

# PROBLEM-ORIENTED PARTICIPATIVE FORECASTING

## Theory and practice

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Problem-oriented participative forecasting<sup>1</sup> (POPF) is an autonomous and evolving concept. It aims not only to provide early signals of threats to development or to identify opportunities for development, but also to articulate interests and mobilize different social groups to act in a manner conducive to the elimination of such threats and exploitation of such opportunities. This concept of the function of forecasting has major factual and methodological implications. The focus of this article is primarily on the forecasting process as a way of active social learning and anticipatory behaviour. It attempts to synthesize the problem-oriented and participative approaches to forecasting into a single methodology, which it documents by a specific example of its application in science forecasting in the Slovak Socialist Republic.

A FORECAST IS A CONDITIONAL and alternative statement concerning the possible, probable, and preferred types of the future. The process of forecasting thus involves the search for answers to questions like: "What will happen if . . . ?", or: "What needs to be done in order to . . . ?". Drastic changes in the conditions of social life, however, challenge the validity of forecasts, often even before they are formulated. Consequently, a need has arisen for information on the possible, probable, and preferred implications of these changes. A good forecast is considered not as predicting what will surely happen by a certain point in the future, but as a forecast which makes it possible to anticipate possible threats to, and opportunities for, development.

The growth in the number of professional forecasters and forecasts is, however, only sporadically reflected in practice. We continue to witness the

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maturing of social, economic, ecological, scientific and technological problems. Although the mitigating effect of forecasts should not be underestimated, forecasting is often no more than the efforts of experts to set the 'ignorant' masses on the road to a happy future or to avert an impending disaster. Attempts to change this situation have been unsuccessful and only serve to confirm the impotence of forecasters and of forecasting.

In the face of these problems, a new idea of the role of forecasting has begun to emerge. The belief is gaining ground that the ultimate goal of forecasting is not merely the generation of information on likely dangers or development opportunities, but also the stimulation of actions which would lead to the elimination of these dangers and the exploitation of these opportunities. The forecast conceived in this way represents the first practical step towards a desirable future.

It was this conception of the forecast which gave rise to the idea of the participative approach, ie, the articulation and mobilization functions of forecasting. With such an approach it is necessary to involve all parties concerned, including the public. It is becoming increasingly evident that the newly conceived goal of forecasting can only be reached in one way—by making it possible for people to do their own forecasting and planning.

### **Problem-oriented participative forecasting—the theory**

The participative approach thus makes it necessary to involve all of the following:

- those who have commissioned the forecast, usually managers and policy makers;
- the forecasters;
- experts and professionals working in the area related to the forecasting project; and
- the public concerned, whose number will depend on the nature of the project.

Participation of the public in the formulation of a forecast is not mobilized solely by conducting public opinion polls for management purposes. A genuine participation requires an active collaboration which makes it possible for one party to open its cognitive and value systems and allow them to be confronted by similar systems of the other parties, in a continuous and iterative dialogue.

This characteristic of the participative approach makes it different from the classical forecasting scheme. The aim of the procedure is not to make forecasters face criticism from the passive recipients of their work, but rather to make the images of possible or preferred types of the future emerge through a process of cross-firing, involving all the parties affected by the subject of forecasting. This is the only way to motivate people to make their own forecasts and engage in dialogue on the course of action needed to reach their common objectives. Thus, it is a process of gradual cultivation and articulation of opinions and adoption of attitudes, rather than a once-only expression of one's standpoint. The identification of areas of possible consensus for future actions is only one of the products of the participative approach towards forecasting.



It is impossible logically to communicate complex theories of sophisticated forecasting models to the lay public. It would also be naïve to expect the public to collaborate in their development. However, everyone can take part in the identification and formulation of solutions to problems affecting them as inhabitants of a town, employees of an enterprise, and so on. This means that active participation of everyone can only be secured when it is oriented towards problem solving. The problem-oriented approach is thus the primary characteristic of participative forecasting.

The problem-oriented approach involves the identification and structuring of problems connected with pursuing social objectives at given points in time. Rather than a single problem, we are thus concerned with a structured set of interconnected problems, each of which affects the emergence and solution of other problems. One simple way of showing this structure is the problem tree. A more complex representation of the problem field is provided by the structural model, with its network of feedback loops between individual problems. It may thus be said that the basic feature of the problem-oriented approach is the fact that it looks at the causes underlying the emergence, maturing and solution of social problems and considers solutions holistically.

From the viewpoint of forecasting science, the solution of problems represents one of the most important sources of social dynamics and of the creation of future social objectives in general. Thus, problems can be defined as a contradiction between the actual and the desired state. This contradiction is thus perceived as something which should be changed. In general, this change can either make use of an opportunity, or eliminate a danger.

Use of the problem-oriented approach is premised on three assumptions:

- The future is a temporal and spatial variety of possible events which, depending on the adopted value system, fall on a threat to opportunity continuum.
- The objectives are the elimination of threats and the exploitation of opportunities.
- Attempts are made to implement these objectives.

The above three assumptions also set limits to the problem-oriented approach. It is important to take account of the possible existence of contradictions which, though affecting the development of social objectives, remain unknown to us yet and so cannot yet be characterized as social problems. They are therefore not perceived as problems and their change cannot be conceived as threat elimination or opportunity exploitation. It is also evident that one recognized contradiction need not be considered a problem by all—not everyone will wish to eliminate it. More specifically, in the process of forecasting we must cope not only with a diversity of perceived problems, but also with the diversity of their desirable solutions. The process of forecast development must therefore involve all parties interested in the solution of those problems which constitute the object of forecasting.

We may thus conclude that the problem-oriented and participative approaches towards forecasting are mutually complementary and can be implemented together in a single technique of problem-oriented participative forecasting. This is a cross-occupation, cross-disciplinary, cross-cultural process



of communication on the possible, probable, and preferred solutions of social problems.<sup>2</sup>

In this process, the primary role of professional forecasters is to mediate in the dialogue between forecast commissioners, factual experts and the remaining public concerned. To mediate, however, also means to articulate and to provide theoretical and methodological services. In order to be able to handle these tasks, a team of forecasters must be more than a centre collecting and evaluating forecasting information. It must establish direct contact with the parties concerned and become the main axis around which the forecasting activities revolve.

### **POPF implementation in the Slovak Socialist Republic**

The primary interest of the problem-oriented and participative approach is the way in which it is implemented. Each application of POPF is an authentic creative action and it is difficult to imagine a universal methodological scheme for its implementation. Thus, we demonstrate below the possibilities and limitations of POPF in a specific case—the forecast of scientific development up to the year 2010 in the Slovak Socialist Republic.<sup>3</sup>

This project, initiated by a government resolution, is part of a continuous regime of forecasting works which culminate in five-year cycles, in a “Comprehensive forecast of social, economic, scientific and technological development”. For the area of science, the main sponsor of the forecast was the Department for the Theory of Science and Forecasts, at the Computer Centre of the Slovak Academy of Sciences in Bratislava. We present below a brief overview of the characteristics of the POPF application process through the sequence of individual phases of the programme. We focus more on lived experience than on presenting an ideal or typical model of the methods.

#### *First phase—setting up communication*

The first phase, initiated by the forecasters, involved establishing contacts and stabilizing the mode of communication with the participating parties. Institutionalized science in the Slovak Socialist Republic was divided into seven areas—social sciences, biological—medical science, biological—agricultural sciences, mathematics—physics—electronics, technical sciences, chemical sciences, and space and Earth sciences—including both basic and applied research and development. Within each of these areas, a forecasting working group was set up to represent decision makers in that field of science. These groups were predominantly made up of directors of research institutes and department heads. A member of the forecasters’ team was also assigned to each working group. Their task was to provide methodological guidance to the group and to facilitate direct contact between the group and the team of forecasters. Consequently, they were also assigned the function of secretary of the group. In order to establish contacts with the public concerned (or with the broad scientific community in our case), a Delphi-type inquiry was conducted by a prognostics team, in combination with problem-oriented assessments of scientific and technological potential.<sup>4</sup> Inquiry participants were selected on the basis of estimates of their competence, made in several rounds by members of the scientific community in Slovakia. In the



subsequent phases of the programme, the panel composed in this way was added to and it currently comprises some 500 scientists.

Because Slovakia has practically no sociologists or economists of science, the forecasters had to take on this role virtually to the full extent. They established contact with the few isolated experts of this type.

### *Second phase—diagnosis*

The second, diagnostical, phase had the objective of identifying problems and the conditions for their solution—again in the form of problems—over the entire area of the forecasting project. The first reconnaissance of the problem field had already been carried out through the Delphi inquiry mentioned above. But, at this stage, forecasting activities focused on cooperation between the working groups and the forecasters' team.

The forecasters' team concentrated on the elaboration of methodological guidelines according to which the working groups identified relevant problem areas. For each problem area they produced a set of analytical forecasting studies, following the semi-standardized charts supplied by the forecasters. Working groups also acted as official guarantors of the accuracy and professional standard of the content of these studies. Semi-standardized, one-to-one interviews with top representatives of the scientific establishment in Slovakia were conducted in parallel to the elaboration of forecasting studies, by the prognostics team. In order to facilitate integration of the information gathered, each of the above methods aimed at collecting analogically structured data. This data was oriented towards the identification of:

- cognitive problems in the form of thematic orientations underlying the objectives of science in Slovakia, including likely scientific-technological and socioeconomic implications; and
- problems related to the personnel, and material-technical, informational and organizational back-up, available for dealing with the problems of cognition.

The resulting material, broken down according to individual scientific disciplines, was communicated via a controlled feedback system to the participants and to communities representing the top management of the Slovak Academy of Sciences and the Slovak Socialist Republic.

These data, often obtained through stormy discussions and conflicts of interests, were used to prepare the report and as input information for the third, synthesizing, phase of the forecasting project.

### *Third phase—synthesis*

This phase aimed to provide for the transition from particular forecasting images produced by individual parts of the forecasting programme towards integral pictures of the possible futures. This transition was achieved by subject experts and forecasters arranging identified problems into a hierarchical structure. This hierarchy was based on the level of urgency of problems, as perceived by individual groups of participants, and their significance for the solution of other problems. The result of this process was communicated back to the participants in the form of intelligible forecasting scenarios. These scenarios



were not derived from a kind of averaged picture of the world of science, but represented the authentic viewpoints of the decision makers, subject experts and differentiated groups of the public concerned.

In our case, this phase took place, and continues to take place, on two basic levels:

- at the level of scientific–cognitive strategies; and
- and at the level of strategies for the development of conditions which will enable the implementation of the outlined scientific–cognitive strategies.

At both levels, integration of the particular forecasting information for individual areas of science was problem-oriented. At the first level, the scientific–cognitive goals were integrated by groups of selected experts according to the methodological instructions of forecasters, by considering their contribution to the solution of relevant scientific–technological and socioeconomic problems. At the second level, four forecasting scenarios of the development of conditions for attaining the outlined cognitive goals were formulated in the preliminary stage of this phase.

These scenarios were oriented especially towards the possible solution of organizational and managerial problems, identified by subject experts and most other participants as clearly dominating the given problem area. The scenarios represented the following value-free continuum: conservative, moderate, radical, ultraradical. The third scenario of this continuum was also incorporated into an integral plan for the radical restructuring of science management in the Slovak Socialist Republic, which was communicated to an independent panel of decision makers in the sphere of science in Slovakia.

The objective of this communication, as regards both the scenarios and the plan, was to provoke a differentiated response from the broadest area of participants. We assumed that after having obtained multiple feedback we would be able not only to detect the distribution of forces of power and interest fields, but also to articulate their interests, in the form of scenarios representing the identified types of participants, and to mobilize their actions towards a change in the mechanism of science management. This effect is evident, even at this early stage of work.

#### *Fourth phase—reflection*

The fourth and last phase of the forecasting cycle is primarily self-reflective in character. Each scenario representing a certain type of participant will be complemented with an updated formulation of its interest background and with the anticipated positive and negative consequences of its implementation. The scenarios enriched in this way will be communicated again to the participants and through feedback it is hoped that they will stimulate self-reflection by different interest groups of decision makers and the remaining public concerned. This step will be followed by the decision-making process itself, in which the forecasters will not participate directly, unless they are asked to do so. The result of this process will become an organic component of science policy in Slovakia.

The forecasting team will be especially concerned with reflecting on their own actions as participants in the forecasting process, and with the evaluation of the



forecasting cycle as a whole. For this purpose, a feedback group was set up at the beginning of the second phase within the forecasters' team to examine contacts between the forecasters and the other participating parties. Self-observation is the principle on which each phase of POPF implementation is based. The final phase of this process is, however, also considered as the preparation for a further forecasting cycle. It anticipates a shift in the focus of further forecasting activities—hierarchization, integration and scenario writing—so that the scientists themselves will become increasingly competent at forecasting. It is also expected that forecasting working groups will in the meantime have acquired greater autonomy of operation. All this will be in line with the basic goal of POPF—to enable, and thus to teach, people to carry out forecasting themselves. Nevertheless, the forecasters will continue to fulfil their role of mediators and methodological consultants later on.

### **Open POPF problems**

POPF is considered an effective forecasting scheme for cases when the forecast deals with a complex social formation, eg, a town or an enterprise. We believe at the same time, however, that before it comes of age, it will be necessary to translate our preliminary reflections on its constitutional principles into a more explicit form. But, to make this transition, concrete action in the form of POPF application is required, rather than speculation.

The practical application of POPF presents a number of major theoretical, methodological and organizational problems. For example, the participative approach to forecasting may be held back by barriers resulting from the need for, possibility of, and right of the public concerned to participate in the concrete historical context. The dominant problem is thus finding an appropriate subject and mechanism of management.

In the conditions of autocratic centralism, therefore, POPF is merely a utopian concept with humanistic undertones. Although POPF as presented in this article was not developed in the context of autocratic centralism, the POPF concept nevertheless entails a substantial innovation in forecasting thinking and acting. There are several reasons for this—ranging from distrust and unwillingness on the part of participants to express their interests and epistemological stance, through their civic indifference, to the lack of readiness of the social system to accept an open, critical and tension-ridden dialogue.

Each problem represents an original entity with its own characteristic structure, its own time and its own mechanism of development. Subject experts, at the same time, introduce their own viewpoints into the identification of this structure, ie, their theoretical stance, reflecting their own disciplinary, occupational and cultural background. Because we assume that such plurality of stances is possible, it is also necessary to call for their unambiguous and explicit interpretation.

This conception of the problem-oriented participative approach, however, entails a shift in our understanding of those all-encompassing theoretical concepts which present social systems as entities governed by fully comprehensible laws of development. These concepts are put forward as the only meaningful theoretical basis for the adequate explanation and prediction, and



thus also the forecasting, of social phenomena. The present body of knowledge acquired by the social sciences, however, greatly challenges the validity of such aspirations. But we are also aware of the fact that each particular application of a theory is, at the same time, an action in itself and that a change in the reality is also a reflection of the theory. POPF has thus become an original methodology for the development of social theories.

### Notes and references

1. The conceptual scheme of problem-oriented participative forecasting was developed by the forecasting group of the Cabinet for the Theory of Science and Forecasts, working within the Computer Centre of the Slovak Academy of Sciences in Bratislava. Besides the authors, the following researchers contributed to its formulation: P. Benkovic, Z. Bútorová, I. Dianiska, S. Kövérová, G. Sajdák, V. Uhrová and S. Zajac. At the initial stages of the project, we also benefited from the critical remarks of J. Alan, B. Blazek, F. Lipták, M. Potucek, J. Markus and several other friends and colleagues. We express our gratitude to all of them.
2. Among the works which have inspired us in the development of the outlined factual and methodological premises of POPF, mention should be made especially of: R. Amara, "Which direction now?", *The Futurist*, 3, 1981, pages 42-46; I. V. Bestuzhev-Lada, "Poiskovoye sotzialnoye prognozirovanye" ("Exploratory social forecasting"), Moscow, Nauka, 1984; M. Botez and M. Celac, "Global modelling . . . without models? Theory, methodology and rhetoric in world modelling", *Technological Forecasting and Social Change*, 2, 1983, pages 122-160; R. L. Ackoff, *Creating the Corporate Future* (New York, Wiley, 1981); R. L. Ackoff and J. Garajedaghi, "One liners by two presentologists", *Technological Forecasting and Social Change*, 2, 1984, pages 1-4; S. Kachaunov, "Problem situations in scientific activities", *Science of Science*, 1-2, 1983, pages 45-58; G. M. Dobrov and V. E. Tonkal, "Comparative analysis and estimation of competence of research units", *Scientometrics*, 7, 3-6, 1985, pages 309-325; and M. Maruyama, "Pradigmatology and its applications to cross-disciplinary, cross-professional and cross-cultural communication", *Dialectica*, 3-4, 1974, pages 135-196. Our own premises have been published in the preliminary form in: F. Gál, "Este raz k otvoreným problémom prognózovania" ("Return to open problems of forecasting"), *Ekonomický časopis*, 8, 1985, pages 734-743; F. Gál, "Participatívne prognózovanie" ("Participative forecasting"), *Ekonomický časopis*, 1986, in printing; F. Gál and P. Fric, "Konceptuálne východiská prognózovania národnej vedy" ("Conceptual prognostic solutions to national science"), *Sociológia*, 1, 1987, pages 45-57.
3. The Slovak Socialist Republic is the smaller part of Czechoslovakia, and its population represents approximately one-third of the total Czechoslovak population of 16 million. The problem of transition from an ineffective to an effective development path was solved in Slovakia several decades ago. The attention of professionals and the public has recently focused primarily on the area of systemic changes, eg, restructuring of social and, in particular, economic mechanisms, restructuring of the economy, etc. Scientific and technological progress has been traditionally conceived as one factor of economic acceleration. But analysis of Czechoslovak, and, consequently, Slovak, scientific research has pointed to its low effectiveness. The diagnosis of the causes of this situation and the search for appropriate therapies were at the root of our efforts. But since this article has the objective of introducing the POPF methodology, we do not elaborate on the particular situation in the field of science in Slovakia.
4. G. M. Dobrov and V. E. Tonkal, *op cit*, reference 2.