what level of authority, and with what source of legitimacy?

Finally, the review needs to have a look at the methods applied in previous efforts: What are they? Which ones could be integrated and used as support tools in preparation or at the workshop? Are there any computer models or data bases which can be used directly or could be modified for use in the policy exercise?

The review is prepared by the Core group and the required number of outside experts appointed to the task by the Core group. At the first meeting of the Core group, they should prepare guidelines for scenario development and assign responsibilities to create the first draft of the scenarios. The guidelines are general ideas on events, internal developments and surprises, and external shocks that might appear in the scenarios.

A set of background "technical" papers will be required for the interactive exercises for use of both Control and Participant teams. Information in these constitute the "rules of the game" when participants formulate their policies and the Control team evaluates them. (The papers include, for example, technology fore-

casts and assessments providing information like how much emission reduction can be achieved by using specific technologies and what are the costs involved.) The Core group has to commission these papers early in the preparation phase so that they can be sent out to participants before the workshop.

Members of the Core group will identify participants to be invited also at this meeting. There are two types of participants according to the role they play at the workshop. Members of the Control team include the experts in the Core group and other experts invited to the workshops. Members of the Participant teams are policy makers. There are several criteria to select the invitees to both groups. Expertise accumulated in the Control team should provide a reasonable coverage of all the important areas of interest to the exercise. There is a clear trade-off, however, since the requirement of keeping the Control team at a manageable size sets a relatively low limit to this number. It is impossible to avoid remarks during the workshop like "we should ask an expert of this or that subject". But these should be kept at minimum.

The policy people invited to join the Participant teams represent the most important actors from the management-policy making side. (In case of multi-regional exercise on forestry, for example, players would be CEOs of a typical company from each region. Typical does not mean average size, turnover, or any other single indicator. It is rather a company whose assets and problems represent the industry.) Besides the obvious requirement for high professional skills, invited participants should have a series of personal characteristics that will contribute to the success of the exercise. They should be open-minded to any ideas from others, no matter how strange some of these might appear at the first glance. In fact, it is an asset if they are able to come up with original ideas. They should be tolerant and cooperative, ready to work in an environment where face to face criticism and open challenge of each other's ideas are basic requirements.

The invitations have to be short and very specific. What is the whole exercise about, why has he been chosen, what would be his responsibilities, and who else got invited. The invitation has to make it clear that this is not yet another scientists-will-teach-you-what-to-do jamboree, but a carefully designed process where both academics and policy people come to work together and learn from each other.

3.1.3. Preparing the first drafts of scenarios

It is obvious from Section 2 that scenarios are the most critical inputs to the workshop. In fact, scenario writing is at least as important to the content of a policy exercise as the workshop itself. Besides the Core group and the necessary experts, two to three members of the already selected participant group should be invited. Scenario writing has become a profession, therefore a key role is given to the one or two scenario experts who are appointed to lead this task.

Additionally, one or two "special" people may be invited who are naive in the sense that they do not know much about science or policy making but are well-known for their imagination and sometimes shocking ideas. (They could be science fiction writers, for example.) Most probably, their ideas will not appear directly in the scenarios but they may stimulate other participants in the scenario drafting exercise and help them explore options they would never have thought of without being prodded in some unconventional directions. It has to be emphasized again how important it is to include surprising or unexpected elements in the scenario. Again, when a scenario with 2 to 3 specific types of surprises discussed, it is not the credibility or plausibility of a particular surprise that is important (the future is never realistic), but rather the search for policies and strategies that will make the system more resilient to those (and, perhaps) other types of unexpected events as well.

3.1.4. Designing and sending out the loose-leaf manual

The Core group has to be very careful about the amount and content of materials they provide to the participants. Giving them a concise document when they arrive to the workshop is not a solution. (The experience of many operational game operators suggests that players do not tend to read carefully even a 6-8 page role description, being much too impatient to start the game. To get through the material in the pre-game briefing process is also rather ineffective, especially when there are different roles and many rules to learn in a short time.) Moreover, the outcome of a workshop and, in fact, that of the whole policy exercise, can be considerably improved if a feedback from the participants is requested and used in the preparatory phase.

Another point of consideration here is that the types of policy makers we expect to participate in the policy exercises are unlikely to be able to block out the amount of time required to go through all the materials at one sitting. If they get the materials in several installments, they are more likely to read them immediately and react when a response is required. This arrangement should also enhance their sense of being really involved in the exercise and should make them less likely to cancel their participation if they run into schedule problems in the course of preparation.

Bearing all these requirements in mind, I propose a loose-leaf manual that is sent out in several installments and is regularly updated during the preparatory phase. The amount of reading material policy makers receive at a time makes it possible for them to read and react to it immediately. By the time they leave home for the workshop they should have the complete collection and read it through again on the way. The manual will be their main working document throughout the exercises and especially at the workshop.

The first installment of the manual should contain a description of the conceptual framework of the policy exercise, a condensed version of the Problem Statement, and the first draft of the scenarios. This amounts to approximately 40 percent of the total material the participants get. As new or revised parts of the manual become available, participants will receive them together with a revised table of contents, and always have an updated manual.

3.1.5. Pre-interview

It has been already emphasized that communication between participants and the Core group is very important for the success of a policy exercise. Lively correspondence is a basic requirement, but towards the end of the first half of the preparation phase it is necessary that members of the Core group visit participants and discuss the problem on the table in detail. By this time, the topic/goal of the policy exercise has to be defined, and participants selected. The aim of the pre-interviews is to get the first input to the exercise from the participants. Interviewers talk about the subject with them, and discover their beliefs, attitudes, and views of the problem. The form of the pre-interviews is close to what sociologists call partly structured standardized interviews.

Ideally, all pre-interviews are conducted by one person from the Core group. If this is not possible, then interviewers have to discuss the form and content for the pre-interviews and prepare a protocol that will be binding for each of them. Participants will tend to focus on the problems of their own region, industry, or business, and there is a delicate balance between extracting from them as much information as possible with respect to the problem as a whole, and becoming preoccupied with problems of one particular party. A good protocol for the pre-interviews will help to ensure a uniform output without degrading the discussion to a rigid, questionnaire type of information gathering.

The pre-interviews take place at the offices of the participants. The minimum time required is 2-3 hours. Given their everyday workload, it is not likely that the type of people we expect to participate in the policy exercise will be able to reserve that much time in a single block. Ideally, the pre-interviews take place in two 1-1.5 hour sessions with a 2-3 hour interval in between. This will allow the interviewer to go through his notes, check them against the protocol, and direct discussion in the second round so that the pre-set goals are reached by the end of the day.

Questions to be discussed in the pre-interviews include a short, general overview of the subject; a more detailed discussion of which parts/aspects of the problem are the most important for the interest holders represented by the participant; a discussion of his views about the relationships of these issues to the concerns of other parties in the game; his opinion on the kind of support that is needed from outside to solve some of these problems; and his views on what sort of technical assistance is needed at the workshop (data base, computer models, decision making aids).

3.1.6. Preparing the final scenarios

Results of the pre-interviews and participants' reactions to the first draft of the scenarios are evaluated by the Core group, at its second meeting. This is the first step in the process of direct preparation for the workshop. It will be a difficult task to select which suggestions from the participants should be implemented and which ones will be disregarded. In any case, a letter reflecting on the pre-interviews and providing a detailed explanation of what has been decided by the Core group and why should be sent to each of the participants.

As a result of this evaluation, the Core group should be able to decide which scenarios will be used at the workshop, how should they be modified, and which scenario types are most appropriate to present them.

3.1.7. Final preparations

At this stage of preparatory phase for the workshop, several activities are going on simultaneously. As new parts of the workshop material become available, they are immediately sent out to the participants. Members of the Core group are collecting data and computer models for use by the participant groups and the Control team at the workshop. A short description and user manual for these models and data bases are also sent out.

3.2. The workshop

The culminating phase of a policy exercise is the workshop. Although the time and effort devoted to the activities in the preparation phase can vary depending on the subject, each step is essential and none can be skipped without jeopardizing the success of the whole exercise. The situation is different in case of the workshop: there is more flexibility in the actual design and length of the workshop, the number and types of scenarios discussed, the time available to work through one scenario, and the way time is split between policy formulation, Control team activities, and floor discussions. In the following sections a workshop will be described in terms we conceive as typical. The five parts (Introduction - Briefing, Demo session, Scenario sessions, Debriefing, and Social event/Heuriger) would be standard to any policy exercise workshop.

The workshop would form an intensive and focused 3-5 day period of work. A key role is played by the Facilitator whose main responsibility is to keep the process moving, to coordinate actions of the participant groups and Control team, to provide support with logistics, etc. The role and responsibilities of the Facilitator are similar to those of a game director in an operational game, but are more difficult because many more unexpected events are likely to occur during a policy exercise workshop.

The most difficult task for the Facilitator will be to keep to the schedule in a flexible way so that interesting discussions will not be interrupted just because 'time is up' on the one hand, and time is not wasted with unproductive disputes on the other.

3.2.1. Introduction - Briefing

The first day of the workshop starts with an introductory session. Participants introduce themselves and give a short report on the region, company, industry, or interest group they represent. This is followed by the introduction of the Control team, whose members tell about both their real-life profession and the responsibility they assume by playing a role at the workshop.

Participants bring with them their manuals for the workshop. Since they have been involved in the preparation of these manuals, there is no need for a long briefing session. Participants have to be informed about the logistics and use of equipment available to them.

3.2.2. Demo session

A relatively simple, surprise-free scenario should be selected for use in the first scenario analysis session. Participant teams go through the process of policy formulation and analysis step by step following instructions of the Facilitator. The aim of this session for both Control and Participant teams is to get used to the working environment, to practise the use of support tools, to see how and when communication with other groups are necessary, and to learn what kind of support is available from the Facilitator and experts in the Control team. Participants are not requested to formulate policies in response to the scenario at this point. They are provided with prepared moves together with a detailed explanation about methods to coordinate the decision process.

3.2.3. Scenario sessions

Four types of scenarios were defined and discussed in Chapter 2. The number and type of scenarios processed at the workshop depends on the problem and focus of the policy exercise. For the most typical exercises providing an interface between research and policy making, Type 1 scenarios appear to be most suitable, but even in this case additional sessions with other types of scenarios might be appropriate.

Scheduling steps of the interactive scenario analysis sessions is the most difficult part of the workshop to design. The final procedure should evolve from a series of experimental "cold" runs. First we have to see how much time is required for each step, what is the most efficient sequence of steps, what is the best schedule for joint and parallel activities of the Control and Participant teams. As an example of basic procedural steps in the interactive phase, the outline of a Type 1 scenario session is presented below.

Scenario sessions using Type 1 scenarios start with a five minute summary of the events and projections described in the scenario. This can be a slide show, an on-line run of a computer model with graphics output, or simply a presentation by the Facilitator or a member of the Control team. Since scenarios were sent out to participants before the workshop there is no need for a detailed presentation. At this point, participants are usually much too impatient to pay attention to a long lecture. They want to start the game.

Participants are requested to formulate their policies for the first period of the scenario horizon. A deadline is given for the submission of moves. Participants will most probably request help from experts in the Control team, particularly in the first round. Experts may help participants to understand the problem raised in the scenario, or to clarify details that are not obvious. They should refrain from giving explicit policy advice to the participant groups. They should, however, document participants' avenues of inquiry.

Depending on the nature of the subject, participants may or may not want to communicate with other groups, to coordinate actions with them, or to work out joint strategies with one or more groups. In case of any conflict or dispute within or between participant group, the Facilitator should intervene. First, he should help the parties to structure their disagreement. When it is obvious that no solution can emerge (the arguments do not seem to lead toward consensus), the Facilitator, with a help from the Control team, should take over the leading role in the discussion and bring the parties to consensus within the shortest possible time.

The moves can be submitted as a set of numbers (if the policy can be translated into fully quantifiable terms), as a written report, in the form of an oral presentation, or as a combination of these three. To facilitate the work of the Control team and reduce the time required to process the moves, a spreadsheet-like decision form should be used for submitting quantifiable decisions, and questionnaire-like guidelines should be used for explaining non-quantifiable policies.

Once the moves are submitted, two activities take place simultaneously. The Control team evaluates the policies, assesses consequences, determines the initial state of the system for the next round, and modifies the original scenario to account for consequences of policies implemented in the first round. Parallel to this, participant groups join for a discussion, unveil to each other the policies they submitted, and try to do the same assessment of consequences as the Control team. This discussion is led by the Facilitator.

The next step is a joint discussion of policy evaluations prepared by both groups. First, a member of the Core group and then a representative of the joint participant groups explain results of their policy assessments, and the floor is open for discussion. If there are major differences of opinion between the two outcomes, the Control team may want to change the modified scenario and/or the initial state of the system for the next round. While the Core group completes final adjustments, participant groups have a short break before the next round starts.

These steps are repeated for several rounds until the end of the scenario horizon is reached. At the end of the last round, the same policy assessments are prepared as before but the closing discussion will address the whole scenario session challenging events in the scenario, policies implemented by various groups, and also the activities of the Control team.

The procedure in case of Type 2 scenario session would be, to a certain extent, similar to those presented above. For Type 3 and Type 4, however, they must be entirely different, involving more group discussion and fewer interactive steps.

3.2.4. Debriefing

Following the last scenario session, all participants come together to discuss and evaluate the policy exercise. It is suggested to reserve sufficient time for this activity although the precise number of hours is hard to specify. As a general rule, it should be at least as long as a Type 1 scenario session at the workshop in

order to fulfill all the purposes set for a debriefing session.

Policy related issues have already been discussed at the end of each scenario session. There is a need, however, to step back and take an overview of the exercise as a whole. In order to structure the discussion, a protocol has to be prepared by the Control team that reflects on what happened at the scenario sessions and what kinds of issues could be raised in the floor discussions.

Participants would be asked to evaluate what had happened, why, what were their ideas in policy formulation, what alternative policies could have been suggested, what would have been the result. The next set of questions address the relationship between what happened at the workshop and their real life problems. How useful was it for them to take part? What do they think would change as a result of what they have learned from the exercise?

Finally, participants would be asked to evaluate the process of organization and implementation of the exercise. Were information and support they got sufficient? What sort of procedural improvements could they suggest?

3.2.5. Relieving group tensions: Heuriger*

The last part of a policy exercise workshop is informal nonetheless important. It may appear rather strange that a social event becomes part of the procedure in a policy oriented scientific method. The reason, however, is quite simple. Although we do not want to create as much anguish, anger, or frustration as some of the social-interaction games do, it is not difficult to foresee that after three to five days of intensive small-group discussions where challenging each other's ideas is a basic requirement, some participants may feel that they are fed-up with everybody and everything. It is the task of the Facilitator and the Chairman to prevent disputes from getting emotionally overheated in the meeting room. An important function of the debriefing sessions at the end of each scenario session and at the end of the workshop is to sort out the tensions that may be building. Still, if we design a procedure that has a chance of generating any sort of uncomfortable feelings in the participants then we have to make sure that those feelings are com-

* For those who have not heard the word before: Heuriger is the traditional Austrian wine-drinking tavern where people come together to have a great time, to forget, and forgive. We use this word as a reminder that the version of the policy exercise approach under discussion here was developed in Austria.

pletely relieved on the last day before participants depart.

Once again, the Facilitator and the Chairman have to assume the leading role in creating an atmosphere at this event that would make it easy for the participants to get rid of all possible hard feelings. Directly applicable advice is difficult to give, but they usually have sufficient experience in group dynamics and methods of small-group social psychology to cope with the problems. It is important that they get help and advice from those members of the Control team who had observation tasks assigned through the workshop. It is suggested that they meet briefly after the final debriefing session to discuss strategy if there is a need to smooth inter-personal tensions generated in the policy exercise.

3.3. Evaluation

The first important step of the evaluation phase takes place at the end of the workshop: participants assess the exercise from their own point of view in the Debriefing phase. This provides the Core team with part of the answer to the question "How useful was the policy exercise?". Criteria for evaluation, however, are likely to be different for the Participant teams and the initiators. Therefore, the Core group, together with selected members of the Control and Participant teams, should stay together for some time after the workshop to review and evaluate the exercise as a whole, to decide whether it would be useful to carry out another round, and if so, to set the guidelines for doing so. Evaluation thus would become, in many cases, an overlapping phase between two exercises.

In the first part of the Evaluation phase attention should focus on the usefulness of the exercise. The most important successes and failures should be identified and the contribution of each activity in the sequence should be diagnosed. Activities of the Core group in the preparation phase, and performance of the Control and Participant teams at the Workshop are also evaluated at this point.

The main question for the second part of Evaluation should be whether it would be useful to organize another cycle, and if so, what are the major lessons from the past exercise that should be applied to the future one. In either case, each element of the policy exercise is to be challenged: the procedure itself, scheduling of phases and steps, choice of scenario types, shocks and surprise events in the scenarios, the ways they were presented, the plausibility of the

scenarios in general, the relevance of models and data bases, and the performance of members of Participant teams, Control team, and the Facilitator.

The real strength of the policy exercise approach should become more apparent if the exercise is repeated several times with a (partly) different group of participants, using a new set of scenarios, updated models, and new data. It is clear, however, that in many cases the decision to run a new cycle would be affected by many other considerations beyond the pure successes or failures of a previous exercise. This is yet another reason why evaluation and a summary report from the Core group to the ex-participants are indispensable parts of a policy exercise.

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