WORKING PAPER

PRACTICING THE FUTURE. PART 2: LESSONS FROM THE FIRST EXPERIMENTS WITH POLICY EXERCISES

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FOREWORD

The Project on Ecologically Sustainable Development of the Biosphere strives to illuminate potential long-term clashes between regional development and the environment in a way that facilitates discovery of meaningful policy strategies to cope with such clashes. Indeed, every project in the IIASA Environment Program aims to generate policy-relevant information in a ready-to-use form. But generating such information goes only part way towards its successful use: also necessary are strong linkages with the policy (user) community that are designed to learn how to synthesize the information in new and enlightening ways, and how the policy community perceives the opportunities for and constraints against implementation of potential strategies for dealing with the problems under investigation. These quests are also addressed in the Biosphere Project through a methodological development known as the Policy Exercise.

Policy exercises were conceived by Gary Brewer and William C. Clark when the Biosphere Project began at IIASA in 1984 (see the 1986 IIASA volume entitled "Sustainable Development of the Biosphere", published by Cambridge University Press), and an operational approach was designed by Ferenc Toth, author of this paper, in 1985 and 1986. Since then, there has been a series of workshop tests of the policy-exercise protocol in two Environment-Program case studies, namely, the Forest Study of the Biosphere Project, and the Study on Future Environments for the European Continent. In this paper, Dr. Toth relates experiences with the first tests in the Forest Study.

In the Environment Program, and indeed throughout IIASA, there is considerable excitement about the potential role for policy exercises beyond the case studies where it has been initially tested. We are exploring ways to continue development and application of the concept both here and elsewhere. This paper is an important contribution in describing the continuing evolution of one of IIASA's most inspiring methodological developments in policy-relevant applied systems analysis.

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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. In Part 1 of the "Practicing the Future" series, a new approach called the Policy Exercise was introduced. A Policy Exercise is a flexibly structured workshop environment designed as an interface between scientists and policy-makers. Its function is to synthesize and assess knowledge accumulated in several relevant fields of science for policy purposes in light of a complex practical management problem.

The first experiments to test and refine various structural elements and procedures of the Policy-Exercise approach were conducted in Summer of 1986 involving approximately 15 graduate students from various countries of Western Europe, Eastern Europe, and North America. This paper is an overview of the lessons learned from these experiments. Section 1 provides a summary of the experiments including the subject matter, participants, and the various activities. Section 2 contains general lessons on the Policy-Exercise approach. More specific lessons about the preparation and workshop phases of the exercise follow in Sections 3 and 4 respectively.

ACKNOWLEDGEMENTS

CONTENTS

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1. Introduction and Background

The need and initial concept for a new approach in policy analysis called the "Policy Exercise" have been presented in several papers which address the special characteristics and methodological requirements related to the issues addressed by IIASA's project on the sustainable development of the biosphere (Brewer, 1986; Clark, 1986). Part 1 of this series (Toth, 1986), presented the most concrete description of the exercise, a general yet operational image of the method together with plans for implementation and guidelines for experiments.*

The goals for our activities in the summer of 1986 were to test two versions of the Policy Exercise. The first version has a workshop format preceded by several months preparation. The workshop extends over several days. Invited participants interact in structured, face-to-face discussions and analysis of the issues.

The second version is similar in structure to the first, but is implemented via a computer-based teleconference. This version of the exercise probably will require more time to complete - perhaps several weeks, or even months - but will allow the invited participants to interact from remote sites. While these two versions were tested, the idea of a third version emerged in which short (1-2 day) workshops are combined with longer periods (several months) of teleconferencing.

The original document (Toth, 1986) describes the workshop version. Therefore, results from the experiments with that format are reported here. Design and specification issues related to the teleconferencing version are outlined under separate cover (Underwood and Toth, 1987).

1.1. The Forest Study of the Biosphere Project

The problem area for the experiments conducted in Summer 1986 was the medium-term (30-50 year) future of the European forest sector.

"The goal of the study is to gain an objective view of the future development of forest damage attributed to air pollution and of the effects of this damage on the forest sector, international trade, and society in general. Furthermore, the goal is to build a number of alternative and consistent scenarios about the future damage and its effects. These scenarios should not be regarded as projections, but as a way to help decision makers avoid short-term solutions in a very complex situation. The major ob-

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*See the Appendix for a Summary of terms & definitions introduced in Part 1 of the "Practicing the Future" series.

jective of the study is to identify the choices and decisions that governments and industry must make today. Of particular interest is what can be done in the short term to address long-term policy questions." (Nilsson, 1986)

Besides the forest decline problem affecting the resource base, there are several other factors influencing the international market for forest products and, in general, the operation of the forest sector in Europe. A short list of these includes:

- the future rate of lumber substitution in major areas of use;

- spread of the electronic office and ways it affects the demand for paper;

- printed versus electronic media;

- EEC land conversion from agriculture to forests;

- public pressure to create wilderness for recreation;

- increased supply to Europe from Siberia;

- increased softwood plantations in the tropics;

- impacts of climatic change on the forests; and

- results of biotechnological research.

Many individual studies have been investigating these problems in isolation, providing useful knowledge on some specific relationships. It is clear, however, that the usefulness of these results is limited unless they are integrated in a suitable framework reflecting the views and perspectives of those who are supposed to use them. The Policy-Exercise approach was developed to provide this framework and the Forest Study is one of the first areas in which it will be applied involving "real" policy-makers.

1.2. Participants

Key roles in the experiments were played by graduate students participating in IIASA's Young Scientists' Summer Program (YSSP). Although their academic backgrounds and experiences in forestry were largely lacking, and they were primarily signed to other tasks, they contributed importantly to an operational version of what was only a promising concept before.

Each member in the Young Scientist's group was trained in a forestry area but their interest and perception of forestry problems were diverse. They came from Eastern, Western and Northern Europe and North America. The diversity in their linguistic, professional and cultural background was very useful. That English was not the native language for most demonstrated that native or good speakers of the exercise language dominate even though the professional background of non-native speakers may be better. Suggested solutions to this problem will be discussed later.

Though we thought we had been aware of the differences between running a Policy Exercise with "real" policy-makers and with students playing simulated roles of policy-makers when we designed these experiments, there were admittedly quite a few surprises in the course of the test runs. The havoc created in the meeting room was at times embarrassing, but these crises helped us to see what we did not know, did not prepare for, did not clarify, or did not even think of.

1.3. Activities

The primary objectives of the experimental runs were to test mechanics of the workshop version, to see how the various types of scenario sessions work, and to estimate the time constraints. For this purpose any other topic would have been useful. We decided to pick forestry because of the interest of the YSSP participants and because we expected some of the results be directly applicable to the "real" Policy Exercises on the European forest-sector futures.

With the emphasis on the mechanics and group interactions, however, less attention was devoted to content. A small group prepared the scenarios, background data, role descriptions, and rules for the sessions and presented these to the Policy Teams shortly before start. The preparation phase that was emphasized as so important in the conceptual papers was limited to a short briefing session. There are two main reasons that preparation was incomplete. First, participants' perceptions and perspectives on European forest management were not expected to be relevant or useful to the "real" exercises. Second, both the organizers of the experiment and the participants had no time for full preparation. As a result, many misunderstandings, mismatches in perspectives and intentions, and gaps in knowledge and data appeared only in the first runs.

There were three Policy Teams and the Control Team participating in the forestry Policy-Exercise experiments. Each Policy Team represented the forest sector: in either Eastern Europe, the Nordic countries, or the remainder of Western Europe. (The difficulties of managing heterogeneous regions led to changes. Participants managed single countries Czechoslovakia, Sweden, and FRG, respectively within those regions in the second half of the experiments. In the remainder of this section, notes in parentheses relate to this set-up.) Each participant team was composed of three members who were playing roles of senior officials from national governmental agencies, forest industry companies, and environmental groups. The primary objective of each Policy Team was to formulate regional (national) policies that responded in a realistic manner to the events and forecasts described in the scenarios. As a secondary objective, Policy Teams assessed the likely consequences of their policies so that their predictions could later be compared to the scenario updates determined by the Control Team.

Type 1 scenarios were used in the experiments with minor modifications in structure and major changes in content between consecutive runs. The intention was to play three ten-year cycles to cover the 1990-2020 period, but some runs were interrupted earlier for one reason or another. For each of the three cycles of the exercise, the Policy Teams were asked to produce a realistic and coherent statement of policy which they would recommend for their region (country) over the next ten-year period. They had to provide a rationale to support these policy decisions and they were also requested to outline the expected outcomes of their moves.

The participants were allowed to recommend any form of action that they decided was an appropriate response to the situation described in the scenario. However, for formulating their initial responses it was suggested they consider the following policy instruments:

1.   tax forest-product imports;

2.   subsidize harvesting, transportation, processing, plantation and export;

3.   implement forest policy changes to reduce the impacts of air pollutants;

4.   emission reduction through public pressure on polluting industries;

5.   pay for pollution-abatement equipment in other regions;

6.   implement new speed limits for cars;

7.   apply pressure on other countries through international organizations to produce a better environment;

8.   introduce taxes on emissions;

9.   inform the public about the situation; and

10. make agreements to reduce the oversupply of wood.

These measures were only intended as examples and were not meant to limit the actions that were considered and recommended by the participants.

The participants had to follow a prescribed sequence of steps as described in the exercise protocol. A detailed description of the steps is provided in Table 1.1 below.

Table 1.1. Procedural steps for participants in the experimental runs

Steps	DESCRIPTION OF STEPS
1. Introduction	The participants introduced themselves and described the roles they were playing. The facilitator then gave a brief overview of the procedures to be used in the exercise.
2. Instructions	The participants read the user manual for the Policy Exercises. The facilitator provided clarification where needed.
3. Read scenario	A ten year cycle was begun. The participants reviewed the initial scenario. The scenarios were distributed the day before the exercise to allow participants to become familiar with them before the exercise began.
4. Formulate policy	The participants then split up into their regional teams (three members in each team) and worked out a collective response to the events and forecasts described in the scenarios. Each group worked independently, but members of each group worked cooperatively with the other members in their group. The objective was to develop a policy statement that describes actions enabling their region to adapt effectively to the present and imminent changes in the forest sector and institutional environments. The policy statement was accompanied by an assessment describing the expected outcome of the actions and a rationale for the selection of these actions.
5. Submit move	The Policy Teams recorded their decisions, expected outcomes, and rationale on a decision sheet which was then submitted to the Control Team.

Steps	DESCRIPTION OF STEPS
6. Analysis/ discussions	While the Control Team was analyzing the policy statements and was preparing updated versions of the scenarios, the participants presented their policies to the other regional groups and they analyzed the combined European situation in a full group discussion (excluding the Control Team).
7. Update system	After the Control Team had determined the combined and regional impacts of the three sets of policies recommended by the Policy Teams, they presented a brief statement describing the updated scenario reflecting these impacts.
8. Compare assessments	Following the Control Team's presentation of the updated scenarios, a plenary discussion compared the assessments of the Policy Teams with those and the revised scenario of the Control Team.
STEPS 3 THROUGH 8 WERE REPEATED FOR THE NEXT TEN YEAR CYCLE	
9. Debriefing	All participants joined in a debriefing discussion by offering their evaluations of the perceived problems and possible improvements to be made in the exercise.

2. General lessons

Due to the special circumstances under which the experiments were carried out, a number of specific points need to be addressed before we draw the conclusions from the experiments for future applications of the Policy-Exercise concept.

2.1. Problems of tests and trial runs

It is envisioned that any future user of the Policy-Exercise approach would want to see how it works before engaging the "target group" (senior scientists and high level policy-makers, in most cases). The obvious solution is to organize one or more test runs with proper substitutes simulating the roles of "real" participants. The problems with this kind of test run are usually related to one of the basic features of the Policy-Exercise concept, that is, heavy reliance on the expertise, views, and problem perception of those participating. There is a real danger of failure even if successful trial runs previously had been completed with close associates (e.g. assistants or senior staff persons) of the "real" participants using the same schedule, scenarios, support tools, facilitation.

Comparing this test procedure to the development procedure of operational games offers useful lessons. The most important lesson is that there is a specific message to get across from the game designers to the players in most operational games while the mes-

sages in a Policy Exercise, if there are any, should emerge from participants' interactions in the process. Therefore, while it is relatively easy to judge whether an operational game or one specific run were successful by evaluating how the messages got through, defining similar criteria for the Policy-Exercise approach or one specific implementation is not that obvious. Not appropriate for Policy Exercises is the classic rule of game designers that "[T]o ensure that the final gaming/simulation product is reasonable, testing must be governed by the 'rule of ten'. That is, a game should be presented as complete only after it has been tested with appropriate audiences on ten separate occasions ..." (Greenblat-Duke, 1981:71).

There are two immediate conclusions from the above. First, the risk of failure has to be revealed to those invited to participate in a Policy Exercise. Second, the risk of failure, confusion, or embarrassment can and should be substantially reduced by good preparatory work involving all would-be participants in the exercise. Ways to achieve this goal were outlined by Toth (1986) and will be further elaborated below.

Simulated roles played by participants at test runs present the next set of problems related to "fine tuning" of a Policy Exercise. The goals of a "real" participant in the exercise might be quite different from what a "substitute" might hold when going through the test runs. As a result, the criteria that these two groups apply to judge the success of the exercise (test run) might be very different.

These incompatibilities stem to a large extent from the differences in professional experience, perceptions about issues at hand, and, in general, the roles played by senior policy-makers and their staff in decision-making processes in real life. In the dynamics of policy-making, the former group usually says: "I want to get there, what are my options?" Then the support staff present a set of alternatives, and the decision-maker picks one. This means that the support staff's approach to a problem tends to be analytic, aimed at exploring alternatives, while that of a policy-maker is comparative, aimed at finding the best feasible alternative.

The small team preparing and organizing the exercise called the Core Group must be aware of these problems and involve both groups in the preparation phase, in bounding the problem, scenario writing, data collection. If a useful distribution of work between senior policy people and their staff during the Policy-Exercise process can be arranged, this will substantially improve the chances of successful completion and the usefulness of the exercise to all parties.

2.2. Goals and objectives

The first experiments conducted to formulate and test the Policy-Exercise concept have revealed a great confusion about the objectives for developing the method (why do we need a new method), the perceived goals of participants (why do they want to participate in an exercise), and their role-related objectives in the game (what do they want to accomplish while playing a role in the exercise). These are crucial issues to sort out before we can draw any meaningful conclusions from the experiments.

2.2.1. Why a Policy Exercise?

The need and purpose for developing the Policy Exercise have been outlined in several previous papers (Brewer, 1986, Sonntag, 1986, Clark, 1986) and were reiterated in the first paper formulating an actual procedure (Toth, 1986). The main reason motivating the development effort is that the approaches that have been widely used in recent studies to synthesize large bodies of scientific knowledge for use in policy-making (large computer models and expert committees being the two characteristic extremes) have often proved

to be ineffective. We felt there was room for new tools that complement those existing synthesis methods. Our special concern is related to the uncertainties and surprises characterizing the kinds of long-term, large-scale issues that are the primary focus of IIASA's Biosphere Project and the inadequacies of earlier methods to handle them.

We realized in the early phase of the project that many individuals and research groups face similar problems when trying to pursue a synoptic perspective to identify, analyze and solve practical management problems. In addition, Biosphere Project case studies were sufficiently different to require modifications of the same conceptual framework. These ideas and requirements directed us to create a general approach, a collection of tools that can and has to be restructured to best serve the purposes of a particular application. Therefore, the Policy-Exercise concept can be considered as a frame containing sets of tools with a flexible structure and the know-how for assembling a carefully chosen subset of those elements for a specific application. These features of the Policy-Exercise concept are similar to those of the Adaptive Environmental Assessment and Management (AEAM) approach:

> "While it might be argued that some of the techniques presented here are not universally adaptable, the main emphasis throughout is on an overall approach to the problems. This is why a range of techniques, from the simple and naive to the more sophisticated, has been explored. The choice and usefulness of a particular technique depend very much upon the particular situation and available resources (Holling, 1978:19).

Much of what is said in this paper about the Policy-Exercise method address issues at the general level of the frame exercise. I will draw examples from ongoing case studies and applications when it helps clarification but these should be considered as hints for application rather than rigid rules. The choice of the appropriate method for a study is conditioned, among others, by the objectives on the study and the available resources. Thus, if one's objective in a study include synthesis and assessment of policy relevant information it is not necessary to invoke the Policy-Exercise concept. And conversely, if one's main goal is synthesis, then Policy Exercise becomes a specially designed approach for this purpose, bearing advantages the other methods do not have.

Although the Policy Exercise is by intention flexible, clear distinction should be made between a particular application of the flexible frame and exercises which clearly are not applications of the Policy-Exercise frame, nor need they be. Thus, a workshop bringing policy people together for whatever purpose without going through the preparation phase of intensive communication with them (reviews, feedback, comments, interviews) would fall in the category of structured or unstructured workshops. If the intention is to communicate research results and disseminate new knowledge to policy-makers, a series of other well-proven methods could be used (e.g. teaching-training games, executive reports). If policy-makers need to make a decision and appropriate data are available, a decision support tool or some kind of an expert system should be used. If policy-makers have major disagreements or obviously conflicting interests, tools of negotiations analysis might help. If scientists need to sort out a scientific disagreement, the classic conference or workshop type activity is appropriate.

2.2.2. Objectives of the Policy-Exercise

The primary goals of the Policy-Exercise approach are

• to synthesize complex and incomplete bodies of scientific information for use in policy-making,

- to test applicability and enhance actual use of scientific knowledge for policy formulation, and

- to get fresh insights and new perspectives from the policy side for future research.

These goals are achieved by providing a channel and forum for communication between policy-makers and scientists in a way that it will help them invent and evaluate strategic alternatives related to the selected issues, thus serving as a preparation for effective participation in actual decision processes. This means that the exercise is intended to help each participant bound, structure, and understand the long-term, wider perspective issues that often remain hidden in the course of day-to-day problem solving work.

To pursue these overall objectives in any practical application, it is necessary to define a set of more operational objectives that will make both the design and evaluation easier. Thus the procedure-related objectives of the exercise are to:

1. *Direct attention*: To focus an interjurisdictional group of senior policy-makers and leading scientists of related disciplines on the consideration of potentially significant long-term, large-scale, complex issues and the possible impacts of surprising futures in a synoptic perspective. This objective is intended to be reached by formulating a Problem Statement, creating scenarios, conducting debriefing sessions at the end of each interactive scenario session and preparing an executive summary.

2. *Improve communication*: To aid sustained and focussed communication between key individuals in the scientific and policy communities who have influence in areas regarding the issues being addressed. The exercise is also aimed at improving (1) interjurisdictional communication by bringing together experts and decision makers from various regions and countries so they can address large-scale issues cooperatively, (2) cross-sectoral communication by inviting representatives from all sectors whose activities are related to the issues at hand to analyze combined impacts of and identify common constraints for their policies. The elements of the exercise that are intended to serve these objectives include pre-interviews, the interactive scenario sessions at the workshop, and various steps in the debriefing and evaluation phase.

3. *Provide synthesis*: To synthesize key scientific and institutional information concerning the issues focussing on both substantive and procedural aspects. The tools for reaching these objectives include scenario writing, compiling technical documents, and interactive processing of the scenarios.

4. *Explore strategic alternatives*: To assist the participants in devising acceptable, feasible, and robust policy options for managing the issues from both scientific and institutional perspectives, from the various geographic or jurisdictional perspectives, and from a collective and synoptic perspective. This objective will be reached by implementing each of the four steps below:

   4.1. *Clarify*: To clarify the issues, problems, dilemmas, and key variables related to the topic being addressed. Attributes of particular interest include the relationships between short term, local actions and long term, large-scale impacts, geographical and jurisdictional interdependencies, and possible surprising futures and discontinuous behavior. Clarification is fostered by preparing the Problem Statement and an introductory phase of each scenario session.

   4.2. *Catalog*: To identify the conventional perspectives related to the issues and the conventional approaches to deal with them. When addressing longer term, strategic issues, we are specifically interested in needed research, possible institutional changes, technological initiatives, and requirements for monitoring and early warning systems. Some of the background technical documents and the Problem Statement are intended to provide a comprehensive overview.

   4.3. *Create*: To generate new ideas and perspectives concerning the issues, especially new policy options. Again, research, technology, institutions, and monitoring are the key areas of interest. The interactive scenario sessions are expected to

provide an intellectually stimulating environment to create and explore new ideas and options.

4.4. *Evaluate*: To evaluate the long-term feasibility, acceptability, and robustness of these options, from both scientific and institutional perspectives, in a systematic and consistent manner. Debriefing sessions provide the fora for evaluation of various alternatives and Cabinet Briefing Documents provide a concise summary.

5. *Document results*: To generate several products from the exercise that will capture the issues, options, perspectives, conclusions and recommendations elicited from the exercise. Some of them will be distributed to participants only while other documents will get wider circulation. The documents include one or more future histories each telling a consistent sequence of events; a Cabinet Briefing Document providing an executive summary; and documentations of data bases and models, if any were developed, that might be useful in the future.

These objectives cannot be reached without creating the appropriate working environment. The related objectives include to:

6. *Satisfy participants*: To satisfy participants in both the Policy and Control Teams so that they feel their time was spent in a stimulating, productive, and possibly entertaining endeavor. This requires written communications in the preparatory phase to be succinct and informative. The workshop activities must be carefully designed and scheduled to avoid any "wait-states" for any of the participating teams.

7. *Work efficiently*: To generate the products of the exercise in a well coordinated and efficient manner. Contributions requested from participants in the preparations phase should take an easy-to-handle format e.g. checklists, matrices, or questionnaires to fill out. Sufficient support staff should be organized for the workshop sessions to help participants manage the tools provided, e.g. computer models, data bases, other support tools.

An overview of the objectives and the procedural steps to reach them in the exercise are summarized in Table 2.1.

2.2.3. Goals for initiation and participation

The Policy Exercise is intended to be a general approach that can be individualized to address any appropriate issue. By appropriate issues I mean long-term, large-scale issues with management orientation involving multiple perspectives, scientific and institutional implications, and incomplete scientific data and understanding concerning the phenomena investigated. In other words, the Policy-Exercise approach might be considered for use if

(a) a channel or forum is needed for communication between scientists and policy-makers

(b) addressing ill-structured, complex issues in a situation in which

(c) no single or ultimate decision-making authority exists but

(d) many actors and stakeholders operate independently

(e) trying to pursue their own (often conflicting) interests while

(f) being buffeted by a variety of strong "external" effects outside their area of control or influence.
    In addition, the situation includes the fact that

Table 2.1 Objectives and related activities

Objective	Preparations	Workshop	Evaluation
Direct attention	Problem statement Scenario writing	Debriefing	CBD
Improve communication	Pre-interviews	Interactive scenario sessions	Follow-up questionnaires
Provide synthesis	Scenario writing Tecnical documents	Interactive scenario sessions	CBD
Explore strategic alternatives Clarify issues Catalog options Create new ideas Evaluate options	Problem statements Technical documents Scenario writing	Interactive scenario sessions	Future histories
		Debriefing	CBD
Document results	Develop exercise manual	Record moves, analysis, discussions	CBD

(a) part of the scientific knowledge they could rely on is solid but not easily available (scattered in the literature, or encrypted in complex models);

(b) other parts are uncertain but (unfortunately) important; and

(c) some parts are missing because no-one on the research side realized they were important for policy formulation.

When a project is initiated, the organizers usually review a range of possible methods they could apply. They might want to use the Policy-Exercise approach if they find that

• the specific issues they want to address show similar characteristics to those the Policy Exercise is intended to manage; and

• the specific goals of their project match the general objectives the Policy Exercise is intended to reach.

If these criteria hold it means elements of the frame exercise may be adapted to serve the project's goals. An important task in the early phase of the project will be to prepare a checklist outlining the overall objectives of the frame exercise, and a matching list to adjust and replace them by the specific goals of the study. These lists will provide useful guidance in later phases for formulating an appropriate version of the exercise adapted to the specifics of the project.

Once the ultimate goals for a project or study have been formulated and the Policy-Exercise approach has been selected, the initiators can identify the institutions involved and individuals required to reach those goals. It is crucial at this early point to identify the motivations of participants to be invited to the study. There are two groups of participants concerning their real-life positions and responsibilities as well as the roles they play at the exercise. Representatives of the policy community form one or more "Policy Teams" to provide the strategic management component. Their analytic counterparts serve on the "Control Team" and help them assess and evaluate the invented policy options. The common goals for participation include to get information and to learn from the other group. These alone, however, would not be sufficient to induce members to dedicate the time and intellectual effort required for effective participation. The more specific goals are difficult to define as they tend to differ depending on the types of participants.

For many issues for which the Policy-Exercise approach seems to be a useful approach, policy-making individuals or institutions that have direct stakes in the problem are hard to find. Identifying the longer-term, large-scale, synoptic aspects, however, often reveals sufficiently important areas of indirect interest to motivate participation. If potential participants have direct stakes in the subject, the issues and focus for the exercise have to be formulated in a way that the stakes participants share will overwhelm the competitive component of their relations.

The goals for participation are relatively easier to define for representatives of the analytical side. They are usually eager to transmit their research results to the policy side and seize the opportunity when they see a meaningful way to do it.

These considerations become crucial in the preparation phase. Then the Core Group is defining the roles, rules, and procedures for the interactive phase. The role-related objectives in the exercise must be congruent with objectives pursued in "real life" positions and with the goals for participating in the exercise.

It is a common experience of AEAM workshop facilitators and organizers of other types of small-group interactions (like committees, expert panels) that besides their revealed objectives, participants tend to have hidden agendas related to the meeting. Such agendas may include a desire to act and talk, to pursue substantial changes in the previously accepted topics, and to convert the exercise workshop into something else. If organizers and facilitators using more structured procedures have difficulties in managing these kind of personalities, the danger is even greater that a Policy -Exercise workshop will get

off-track. Therefore, hidden agendas and unrevealed motives for participation have to be identified as far as possible in the preparation phase so that strategies to manage "strong" personalities can be developed in advance.

3. Lessons on the preparation phase

As noted in Section 1, the preparation activities in the experiments were not carried out as they are perceived to happen in a "real" exercise. Activities of the organizing group, events at the test runs, and comments of participants in the debriefing phase, however, provided useful insights on what should be the primary concern of organizers in the preparation phase of a Policy Exercise.

Probably the most important lesson from the experiments is that it's not worth saving time and effort in the preparation phase, especially as it relates to acquiring input and feedback from participants. In many cases, problems at the experimental workshops would not have been problems if participants had been involved earlier in inventing roles, formulating rules of the game, and scenario writing. Although it is not possible to "fine-tune" an exercise as would be the rule for a simulation game, serious confusions can be prevented by careful preparations. There is no redundancy planned when inviting a group of people to the workshop; thus, the whole exercise can be jeopardized when some of them realize that it is not what they expected and they become uninterested or even hostile. If this occurs in the preparation phase, these participants can probably be replaced without much difficulty. Those involved in several months of preparatory work will have confidence, become committed and feel that the exercise is their project. Several rounds of comments, criticism, and feedback are necessary to achieve such commitment, provoked by, for example, questionnaires, requests for comments, preinterviews. The exercise's manual, sent out to participants in small installments, must really be an evolving document reflecting this iterative process.

3.1. Roles and role-related objectives in the exercise

The Policy-Exercise workshop offers a simulated, "artificial" working environment for its participants. There are two contradicting concerns when organizers of the exercise formulate this environment:

- it should remove participants from their daily, routine, problem- solving tasks and the related organizational/bureaucratic structures and help them focus on longer-term, wider-perspective strategic issues; but at the same time

- it should preserve basic features of the "real-life" position and institutional constraints; otherwise, the exercise becomes irrelevant to participants' real problems, rendering the outcomes of the exercise nearly useless.

These double criteria for creating the context and operating environment for the exercise will be valid for formulating the roles to be played by the participants, their objectives in the context of the exercise, and the rules regulating their interactions in the exercise.

3.2. Roles

One of the most difficult tasks in designing a Policy Exercise is to devise appropriate roles for the participants. This involves the geographical and jurisdictional areas to be included, as well as the particular interests to be represented and the mandates attached to each role in the exercise. In the light of the difficulties related to the roles and mandates

in the experiments, it was generally agreed that roles should approximate the participants' actual job responsibilities, and that only the very top level policy-makers from each sector should take part in the workshop part of an exercise.

When initiators of a Policy Exercise define the problem area they want to investigate they first search for people whose positions and mandates are relevant to making strategic decisions related to the issues. It is not possible to "invent" role descriptions for participants. Instead, the Core Group has to analyze real life roles, first including goals people in those positions want to reach, mandates they have the authority to fulfill, indicators of performance, personal rewards and losses all depending on performance.

The next step is to distil and simplify this information and to formulate the roles for the exercises. The role descriptions must be sent out to participants for comments and criticism. By the time the workshop commences, the participants must have a clear understanding about their simulated roles, the related objectives, mandates they have the power to carry out, and policy instruments they can use.

An important goal for the Policy-Exercise approach is to encourage innovative thinking, pursue non-conventional approaches, and test new ideas. "What if" questions, therefore, are crucial to the exercises. In the context of roles this means participants may want to try operating in a different role in some sessions or in some parts of sessions. These "experiments" might provide useful insights on shortcomings and inadequacies of present decision-making structures and procedures. However, the "temporary" changes in the roles and procedures must be made explicit and public to all participants to avoid confusion. Implementing changes to the "normal" set-up will be discussed below in Section 4.

A rigid role description enforced on participants from "outside" would suppress even the possibility of any lessons emerging about institutional aspects and decision-making mechanisms for the real issues. If participants are worrying about what they are allowed to do within their assigned roles and they keep comparing them to their real-life mandates, they are wasting their time with irrelevant and artificially created problems. Instead, they should compare their real-life roles, adequately represented in the game, to how things might differ if they could act, interfere, and access information, as they test these possibilities in the exercise.

The same is true for the goals and rewards/losses attached to each role in the exercise. If participants were given strictly defined, "external" goals they would likely find them irrelevant. Even if they pursue those goals, the outcome of the exercise may be irrelevant to the real issues. However, the participants are likely to try to pursue some combination of their role-related objectives and real-life goals, leading to confusion among participants and rendering the exercise useless.

Formulating role descriptions for members of the Policy Teams will also provide guidelines for developing ideas on activities of experts on the Control Team.

In summary: role descriptions need to specify the participants' position, mandates, and objectives in the exercise. These are formulated by considering both participants' real-life roles and the objectives of the specific exercise.

3.3. Rules

Rules governing the processes in the interactive scenario- analysis session cover both the formal (procedural) aspects as well as the content side of the exercise. They are developed in the preparation phase together with the role specifications, procedural design, and content formulation.

Formal rules of the exercise govern actions of each participant, their interactions in the course of the exercise, and the sequence of events they follow in various sessions. Most of these formal rules are specified either as part of the role descriptions or in the procedural outlines characteristic of each scenario session.

Rules related to the content of the exercise include mandates of the Control Team in scenario updates and the related, explicitly defined principles of the behavior of the system investigated. There are two sources of such information: the analysis carried out by the Core Group in the preparation phase with input from participants, and the papers commissioned by the Core Group and written by invited experts to address important aspects of the issues addressed by the exercise.

As in the case of roles, it is very important that the rules established for the exercise have relevance to reality, and this relevance must be realized by participants. Parallel to revealing and analyzing real-life roles of participants, guidelines for reconstructing "exercise reality" will also be acquired. Failing to do so would result in adapting and analyzing policies that do not offer any lessons. It is easy to see that if, for example, market clearance and equilibrium prices are assumed and implemented as a rule in the exercise, whereas in reality cartel prices prevail or there is a single leader setting the price, the exercise offers close to nothing to provide any applicable lesson for organizers and participants.

Participants, of course, may ask to assume a different system or different rules to explore their properties and compare advantages and shortcomings of a number of alternatives. These usually temporary changes in the rules must be clear to each participant and must be recorded for analysis in the evaluation phase. The "default" set-up should always reflect the real-life properties of the system and organizers should allow for change if participants so request and agree.

3.4. Procedures

In the workshop phase of a Policy Exercise the actual procedures are largely determined by steps of the interactive scenario-analysis sessions. There are, however, a number of general considerations in the preparation phase required to create a smooth, productive working environment for those sessions.

An essential feature of the Policy-Exercise concept is flexibility. It is designed to serve a clearly defined set of general objectives but it must be appropriately modified to serve a set of specific goals in the context of a particular application. A critical step in implementing this idea is the formulation of operating procedures for the interactive phase. Brewer's note on the Policy-Exercise approach ("It is as much artistic as it is scientific in its style and means ...", Brewer, 1986:469) is especially relevant to designing this part of an exercise. Therefore, specific advice is impossible at this general level but, for the interactive processes, a set of objectives that might serve as useful guidelines for exercise designers must be listed. These objectives are to:

1. Realistically simulate sequences of decisions and feedbacks. There are several aspects to this "realism". First, the exercise operates in a drastically reduced time frame compared to actual decision-making. In real life, decision- makers might have several weeks or even months to make a strategic decision. They have, at best, an hour to do so in the exercise. Second, the decision-making dynamics are likely to be different. It is a common practice that policy-makers say "I want to get there", then they are presented with a set of options and, usually in a series of iterative steps, a modified version of one option, or a combination of several, is adopted. It may help focusing the exercise if the Core Group prepares as wide a range of strategic options as possible and does not go overboard on analysis capabilities. (Policy-makers tend to use "feel" to make decisions, anyway.) But this arrangement must not be reduced

to the level where participants are presented with ten options and the task is to pick one. Two things may happen: they find the intellectual challenge is too low and pick one option almost randomly, or they spend almost as much time studying and analyzing the options as it would take them to invent a new one on their own. Obviously, the second version is much more challenging (and productive).

2. Provide time for reflective assessment of policies. Time is a scarce resource at Policy-Exercise workshops. Therefore, any possible way of using it more efficiently must be utilized. Providing a support person for each Policy Team to handle models, spreadsheets, databases and other support tools would give more time for participants to deal with substantive issues. Organizing parallel activities would prevent different subgroups from waiting while others complete their tasks. All participants must be actively involved at all times.

3. The policy/decision cycles should include the long term but should be short enough so that feedback responses are relevant to the available policy options. For most cases, there is a characteristic time constant related to strategic decisions in the sector investigated. This is usually related to investments in fixed assets: once it is decided to invest and build a plant, the capital is stuck no matter what happens shortly after the decision was made. Adaptive policies would require shorter cycles but this contradicts the next objective:

4. Provide time, opportunity and means for all participants (Control and Policy Teams) to share information (perspectives, values, believes, facts). There are ample opportunities designed for information sharing in the workshop. The policy formulation requires and assumes intense interactions and discussions among participants. The policy assessment phase is a structured discussion among the Policy Teams and the Control Team. Finally, the debriefing provides the most general and open forum for comments and discussions on all the events.

3.5. Scenarios

The scenarios serve as the initial focus and starting point for participants; hence, a well-conceived scenario is essential for a successful Policy Exercise. Three versions of the scenarios were used for the trial exercises. According to the typology set forth by Toth (1986), the first session used a Type I scenario, composed of "forecasts only and not actual [future] events ... a set of partially or completely contradictory expert projections." For the second trial, a slightly different approach was taken. Participants were presented with a single scenario combining Types I and II. Because this second type of scenario describes the recent history, and current "state of the system", the combination of the two provides a detailed overview, including past events, current situations, and future possibilities. There were also experiments conducted with Type IV scenarios (participants are provided with a detailed description of a hypothetical future state of the system and they are requested to create the history connecting the present to the end point). Two new scenario types had also evolved in course of the experiments. These will be presented in Section 4 below.

There were problems involving each of the initial scenarios developed for the experimental sessions. In the first exercise, participants were presented with a simple, four-page overview of three potential disturbances likely to affect the forest sector over the next 30 years. The scenario itself was not very detailed and no background materials about the resource base, technologies, finances, etc. were provided. As a result, the participants were unable to develop effective policies to address the situations described.

In the second exercise, a more detailed "packet" of information was provided, including some 30 pages of statistical data on various aspects of the forest sector and industry as background material. This, however, proved to be overwhelming in terms of the mass

of information presented; and participants found it impossible to assimilate such a broad range of material in their policy formulation. A considerable fraction of this information was basic background data that would have been unnecessary for those whose roles the participants in the experimental runs were simulating.

In addition to the level of detail, the actual content of the scenarios must be carefully considered and tailored to the backgrounds and interests of participants. For participants to respond to a given scenario, they must first believe that the events it describes are indeed possible. Participants will not waste their time designing policies to cope with an absurd situation. Credibility can best be achieved through internal consistency and adequate substantiation.

Given the academic background and professional experience of the participants in the Summer 1986 tests, the Type IV runs (no detailed scenario only future situation; participants write the connecting scenario as future history) did not provide particularly useful or relevant lessons. It might be worthwhile in certain cases to discuss alternative views of how future events might unfold differently but still converging to the same final point, but there is not much room for interactive processing of this type of scenario. Their real values are likely to be more apparent when used in the preparation phase to get input from participants about their views and beliefs of possible futures, and to give them a chance to "order their nightmares" for further investigation in the context of the exercise. The information acquired this way will be very useful for the Core Group to develop scenarios most relevant to the problems and interests of participants.

3.6. Models and supporting data

Although no models were used during the experimental sessions, it has been suggested that formal models would be very useful in course of the exercise to:

- ensure that the scenarios are internally consistent;
- generate, quickly and efficiently, background information and figures requested by the participants; and
- update the scenarios rapidly and systematically.

Potential drawbacks to using models are that they tend to be restrictive, and lack those elements of surprise which the Policy-Exercise concept is intended to capture. Nonetheless, models may be very helpful when used in conjunction with the Control Team of experts.

There were no supporting materials provided at all during the first trial exercise, and this was clearly a problem for the participants, especially for those lacking a basic overview of the subject area. Moreover, the remedy - to supply a large quantity of data for the second trial - proved also to be unsatisfactory. The experience from the trial runs suggests that the best approach is to supply background material "by request". In this way, participants will have access to the quantity and format of data they need, without getting bogged down in pages of irrelevant details.

Activities in the preparation phase should include asking the participants what kind of information they want included in the scenarios and what they want available on an "upon request" basis. Input from a large number of participants is likely to provide a good coverage of the necessary data for the Core Group to make available for the exercise.

3.7. Indicators and the accounting system

One of the most fundamental flaws in the experimental exercises was the lack of a well bounded, consistent system of indicators. Participants had no way to measure the impact of individual policies from one round to the next. Moreover, there was no reward structure to provide incentives and no penalties were imposed for rash decisions. Finally, issues such as political influence and budgetary limitations were ignored entirely. These problems are direct consequences of not involving the participants in the preparations.

Because the definition of issues for the exercise takes place in preparatory activities, participants are specifically asked what system attributes they are most interested in, and what future statistics they would look at first if these were available. All the other system components and parameters are then structured around these key indicators both in terms of linking policy actions to these indicators and updating the system by tracing impacts of all internal and external processes though these indicators. Indicators, about which policy-makers are not worried, provide no guidance for policy-making.

3.8. Performance evaluation

This section of the paper began with guidelines for formulating exercise roles and ways they can be linked to real-life positions of participants. Although performance evaluation of the individuals or teams participating is not as important as it would be in the context of a simulation game, in most cases it is illuminating to examine how participants or teams perform with respect to evaluation criteria set forth by the Core Group. Of course, there are no points to win or lose as there are no winners or loosers in the gaming sense. The ultimate criterion for success by each participant is whether the ordeal worth their time and effort. Thus their real reward is the satisfaction of creating and contributing, and their real loss is the failure to do so.

The important principle for creating a performance evaluation scheme for an exercise is that it should help mobilize participants to work towards the common objectives they share with the organizers. In other words, the first criterion to gain rewards is a creative and cooperative attitude, whereas inventing "successful" policies has only secondary importance. If participants' real-life goals were correctly translated into their role-related objectives and the system in which they operate adequately represents "reality", then they will most probably respond well to the scenario challenges and they will devote their full intellectual capabilities to policy inventions and analysis.

4. Lessons on the workshop phase

If the Policy-Exercise approach is to address a wide range of problems and issues, we need to be able to choose from a large selection of building elements to best serve the goals of a particular application. The exercise centers on a series of gamed, analytical scenario processing sessions. There were four distinct types of scenarios introduced and described in Toth (1986) together with guidelines for preparing and implementing them in an exercise (see Appendix). The experiments have provided useful lessons on the actual game dynamics of those scenario types and have also led to creating and testing new scenario types.

4.1. New scenario types

The number of scenario types offering different perspectives, special focus and approaches to the substantive issues of a Policy Exercise is likely to increase as the concept is adapted to address different issues. Merging already existing scenario types (as happened at one of the experimental runs) might also be useful to emphasize special perspectives or direct participants' attention to certain important issues.

4.1.1. Type 5 scenarios

Type 5 scenarios present one detailed, internally consistent sequence of events as a complete history for the whole scenario horizon. The history explains the major trends in the background socio-economic development, outlines major policy directions that are particularly relevant to the subject matter of the exercise, and provides a detailed description of the history of system attributes that are of major concern for the participants. These are all presented in form of a "future history" looking back at the scenario horizon from its end-point and addressing all the issues in the scenario as historians would do it with "real" past history.

There might be two different perspectives taken when preparing Type 5 scenarios, depending on the particular purpose of the interactive session. The first possibility is to present a "conventional wisdom" kind of future that most participants would easily accept and ask them to "improve" it by suggesting policy initiatives within the scenario horizon that would result in a "better" outcome, better along an explicitly defined set of criteria. The second possibility is to present a "surprise rich" future that is a sequence of events most participants would find surprising but not impossible to read in a history book published in the year marking the end of the scenario horizon. The Core Group should heavily draw on the "nightmares" which participants suggested in the pre-interviews and other preparatory activities. In both cases, however, the challenge for the interactive sessions is to mark the turning points in time and identify branch or break points when alternative policy actions would have resulted in different historical paths.

The interactive processing of Type 5 scenarios consists of systematic re-writing these future histories in several rounds (Figure 4.1). In the first step, Policy-Team members suggest alternative policy directions to be introduced at any point or for any period of the scenario horizon. However, they cannot change the initial starting conditions. In this phase they can work individually, in small groups or they can operate as a single team as well.

After submitting their moves to the Control Team, the participants prepare a joint assessment of how the alternative policies they submitted complement or contradict each other and what the expected new "future history" of the system looks like. Meanwhile, the Control Team prepares the same kind of assessment. In the last step of a round, they compare the two new versions, discuss the differences and draw the final conclusions.

Instead of moving forward in time, as in the case of some other types of interactive scenario sessions, participants make a new iteration on the same time interval (that is, the whole scenario horizon). The new initial scenario can either be the "improved" future history produced in the previous round and the task is to suggest further improvements and modifications, or it can encompass development and testing of new alternative policy initiatives, "pulling" the original future history in other directions.

Making several iterations over the same time horizon offers several advantages. First, it offers a deeper insight into the properties of the system investigated and the relationships governing interactions of policies formulated by the teams. Second, it may provide a better understanding of how external shocks and surprises affect those policies and it might lead to clarifying properties of policy options that are robust with respect to
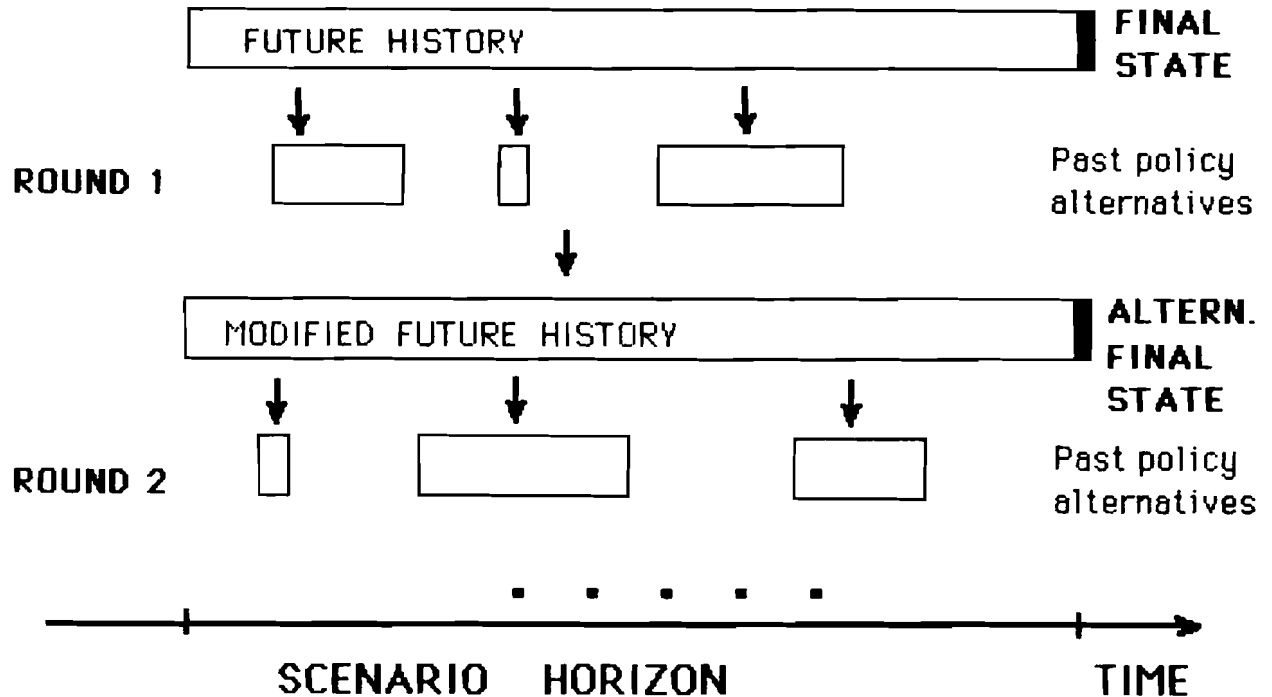
Figure 4.1. Type 5 scenarios

those surprises. Third, participants would try to adapt what they just learned in the previous iterations when formulating moves in the next cycle. Thus, several policy options suggested by each participant as well as cumulated outcomes of various combinations can be explored and assessed. Finally, Type 5 scenarios are time-efficient since participants can use the same base scenario and do not have to "learn" initial conditions and assumptions of a new base scenario.

4.1.2. Type 6 scenarios

A Type 6 scenario is a detailed elaboration of a future path, assuming that current trends and management practices continue. The events at various future points incorporated in the scenario represent the "conventional wisdom". This is a "most likely" pattern for the future. A Type 6 scenario can be devised as a written history and a manual board game. However, a computer simulation model with the most important relationships reflecting the rules assumed to govern the dynamic behavior of the system would be particularly useful. One important criterion, however, is stability. The model must be able to run with the initial conditions and must not "collapse" before the end of the scenario horizon is reached even if no intervention was made in the policy variables. The

default path can be either a "conventional wisdom" development or some surprising but plausible sequence of events.

The central task for participants in this kind of scenario session is to manage the system in a "real time" mode (Figure 4.2). This means the elapsed time in the scenario and the real time in the meeting room are predetermined, for example, 5 years scenario time being equal to 30-60 minutes real time. Participants receive a report on the current values of key indicators regularly and they can introduce changes in any policy variable driving the system which belongs to their mandates. The Control Team introduces those changes into the system immediately but the "scenario clock" will not be stopped while participants are formulating their interventions. It might be useful, however, to suspend the process for short conferences either at predetermined time points or when the Control Team and the facilitators feel that participants are getting lost and the system is getting out of control.
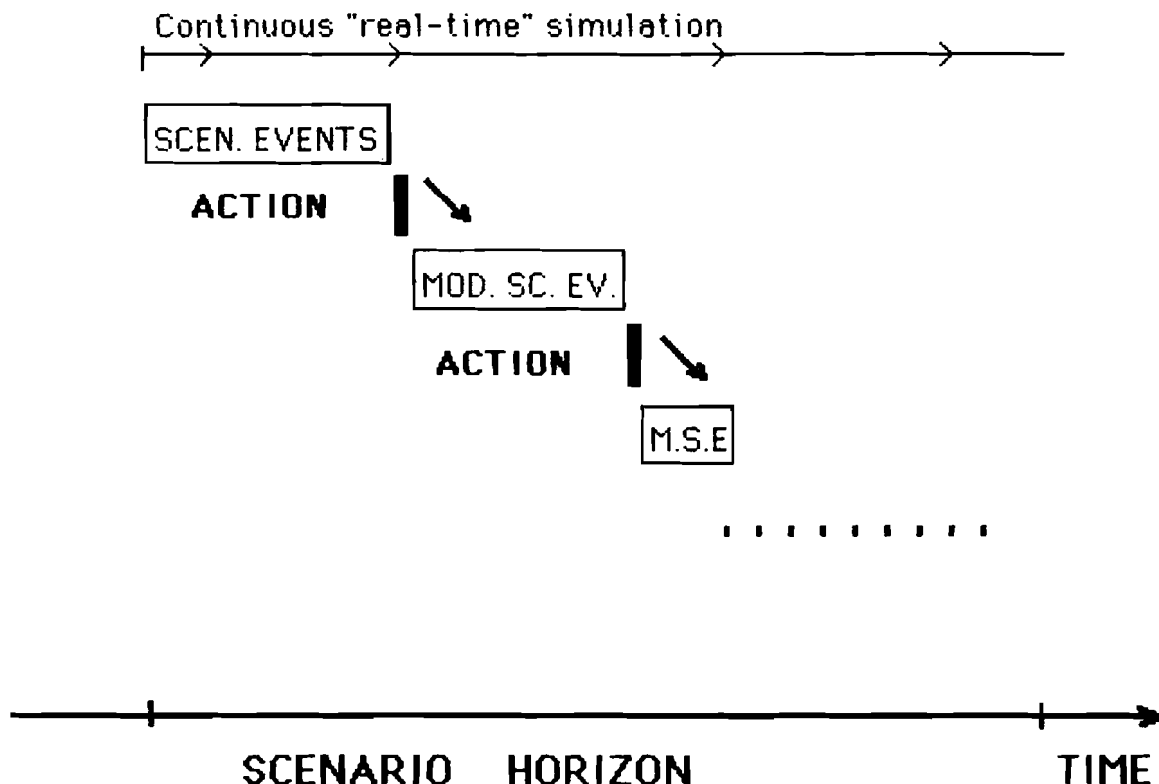
Figure 4.2. Type 6 scenarios

Type 6 scenarios seem to be especially useful when the issues for the exercise can be bounded in a relatively simple, easily comprehendable and manageable system. The choice of indicators is crucial for this type of scenario session since only a well selected and designed set of system indicators can provide the necessary "early warning" for timely action. This kind of exercise might illuminate the importance of identifying undesirable tendencies in the system behavior early enough to take counter-measures rather than

drastic interventions that affect other components of the system and create more problems than they solve.

Depending on the specific goals of the exercise and participants' interest, the Core Group may design repeated runs with the same baseline scenario. This would make Type 6 sessions more similar to Type 5 exercises. However, Type 6 scenarios unfold in "real-time" mode requesting quick responses from participants, whereas Type 5 scenarios require an autopsy of an historical past and participants know the complete story from the beginning to end.

4.2. Modifications of basic scenario types

During the Summer 1986 experiments, several ideas developed to make the already-defined scenario types more flexible and thus more useful for some of the potential users. The difference between a new scenario type and a modified version is that the variations in the latter (presented below) do not change the basic structure of the scenario and the procedure through which they are processed. The basic purposes, which the scenario type is intended to serve, are retained, too, but there are some additional special considerations better served by a modified version.

4.2.1. Targets

This variation can be applied to Types 1, 2, 5, and 6 scenarios. Besides the overall rules and objectives provided in the role descriptions, participants are required to follow or reach some explicit targets that might relate to the system behavior as a whole or some selected indicators. These additional objectives can be:

- a well-defined trend the system should follow as closely as possible throughout the scenario horizon;

- target values for a group of indicators that should be reached in each decision-making cycle or by the end of the scenario horizon.

It is essential that the additional objectives or targets are consistent with both the role description and the other role- related objectives as well as with the real-life goals. An exercise imposing irrelevant external objectives on participants is neither interesting nor useful.

4.2.2. Introducing surprises in the policy-formulation phase

One key feature and basic objective for the Policy-Exercise procedure is to provide a framework for analyzing development paths different than the "most likely" trends (if there exist such things at all) and are far off the "conventional wisdom" kind of thinking. In many cases the initial scenario contains some surprising elements, while in other cases, unexpected events are introduced in the course of the interactive session. The surprise element can be implemented for Types 1, 2, 3, 5, and 6 scenarios. In the interactive sessions, surprises are usually introduced in the scenario updates as a result of ongoing processes reaching threshold values or from a collision of individual policies. New pieces of information about unexpected events could be introduced in the policy-formulation period when Policy Teams are busy developing their policies for the next round. The actual form for delivering this information can range from "confidential information" spread verbally by Control-Team members to written formal announcements in forms of scientific reports, or, e.g., press releases.

Introducing surprises in the interactive phase, as opposed to an initial "surprise-rich" scenario, might be particularly useful to show how "recent" events or information affect policies that are intended to be formulated in the context of a longer-term perspective.

4.3. Interactive sessions

Except for Type 4 scenarios, all the other scenario types are processed at a Policy-Exercise workshop in an interactive session consisting of at least three consecutive repetitions of a given sequence of procedural steps.

4.3.1. Introduction to the session

In the preparation phase, a detailed schedule was sent to the participants specifying the sequence of events and activities at the workshop. Control- and Policy-Team members can be reminded in the introduction phase of the objectives for the next session, the learning goals the team must reach by the end of the session, and new characteristics of the session which must be explored. This short introduction also sets the tone for the rest of the session and creats a good working atmosphere.

4.3.2. Scenario presentation

Scenarios are prepared in several passes, with contributions from the participants in the preparation phase. The revised scenarios are also sent out to team members before the workshop. Participants on the Policy Teams are asked to develop initial ideas about the policies relevant to their own mandates before they arrive. Thus, there is no need to spend time on long scenario presentations or for reading the scenario and clarifying its content.

A quick synopsis of the scenario can be useful as a slide show or a very short presentation. The same charts and figures can be used that are included in the scenario package handed out to the participants. This presentation is certainly not appropriate for making major revisions to the accepted scenarios or for making major shifts in scenario focus, but it is clearly an opportunity to emphasize some of the most important focal points for this particular session.

4.3.3. Formulating the moves

When participants first reach this point (first round in the first scenario session), silence and helplessness usually characterize participants. This usually disappears as participants become more experienced and individual roles develop for presenting ideas, initiating and moderating discussions within each small group and so on. The Core Group must be aware of this potential problem and devise ways to help participants coordinate activities in the policy formulation process. These activities may include explicit assignments in the role descriptions, a suggested sequence participants may wish to follow in tabling their suggestions, or a structured procedure participants are requested to follow.

Following the initial difficulties of inter-team communication, more serious ones are likely to arise as participants get to work. The first one is related to the ways they can request help, advice, or clarification about the scenarios. In many cases these are just short, easy-to-answer clarification problems that can be sorted out by a member of the Control Team and the Policy Team requesting help. If the Control-Team member feels that the information requested is of general interest, the answer should be repeated for all the

teams at the next short discussion (see below).

The second problem common to this phase of the workshop is related to the ways and forms Policy Teams may communicate with each other. There is no general rule to follow here as the problem depends to a large extent on the context and specific goals of a particular exercise. Possible arrangements include:

- bilateral negotiations at any time with secret or public outcomes;

- multilateral negotiations at any time at the initiative of one of the Policy Teams also with secret or publicly announced outcomes;

- mini-conferences at pre-set time points of the policy-formulation phase with pre-set or flexible duration.

Although an important feature of a Policy Exercise may be to reveal shared interests and perspectives among participants, it would be a serious mistake to turn a Policy-Exercise workshop into a negotiations game or, even worse, into an effort trying to negotiate "real" treaties among the participants. The Policy-Exercise approach is neither an appropriate nor efficient way to reach these kinds of objectives, although it certainly is aimed at revealing areas of potential cooperation, agreements, and room for "real" negotiations. In order to make use of this potential, the role descriptions and the exercise protocol must specify all the rules related to inter-group communications in the policy- formulation phase.

Even though formal negotiations among Policy Teams in this phase are not of primary concern, it might be useful to stop the group work once or twice in each round for a short time when questions of general interest are clarified. This may be better than breaking the group work every now and then whenever a question or request from one group is of interest to all the others. These pre-set short discussions might also help participants structure their decision-making processes in time and formulate moves efficiently.

4.3.4. Submitting moves

Policies formulated in the previous phase are submitted to the Control Team for assessment and system update. The exact form this step takes might vary from simple written policy statements to more sophisticated computerized forms like spreadsheets. During the experiments it proved useful for Policy-Team members to attach short explanations of the rationale behind choosing policies and the objectives these were intended to reach. This makes it easier for the Control Team to evaluate policies and to understand the motives behind them.

4.3.5. Revealing moves to other Policy Teams

At this point of the scenario-analysis session, two parallel activities take place. The Control Team is evaluating the submitted moves and preparing the updates on its own, while Policy Teams reveal their moves to all the other teams and carry out the same assessment.

Ideally, Policy Teams communicate their moves to each other in the same form as submitted to the Control Team. This is not only the simplest solution but also provides the same information base for group evaluation that the Control Team is using. If for any reason this is not appropriate (e.g. teams do not wish to reveal all aspects or elements of their policy intentions to the others), alternative ways need to be devised. One possibility is to issue a short press release or arrange a media appearance. The problem here is that these forms tend to turn into public-relations shows rather than information-sharing opportunities, but in certain cases this might be exactly the goal.

4.3.6. Policy Teams' assessment

The goal we intend to reach with this step is not just to keep the Policy Teams busy while the Control Team is preparing the update; rather it provides a basis for comparing and evaluating the differences in the ways a group of experts and a group of policy-makers look at the same practical problem and situation. To make this comparison meaningful, the assessments the groups prepare must be compatible with respect both to their final form and the procedures used to produce them. The facilitator(s) have a critical role in moderating this large-group discussion (a difficult task in itself). They should avoid development of a complaint session (this should first happen in the debriefing phase) and should, in general, separate items relevant to a joint evaluation and update from problems that have to be sorted out in the debriefing phase.

The easiest way to carry out the joint Policy-Teams' assessment is to use the same structured process that is suggested for the Control Team to follow and to produce the same list of system components and indicators for update that the Control Team will report to the Policy Teams. Exact congruence is not very likely to occur, though if it were, the Policy Exercise would reach little regarding differences in the executive's and scientist's perspectives on the issues. Nonetheless, the processes, even if different, must provide comparable outcomes.

4.3.7. Control-Team assessment and update

This step is probably the most critical one in a Policy- Exercise workshop, and, unfortunately, the most difficult one to prepare for. It is critical because participants lose interest if the Control Team's assessment is not relevant to the policies submitted as moves, or not plausible in terms of what should happen as a result of their actions. This is very difficult to prepare because the possible range of policy responses developed to a challenging scenario by a set of good teams is immense. Also, it is a major task to comprehend the policy responses in a relatively short time.

To ease some of these difficulties, a set of carefully chosen decision variables and indicators is extremely helpful for sorting out the quantifiable aspects. Small models can be devised in the preparation phase to check the decision variables for consistency and to make an initial assessment of cumulative impacts.

One arrangement to make the Control Team work more efficient is to form small subgroups, or to work individually in the first part of this phase to prepare the analysis of moves in the individual fields of expertise. Synthesis can then be carried out in the second part, or, if more appropriate, the aggregation can be formulated in an hierarchical way following the internal logic of the system.

It may also be helpful in some cases to delegate one member from each Policy Team to join the Control Team for the assessment. These people clarify the ambiguous items in the submitted moves and they represent the Policy Team's concerns at the evaluation. This would prevent the Control Team from misunderstanding policy intentions.

4.3.8. Control-Team report

The Control-Team report on the evaluation of policies and system updates should contain:

- a short summary of events in the background scenario;
- a short summary of policies pursued by each Team in this cycle;

- a more detailed evaluation of how these policies affected each other (amplified or weakened each others' effects);
- an analysis of how the cumulative result of the policies affected the system;
- an indication of how the policies affected trends in the background scenario;
- an update of the key indicators representing the new initial state of the system at the beginning of the next cycle;
- an updated version of the scenario reflecting changes due to policies implemented in the previous cycle.

The Control-Team report is presented as a mixed written statement and oral presentation by one or several members of the team. The perspective in presenting each item should be that of the policy-makers with explanations reflecting the scientists' concerns related to the issues.

4.3.9. Discussion of the policy assessment and system update

This is probably the most exciting part of a Policy-Exercise workshop because the views and perspectives of the policy and analytical representatives on the issues confront each other directly. It is also a difficult part to facilitate since an efficient forum for communication must be provided for 20-30 people. To prevent the discussion from exploding in an unmanageable number of (partly irrelevant) directions, the facilitator should pursue, with reasonable flexibility, the same structural frame what was used to prepare the joint Policy- Team evaluation and the Control-Team assessment and report.

Clear distinction should be made between the discussion phase of each interactive cycle and the debriefing part at the end of the scenario session. The main objective for the discussion phase between two cycles is to give participants a clear understanding of happenings so far, and to reach an agreement with the Control Team on the system update and the initial state before the next cycle starts. Any attempt to initiate an overall evaluation of the scenario and policies, or to discuss details of the process evaluation, should be postponed until the debriefing phase at the end of the scenario session.

A critical task for the facilitator in this phase is to provide equal opportunity for each participant to comment. This tends to be a difficult task even if the participants share the same native language. Many issues for which the Policy Exercise seems to be a useful tool, however, involve multiple nations and thus participants working in a difficult, non-native language environment. The facilitator's task is to make sure all can contribute to the joint effort.

4.3.10. Starting the next cycle

For most scenario types, steps 3 through 9 above will be repeated at least twice in the interactive scenario-analysis sessions. Commonly, the exploratory and learning value of consecutive cycles increases as participants are more comfortable with the procedural rules, the group dynamics, and the overall working environment of the exercise. The chairman and facilitator must decide whether and how long to break between cycles.

4.3.11. Debriefing

For most operational games, 40-50 % of the total exercise product, in terms of learning, communication, information sharing, is realized by a carefully designed and conducted debriefing session at the end of the interactive phase. The corresponding figure for a Policy Exercise is probably less. Nonetheless, debriefing is a key procedural element for each type of interactive scenario-analysis session.

Given the severe time constraints under which Policy-Exercise participants are working, an appropriately structured sequence for the debriefing is necessary so that participants can discuss the scenario they just completed. Steps in the debriefing sequence should depart from very specific, detailed aspects of events in the scenario and proceed gradually towards more general issues like retrospectively identifying potential branch points in the scenario. Finally, debriefing should also include a brief "performance evaluation" for each Policy Team as well as the Control Team.

5. Summary and conclusions

The first experiments conducted in the Summer of 1986 were extremely useful in many respects.

- First, they clarified some basic, conceptual issues related to the objectives for the methodological development and to the goals of particular applications.

- Second, the experiments provided valuable experience on the actual operational and procedural aspects of the design elements.

- Third, many new ideas evolved and were tested as some earlier elements failed or were not efficient for specific purposes.

- Fourth, substantial preparatory activities were identified as being crucial for a successful exercise; the group and personal interaction procedures are not sufficient to hold participants' interest without providing new and interesting information from the preparatory analysis conducted by the Core Group.

- Fifth, and probably most important, many more "experimental" runs will be necessary before full-scale exercises involving "real" policy-makers can be organized.

Specific lessons on the various phases and procedural steps of the exercise have been systematically outlined in the previous sections. This material is not sufficient to prepare and run "full-scale" exercises. However, the considerable interest in the Policy-Exercise approach requires that we share our experience. Those who wish to conduct their own experiments can thus avoid the pitfalls and pursue the more promising directions of the Policy Exercise method.

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APPENDIX 1

SUMMARY
of terms and definitions introduced in
Part One of the "Practicing the Future" series*

What is a policy exercise?

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.

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

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*See Toth (1986). To obtain a copy, please write to: Ferenc L. Toth, IIASA, Schlossplatz 1., A-2361 Laxenburg, Austria

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

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 Policy 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 Policy 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.

What are they doing?

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. Below, I will briefly describe four different versions of scenarios that could be used.

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.

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.

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.

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 to get into a crisis situation.

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.