

STEPS TOWARD A GLOBAL INFORMATION AND FORECASTING SERVICE

A Planning Grant Proposal by Global Vision, Inc.

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Summary

This is a request for a project planning grant to develop a more detailed proposal for a Global Information and Forecasting Service, as described below.

Rapid changes in the environment and in human society present an array of problems that may threaten human values, institutions, welfare, even species survival. To reliably evaluate these problems and to cope with them requires a much more realistic picture than heretofore, of the present state of the world and of its alternative potential states at various future moments, depending on present choices. Such a more realistic picture requires, in turn, greatly improved forecasting methods—improvement that can be had by making better use of existing knowledge resources.

Ordinary persons acting in their role as citizens, but also analysts, planners, and policy makers, in every area of human life, public and private, throughout the world, urgently need to acquire the more realistic picture that will result from such improvements.

The proposed Global Information and Forecasting Service (herein, Service) would address these requirements. Its goals would be 1) to develop improved computer forecasting programs, 2) to develop an internet web site and other modalities to make publicly available these programs, and 3) to assist interested parties in using them.

How best to do these things in actual practice is a novel and important question. Thus we are requesting a planning grant for the purpose of developing a comprehensive, properly reviewed proposal for the Service. This planning project would consist of four phases: an initial phase in which various questions are addressed by individuals and project groups, a draft proposal-writing phase, a conference that would review the draft proposal, and a final phase in which the proposal is revised and submitted to potential funding sources. This final product would also be placed on a public internet web site.

I. The Forecasting Goal

Identified just above are the three goals of the Service. In the following we discuss the first of them. This is not because the other two are unimportant—far from it. However, in comparison with the first we anticipate that web site and other media development, and assistance to others,

will be comparative more simple undertakings, having already well-developed modalities on which we can rely. The truly novel and difficult part lies in the forecasting goal; and it is on this part that the other two goals crucially depend. Thus we focus on it here.

Two problems have afflicted, and continue to afflict, private (for instance corporate) and public (for instance government) forecasting. First, in the customary practices, the methods and information used in forecasting are specialized and fragmented, to the extent that they exist at all. (To the occasion claim that forecasting is neither necessary nor actually practiced, we would reply that some form of forecasting, however primitive, is implicit in all actions that intend a result.) No one would want to ride in an aircraft in which each of the wings, the tail, the fuselage, etc. had been designed in complete indifference to the other parts, yet in essence that is how corporations, governments, and other entities with societal planning responsibilities do planning and policy making. The truth of that statement is easy to realize when one realizes that the counterpart to an entire aircraft is the entire Earth.

Second, and more fundamentally, the methods used in societal forecasting have reflected an inadequate conception of the possibilities for scientifically grounded forecasting and dynamic modeling.

The forecasting goal has two parts. First, is to encourage and support a more adequate scientific methodology for forecasting. Second, is to combine or network already accumulated information bases and add to them, to form a more complete and usable system for accessing the information in such bases, on which the forecasts will depend. We believe that the resulting increased reliability and comprehensiveness of forecasting will improve—perhaps greatly—the ability of researchers and practitioners to anticipate where the world is headed, to try to change that course where appropriate, and to anticipate certain affects via what we refer to below as the "couplings" between problems.

2. Improved Forecasting

A key part of this improvement is the recognition that human problems are not a list of disjointed issues but an interconnected or *coupled* complex of issues and other aspects.

The tendency in analysis and policy making up until now has been to consider problems on an individual basis. Moreover, the response to previous suggestions to address the "global problematique" (starting several decades ago with groups such as the Club of Rome) and for "holistic thinking" has been commendable but lacking in appropriately comprehensive use of one or more of the scientific elements to which we refer in this proposal. We believe that neither piecemeal thinking—the normal mode of approach in studying social and environmental problems up to now—nor anything less than a radical scientifically grounded approach, such as we are advocating, to the problem of integration, are viable responses.

This is not just a question of rhetorically acknowledge the fact of connections in global reality. For effective forecasting, it is essential that integration take place at an operational level. Let us take a closer look at this issue. Every problem and condition is vitally affected by one or more of the others; in fact, it is plausible that each of the 18 problem areas listed in Appendix 1 affects, and is affected by, directly or indirectly, every other area on the list.

The more important links between problems, or "couplings", are *speculatively* illustrated in Appendix 2. The problems are listed twice, as *antecedents* tagging the rows of the table and as *consequences* tagging the columns. A • or + in a cell indicates a coupling between row antecedent and column consequence. For example, ozone depletion as antecedent has species extinction as a consequence (since many living things may not be able to survive increased ultraviolet light). This is a "first order" consequence; that is, ozone depletion and species extinction are coupled. Now take species extinction as an antecedent and move across its row to

find malnutrition/ starvation as a consequence. This is a first order consequence of species extinction, but also a "second order," that is an indirect, consequence of ozone depletion; ozone depletion and malnutrition/starvation are indirectly coupled. Taking malnutrition/starvation as antecedent, likewise find a third order consequence of ozone depletion (which is also a second order consequence of species extinction); and so on for 4th, 5th, ... nth order consequences of ozone depletion.

Now we can see how all the problems are connected. Since every row is filled with one or more X's, every problem has consequences; since every column is filled, every problem has antecedents. Thus the process of tracing 1st, 2nd, and higher order antecedents and consequences can go on forever, with every problem part of an infinite string of causes and effects involving the other problems. To address any one problem we must consider it in the context of this string of causes and effects.

For this purpose, however, what appears in the table is not enough. First, as already mentioned, the indicated couplings are speculative. More fundamentally, qualitative links are not enough. For the table to be truly useful, the •'s and +'s must be replaced with empirically defined and estimated numbers that indicate the strength of the couplings. For the +'s, there is the added requirement of estimating the risk of the antecedent event; for instance, how likely is global war onset in a given year? Furthermore, the table must be expanded to include all the distinct problem indicators and, similarly, all the background factors previously mentioned, and numerical values must be provided in each relevant case. Since important effects flow from one geographical area to another, the same conclusion also applies to consideration of distinct regions. Estimates of degree of reliability or accuracy must also be furnished.

Here we come against one of the most important difficulties in answering pressing societal-environmental problems: There is little agreement as to which problems are coupled and how, or to which other kinds of information the problems are connected. This means that it is not yet possible to come to a consensus about what interventions are available, for controlling global change, or about which of them we should use to make things better. For intervention involves a coupling between something that we can control, as antecedent, and something we want to change, as a consequence. So we would need to agree first on what the coupling is, and since every problem is really part of a long string of problems, also we would need to agree on what the long string of consequences are in order to agree on the realistic implications of a proposed action. This work must also recognize that one cannot, in practice, address all couplings. Rather, one must make reasonable assumptions of where to focus attention and how to work around areas where available data are highly incomplete or otherwise unsatisfactory. Moreover, one must use techniques, such as artificial neural network modeling, that can search for regularities in the absence of complete information about complex processes.

At this stage of our planning project, we propose to investigate ways to approach modeling and forecasting which will incorporate the reality of these couplings. This will require input from researchers and creative thinkers from a diverse collection of mathematical, physical, biological, and social inquiries. Because this is only the planning stage of a larger project, we do not anticipate finding solutions to the problems of modeling and forecasting. However, this first step will identify a variety of possible avenues to be addressed in a full scale operation of the Service and will provide an agenda for research.

3. Improved Data Bases

While the above analytic and creative activities are essential to the aim of better forecasting, an adequate data base is a parallel and equally essential aspect. The requirements of this information aspect are, by themselves, quite demanding. As discussed in Appendix 1, they span a multiplicity of indicators for tracking 18 or more threatening global problem areas, as well as background indicators taken from six very broad substantive categories, describing continental,

national, provincial, and local regions. Moreover, there is the need for indicators that are *reproducible* and *comparable* over broad spatial and temporal domains. That is, to the extent possible, we need to downplay the anecdotal and impressionistic, and to emphasize the development of information into scientific data. As these data requirements are met, the forecasting will return the favor by telling us, by its success or failure, whether the information accumulation efforts are on the right track. For this reason, the two aspects are so closely mingled that to try to separate them would be most unwise.

II. Work Plan

For the goals of the Service to be realized, the entire concept must be subjected to more careful planning and evaluation than we can give it here. For that purpose we presently seek a planning grant.

We recognize the impossibility of any one enterprise meeting all of the requirements of the many tasks involved. Thus there is a clear need for a collaborative effort among *many* centers of activity. There are many resources, world wide, which can and do offer support, and we will seek to make this a cooperative enterprise with them. Indeed, we will aim for the Service to involve, and to be available to, as many centers and individual researchers as can be arranged.

All that we have mentioned implies a very large flow of information, coming in from sources and going out to users, and active discussion and consultation among all parties. This will call for more careful, informed planning of data processing procedures and facilities and other management questions than can be accomplished here. However, one can anticipate the kinds of information flows and consultations for which planning will be needed.

The method by which we propose to achieve this has four phases. In the first phase, the several project groups described in Appendix 3 will address various questions relevant to the functioning of the Service, including dynamic modeling of the inter-factor couplings and other forecasting issues and, in equal emphasis, issues of data development and use. These groups will draw on many sources, including the work of consultants. For this purpose, each consultant will be asked to write a study paper and to serve on a discussion panel addressing one or more topics or problems.

In the second phase, the co-investigators will prepare a draft funding proposal for the Service. The work of the task groups will be focused on this draft proposal through a series of reporting and review steps.

In the third phase, the co-investigators will stage a conference at which this proposal is presented for review in workshops and plenary sessions. Participants will represent a global geographic and cultural diversity, and a variety of intellectual and practical pursuits. These sessions will include a re-convening of the consultant panels of phase one, above. Planning will draw on the experience of one of the co-investigators in organizing and coordinating a similar conference in 1988.

In the final phase, the co-investigators will revise the document and submit it for funding consideration by various sources.

III. Characteristics of Participants

Participants will consist of persons from the sponsoring agency, co-investigators, consultants, project assistants and, in the third phase, other conference participants. Selection considerations include mutual complementarity of backgrounds and interest in the issues presented herein. As specific needs are identified, the co-investigators will seek the consultants, referred to above, in areas such as complex system dynamics, evolutionary biology, population dynamics, statistics,

computer programming, societal impact of science and technology, social data development, and management. Project assistants will include persons who are thoroughly experienced and skilled in appropriate management functions, including data development and use, but who also are already familiar with the global-systemic perspective expressed in this proposal. All the above persons will take part in the conference; others will be invited by the conference planning group.

In choosing the participants, it is extremely important that they span an appropriate range of expertise and interests from mathematical, physical, biological, and social inquiries. This will enable the project to make use of known and potential complementarities among the different areas. For example, Do concepts and recently emergent techniques related to "chaotic" phenomena compliment empirical knowledge of specific political-economic indicators in a way that leads to improved forecasting? More generally, it is essential to effectively compare and combine alternative forecasting techniques and to address key issues such as the possibility and usefulness of representing human and ecological phenomena as a single system, and whether nominally distinct problem areas are coupled in previously unnoticed combinations, as outlined in Appendix 3. Careful choice of participants will enable this project to effectively address such matters without the narrowness of perspective that has severely and needlessly handicapped previous forecasting efforts. This ability will permit a revolutionary improvement in global forecasting.

IV. Possibilities for Dissemination

There are several ways in which results can be communicated, all of which we will explore. First is the conference itself. Second is to publish the final Service proposal. A third direction is to organize workshops at regional and local levels. Given additional funding, we would also be willing to collaborate with media professionals to produce a television program or series. A related direction is to publicize the conference and other project activities.

V. Budget

Projected costs assume participation at full time by two co-investigators at \$20/hour each and at 2/3 full time by a third co-investigator at \$40,000; at full time by a senior management assistant at \$15/hour; at 4 months full and eight months half time by three graduate and two undergraduate assistants, at \$10 and \$6 /hour, respectively. Consulting fees are based on 20 panelists, serving a total of 1600 hours at \$20/hour. Conference costs are based on experience in previous conference organizing and staging . They include accommodations, travel, food, postage, printing, advertising, duplication, auditorium rental, registration labor, and telephone expenses for about 50 active participants. Costs of office space and of most computer support are omitted, since we anticipate that they will be provided by the institutions with which project participants are affiliated.

1. Wages:	
3 co-investigators	123,200
senior management assistant	31,200
3 graduate assistants	41,700
2 undergraduate assistants	16,640
2. Other expenses:	
Fringe benefits at 23% on total wages of \$212,740	48,930
Consultant fees	32,000
Consultant travel	16,000
Computer hardware and software	4,000

Administration and communication	3,600
Conference costs	50,000
TOTAL COSTS	367,270

APPENDIX 1: DATA REQUIREMENTS OF THE SERVICE

The purpose of this Appendix is to suggest what kinds of information should be stored by the Service. We have organized the discussion into four parts, covering 1) global problem areas, 2) ecological (background) factors, 3) regions and other entities to be distinguished, 4) time period to be spanned by the information.

1. Global Problem Areas

The variety of problems that afflict and threaten the world is enormous; the variety of facts that will need to be stored to keep track of them is similarly large. The following list of such problems is representative of that variety; additional thinking and work will likely identify others. The Service should maintain facts on:

- 1) ozone depletion;
- 2) CO₂ pollution;
- 3) ground and water pollution;
- 4) deforestation;
- 5) desertification;
- 6) biological species extinction;
- 7) instabilities in the value of money, concerning both the continuing problem of world-wide inflation and the threat of collapse in the international banking system;
- 8) continuing local wars, between neighboring nations and within nations;
- 9) the accumulation of armament stockpiles and military forces;
- 10) disinvestment, the decline in public and private capital stock as manifested, for instance, in failures of equipment modernization and replacement, in inadequate resource allocations to education and human services (i.e. to human capital investment), and in the destruction of capital through processes varying from deforestation to urban decay.
- 11) widespread and growing human disease, most prominently in non-industrial nations and in the urban cores of industrial nations, of which drug abuse and AIDS are the most virulent manifestations;
- 12) the instability of global peace, that is, the continuing potential for world war between nations of the Western bloc and the Soviet Union (or its fragments), particularly nuclear war;

13) the disintegration of urban areas, including aspects of disinvestment and disease but also crime, pollution, both overcrowding *and* under-utilization of land, urban sprawl, and an overall decline of all aspects of what makes cities effective and habitable;

14) authoritarianism, the depersonalization and bureaucratization of human relationships, lack of personal civic involvement and sense of responsibility and efficacy, excessive reliance on police power and intrusion, and disrespect for personal liberties;

15) population instability, normally manifest as dysfunctional population *growth* but also latent in the potential for catastrophic *decline* from disease (as from AIDS in Central Africa), from malnutrition or starvation, and from war;

16) illiteracy so widespread as to render most of the world's people unable to contribute more than marginally to the world's work;

17) malnutrition, the imbalance in diet, particularly in shortage of protein intake, and starvation, the shortage of caloric intake;

18) poverty of such an extreme degree as to debilitate the economic and psychological functioning of the afflicted individuals.

It bears repeating that this list probably omits some of the potential threats to the globe, but what we see above suggests the magnitude of the task, merely to catalog and adequately monitor the problems, since each item represents many specific indicators.

2. Ecological (Background) Factors

There are, in addition, the great many factors that form the background or context for all the problems-- facts about the world that must be taken into consideration to realistically evaluate problems and choose strategies for their alleviation. Specific facts can best be listed later, since much of what we choose will depend on what is already available, and/or the cost of acquiring them through original research. So this list should be formed as we proceed step-by-step through our own inventory of the information archives that already exist. We can, however, visualize six broad categories, concerning:

1) Physical and behavioral characteristics of individual humans and of other living species;

2) Human and other social groups, including cultural, social, and ethnic groups;

3) Local, provincial, national, international, and transnational political and economic units;

4) Human cultural and technological artifacts, including capital and capital infrastructure;

5) Geophysical elements, including land masses, oceanic regions, the atmosphere, and the spatial environment of Earth;

6) Material, energy, and information flows among the elements in 2 through 5, including the movements of persons.

We can also observe that each of the 18 problem areas listed in Section 1 forms a part of the context or environment for other problems, a point which we have emphasized above, in the proposal.

3. Regions and Other Entities to be Distinguished

It is wholly inadequate to maintain information only with reference to the Earth as an undifferentiated unit. One obvious reason is that conditions greatly vary from one region to another; a single global summary would conceal much of what we wish to keep track. Possibly less obvious, but equally important, is that it appears likely that *changes* in conditions significantly are driven by their *differences between one region and another*. For example, the contrast between rich regions and poor may be a powerful stimulus to the latter, in seeking to change the situation. Because, particularly in the political realm, the relevant differences in determining change often involve small regions (for instance, consider the impact of northeastern United States on the remainder of the world), and also because small neighboring areas may differ greatly in their response to change factors, it is important to subdivide the data to the greatest extent feasible, given the availability of information. (This will vary considerably, depending on the type of information. Also, the ability to benefit from information of great regional specificity will depend on the uses to which it is put.)

At a minimum, we should seek to subdivide at the level of nations and geophysical units such as islands and continents; and, where possible, this should extend to provincial and even local units. Subdivision should also be sought between differing ethnic, cultural and religious groups, even where their boundaries do not correspond to geopolitical boundaries. The implication is that well over a thousand regional subdivisions must be recognized by the Service.

4. Time Period to be Spanned by the Information

We are accustomed to thinking that global problems are special to the present age, but are they? From medicine, we know that the symptoms of illness often appear long after the disease has begun; a period of incubation or latency must intervene between onset and outward appearance. And we are aware that dangerous personal health practices may be continued for some time before the inherent risks produce serious results. Similarly, the present illnesses of the global system may be the culmination of a long historical period of latency or risk taking; and there is reason to believe that, in fact, this is the case.

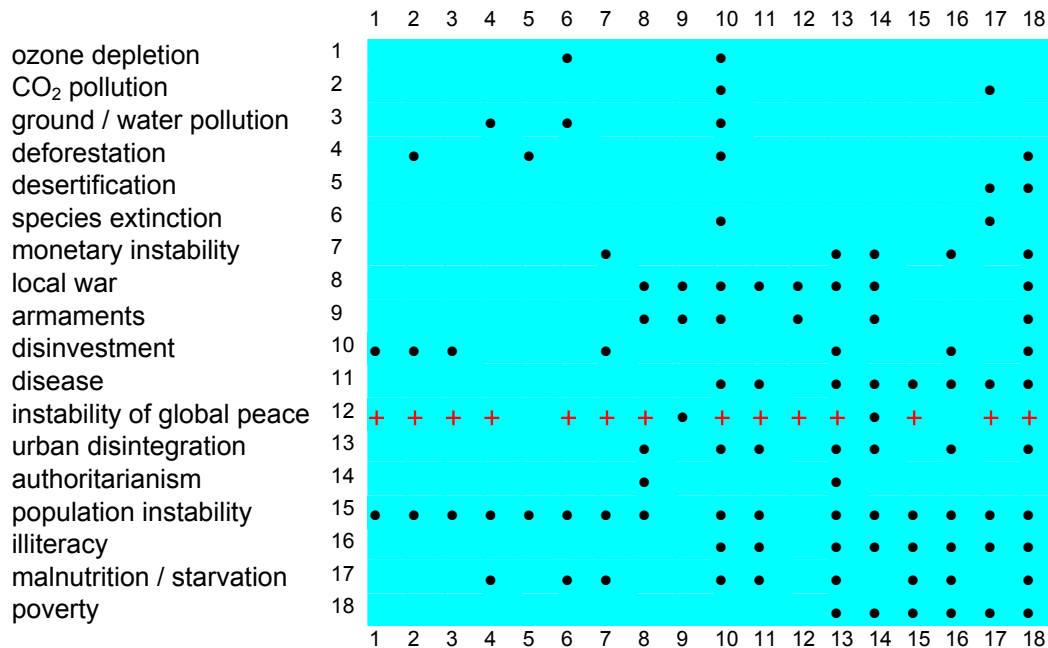
Getting a realistic picture of the world today thus calls for the scope of information maintained by the Service to extend back into the past. This will help us identify the less obvious factors-- processes, relationships, conditions, and practices --that may underlie our present difficulties. Another way of putting it is that detailed information of where the world has been will help us understand where, in detail, it is headed. Knowledge of the past will also help us identify those presently obvious factors *about which our understanding is wrong*. If we are effectively to deal with our problems, such historical insights must be part of our world picture; and the deeper the history, the more confidence we will have in the insights.

How deep is that? In part this depends on the availability and reliability of information, both of which decline rapidly prior to the present century; but availability also varies with the particular kind of information. Work at the University of Michigan has found that good quality data of use in understanding international war and peace, can be obtained from 1816 (the close of the Napoleonic Wars) onward. That information of very great historical depth is available, and well worth having, is shown by conclusions that David O. Wilkinson, at U.C.L.A., has come to, in his study of "Central Civilizations" from 3,000 B.C. to the present. These conclusions are about the future stability of the present global system; they contain important suggestions about our problems and where we may be now heading.

APPENDIX 2: SPECULATIVE BUT POSSIBLE COUPLINGS AMONG GLOBAL PROBLEM AREAS

Row entries are antecedents, column entries are first order consequences. Numbered row and column entries code the items named in the left-hand column. Some of these items are further elaborated under the same numbers in the Global Problem Areas section of Appendix 1.

Figure. Speculative but Possible Couplings Among Problem Groups



Key: Cell entries represent couplings between row problem group and column group.
 Column of given number denotes group named in the same numbered row.
 • represents the presumption of continuous strong coupling.
 + represents presumption of contingent strong coupling-- actual coupling only in event of global war.

APPENDIX 3. DESCRIPTION OF THE WORKING GROUPS

Oversight Group

Will exercise overall management and coordination of the Phase 1 project, including searches for:

- (1) Funding sources for later phases;
- (2) Additional co-investigators with suitable complimentary training, skills, and interests.

Conference Planning Group

Will plan and coordinate a large meeting, convened to review and critique all aspects of the evolving Service plan, as presented in workshops and plenary sessions. This will be world-wide in its representation, including various groups that Robert Malone encountered during his organizing of the Conference on Sanity, Science, and Global Responsibility at Brock University, Ontario, 1988, and at the World Information Clearing Center meeting in Geneva and the Conference on Rethinking the Curriculum in San Diego, 1989. The planning group will:

- (1) Determine whom to invite;
- (2) Extend invitations and carry out negotiation and other communication with prospective participants.
- (3) Determine the structure of the workshops, panels, sub-panels, etc.; select topics, obtain chairpersons and other members for each.
- (4) Make and carry out transportation, accommodation, and other logistic arrangements.

System Management Group

Will be concerned with non-computational management aspects of the Service:

- (1) Recommend where to locate the Service and its branches;
- (2) Determine staffing requirements for administrative support;
- (3) Make preliminary cost estimates;
- (4) Inventory other questions that must later be answered about logistic, financial, and other managerial matters;
- (5) Considering all the above, draft a preliminary business plan.

Data Acquisition Group

Will determine the availability of existing data, and appropriate procedures to access, or obtain and assemble them, including:

- (1) Determine the location of information repositories among educational institutions, research groups, government bodies, the United Nations, other international organizations, public interest groups (such as Worldwatch), and private parties;
- (2) Contact and negotiate with groups to obtain necessary information/data and/or access to it;
- (3) Examine political and other institutional barriers to information and data availability and consider possible solutions and alternatives;
- (4) Formulate questions for submission to consultants (to be forwarded to the forecasting group, below).

Data Selection Group

Will be concerned with the selection and input of data, and of information on which new data is developed, and with the form of output to prospective users. It will set requirements for the above acquisition group. Its functions will include:

- (1) Elaborate the global problem areas (Appendix 1, Part 1) and add new areas to the list, as appropriate; *make a start* on setting forth the detailed aspects;
- (2) Elaborate the list of ecological (background) factors (Appendix 1, Part 2);
- (3) Determine the regions and other entities to be distinguished (Appendix 1, Part 3);
- (4) Consider the relative emphasis among various time periods to be spanned by the information (Appendix 1, Part 4), according to the specific kinds of information;
- (5) *Make a start* on selecting and (as frequently will be necessary) devising operational, reproducible indicators appropriate to the above;
- (6) Identify and address problems of data reliability;
- (7) Devise appropriate labeling, tagging, and coding schemes;
- (8) Suggest priorities among the global problems, and determine corresponding indicator priorities;
- (9) Determine the match or mismatch between needed and available indicators, and priorities for collecting additional information;
- (10) Locate and consider how to interface with other data development activities (e.g. the Data Development for International Research program, funded by the U.S. National Science Foundation);
- (11) Suggest the specific kinds of networking, intervention, and support to be offered to research and action programs, to institutions, and to the public;
- (12) Determine the identity of relevant institutions, and political/social action groups and networks; contact these groups where appropriate;
- (13) Formulate questions for consultants (to be forwarded to the forecasting group).

Data Management Group

Will be concerned with the technical aspects of receiving, storing, accessing, processing, networking, and forwarding information, in both its hardware and software aspects. Its specific responsibilities will include:

- (1) Make a data management plan;
- (2) Recommend corresponding hardware selection;

- (3) Choose or create appropriate software programs;
- (4) Address the relationship between the data processing systems of the Service and those of other parties, survey actual or potential problems of compatibility and decide how most effectively to achieve it;
- (5) Write data management questionnaires for consultants.

Forecasting Group.

Long after the other problems are ironed out, the funding is in hand, and the Service is put together and functioning, the task of forecasting will continue, because forecasting is an open ended issue. The work entails identifying and accounting for the connections among the many problems, factors, and entities, and discovering how to use this account to predict, to the extent possible, global system behavior and the consequences of human actions. For its initial contribution, this group will:

- (1) Consider and recommend an appropriate balance between long- and short-run products-- between concrete and immediate, versus more fundamental but distant information and forecasting capabilities;
- (2) Decide how best to organize/arrange the many translations among basic thinking, applied forecasting, and information development;
- (3) Identify appropriate models and research approaches for interpreting information and assessing trends (e.g., in the econometric, economic-political, and environmental areas, models such as SARU, GLOBUS, Project Link, FUGI, US Environmental Assessment Model);
- (4) Identify modeling issues that present procedural ambiguities for forecasting (e.g. the roles and relationships between "inductive" versus "deductive" approaches, the tension between purposive and mechanistic views of human behavior, phenomenological" versus "fundamental" modeling, the questions raised by the idea of "chaotic" systems);
- (5) Address problems of overall framework, such as how, if possible, to determine the "couplings" (see the main proposal) and how to synthesize the many disparate elements of the global problematique;
- (6) Survey existing programs of fundamental and applied research that may be relevant to indicator selection and modeling; make appropriate contacts (e.g. the Correlates of War project, the National Center for Atmospheric Research, the Merriam Laboratory for Political Research, the Santa Fe Institute);
- (7) Formulate questions for consultants, receive questions from acquisition and selection groups, and write consultant questionnaires on data / forecasting issues.