

DESIGNING A SURVEY OF INFORMATION AND FAVOR EXCHANGE NETWORKS  
AMONG REGIONAL, STATE, COUNTY AND MUNICIPAL LEVELS OF GOVERNMENT\*

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This paper reports the methodology used by an interdisciplinary (Sociology, Civil Engineering, Transportation, Architecture and Urban Planning) group at Princeton University in a personal interview survey of upper-level officials in regional, state, county, township and municipal government in New Jersey. One central purpose of the study is to understand the governmental process of policy and planning in coastal zone areas. This process has at least two salient features that determine the method of its analysis. First, the process is interorganizational, involving as it does five distinct levels of government (a sixth level, federal government, excluded from the sample because of lack of resources, is included in some questionnaire items). Second, the process must necessarily include a larger informal component than those involving a single governmental agency or level, or a single set of governmental regulations.

These two features suggest analysis in terms of interpersonal networks of exchange of information and commodities controlled by the governmental system. If the various organizational components of coastal zone management do indeed constitute a coherent sector of government, then these various organizations must be interconnected in some system of regulation and control. That is, the processing of technical and policy needs and problems requiring innovative or specialized solutions must be regulated (in the macro-level control system sense as well as that of conscious action by individuals) by a flow of information about new scientific and technical innovations, new policy pressures and marketing possibilities, new sources of capital and funding, etc. The emergent system of interlocking behavior does constitute a true control system in the sense that it regulates the allocation of resources at the macro system level.

The concept of control, central to systems engineering, also has a venerable tradition in social science theory.

Lack of a metric for precise measurement of social systems, however, has until recently precluded the borrowing of control systems engineering ideas by social scientists. Flows of social information and commodities--such as the exchanges of papers, criticisms, citations, referrals, professional favors, subcontracts, consultantships, etc., have largely eluded precise measurement and systematic analysis (citations are the only exception worthy of mention).

Hope for a breakthrough in this impasse has recently come from an unanticipated direction: the rapid development in what is generally subsumed under the heading "social networks" (for good general discussions, see Barnes 1969; Mitchell 1969; White, Boorman and Breiger 1976). Particularly promising, as a means to link the social network literature to work on control systems, is work on sampling large-scale social networks for survey research (Granovetter 1976; Beniger 1976). Densities of communication and exchange among various subsets of individuals afford an obvious means to quantify such flows in the more macro-level social control systems in which they participate; survey research provides well-established techniques to collect such data.

The "subgroup" approach to network sampling developed by the senior author (Beniger 1976; 1978b) permits the operationalization of system-level flows by means of a standard survey instrument. Using this approach, the population to be surveyed (i.e., those participating in the larger social system of interest) is partitioned by institutional affiliations into a manageable number of mutually exclusive and exhaustive subgroups which serve as referents for at least some network questions. These permit estimation of information and commodity flows (interpersonal communication and exchanges) by means of a measure called "estimated density space" (EDS), a practical approximation of simple network density (Beniger 1976, where EDS is referred to as "the estimated upper bounds of densities"). The extent to which various organizational sectors and subsystems (aggregates of individual institutional affiliations) constitute a control system can now be discovered empirically.

Previous work by the senior author (Beniger 1978b; 1980; summarized in Beniger 1978a) has used actual survey

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data to find a coherent cybernetic system for the control of deviance among youth with respect to drugs in two American cities (Baltimore and San Francisco). The 12 professions studied constitute four individual system components--medical, legal, counseling and educational sectors--stratified by specialization in the control function. The medical and legal sectors are at the highest level of specialization, the counseling sector at an intermediate level, and the education sector at the lowest level. Control is characterized by exchange dominance of each level by all higher levels, i.e., by user referrals upward and informational feedback downward. Exchanges of both information and referrals are mediated by the counseling professions of psychologists, social workers and clergy.

The methodology presented here may be taken as an elaboration of the general strategy for the investigation of inter-organizational and interpersonal networks which is, with a few modifications, applicable to a wide variety of contexts and subject matter. A hierarchical control system similar to that for the control of deviance among youth with respect to drugs might be expected to characterize the institutionalized systems for the control of any socially-processed commodity (like deviants) in modern postindustrial societies. Inter-organizational and interpersonal exchange is quite literally vital to the maintenance of all social activity and institutions which are organized in hierarchies across geographic space; the management of the coastal zone of New Jersey is just one of many such cases.

#### Identifying the Population

The problem to be solved in the design of the sample and survey instrument was dictated by the conception of a social network as a dynamic structure of commodity flows. Because transportation planners and the planning network were the objects of study, it was natural to designate the planning process as a focus for the operation of such flows. At the outset we knew so little about the process that we undertook a series of intensive interviews with state planners. Not only did this enable us to get a feel for the process of creating and implementing plans and projects in a myriad of organizations with competing interests, but we were also able to identify key individuals and organizations in the process and to determine the kinds of commodities which were typically exchanged. The instrument eventually developed was in large part based on these preliminary interviews via a

process of generalization and abstraction.

Many different types of planners and planning agencies are involved in New Jersey's transportation planning process. In choosing the population to be studied, therefore, it was recognized that the population could not be confined to the New Jersey Department of Transportation (NJDOT) in particular, nor to transportation planners in general, because transportation interrelates with so many other activities. In order to deal with this problem of horizontal fragmentation (the interrelationships between diverse activities on the same government level), planners from a spectrum of activities--notably transportation, environment, energy and land use--were included in the population chosen.

The second constraint in selecting a population was to include planning officials from more than one level of government, with the problem of coordination often one of getting those levels of government to agree with each other, or at least to communicate with each other. This problem of vertical fragmentation (the relationship between diverse government levels involved in the same activity) dictated the inclusion of federal, state, regional, county and municipal planning agencies in the population to be studied.

The actual identification of the population was a three-step process. First, all counties and municipalities in New Jersey were included, though this was expected to create sampling problems. The alternative to this was to make inclusion in the population dependent upon location, population size, or some other category. This alternative had the advantage of making a given sample size be a larger proportion of the total population, which would increase the accuracy of any conclusions drawn from the sample (a perhaps unfamiliar feature of sampling networks). On the other hand, making comparisons between different categories would be impossible. The choice made increased the flexibility and application of the data collected.

The second step in selecting the population was to make a preliminary identification of the state agencies most involved with transportation planning issues. The basis of this preliminary identification was information extracted from NJDOT's Action Plan, the New Jersey Department of Environmental Protection (NJDEP) State of New Jersey Coastal Management Program Bay and Ocean Shore Segment, and the New Jersey Department of Energy (NJDOE) Master Plan. The agencies identified were NJDOT, NJDEP, NJDOE, the New Jersey Department of Community Affairs (NJCA),

the Governor's Office, and two regional agencies, the Port Authority of New York and New Jersey and the Tri-State Regional Planning Commission. After these agencies were identified, interviews were conducted with officials in each of them. The purpose of these interviews was to obtain a feeling for the transportation planning process, and to identify agencies and officials which were most important to that process, so that they could be included in the sample.

The final step in identifying the population was the compilation of a comprehensive list of federal, state and regional agencies involved in the transportation planning process, based upon information gained from research and from the preliminary interviews. The initial population of state and regional agencies included all those which produced a formal plan, even though it is acknowledged that agencies which do not produce such documents may be involved in planning in other senses. The chosen agencies were combined with the counties and municipalities to complete the population of agencies involved in the transportation planning process in New Jersey.

After these agencies were identified, interviews were conducted with members of their planning divisions, usually with the highest available planning official. These planners were asked, in an informal way, which agencies and individuals they typically contacted in the course of their jobs, or had contacted recently. Special probes were used when a new name or agency was mentioned. When a large amount of redundancy began to be apparent, a list of agencies was compiled and discussed for possible modifications with key informants. In this way a fairly comprehensive list of 76 agencies with some planning functions was compiled. This list defined the subgroups which were used as the organizational population. Thus should be clear the distinction between subgroup (organizational) and individual sampling.

#### Individual and Subgroup Sampling

Having completed the preliminary interviews and defined the subgroups, our approach to sampling individuals was guided by the desire to make use of the groundwork already laid and the principle that in areas of total ignorance we would treat our respondents as informants. In other words, a "modified snowball" technique was employed, whereby some but not all of the individuals to be interviewed were chosen by the interviewees.

First, because we were already aware of many of the "stars" in the network (an assumption later confirmed by the data), we created a list of 29 state and regional planners to be used as name prompts after the respondent had volunteered a majority of his contacts via organization prompts. The name prompts list was compiled on the basis of preliminary interviews and supplemented by the names of planners with key positions on the organization charts. We originally intended to interview each of these individuals and finally succeeded in 22 of the 29 cases. We are satisfied after analysis that most of the individuals listed would have been included by our second technique as well. The advantage of using name prompts is the check it permits on the internal validity of the method.

Second, it was apparent that the county planning agencies were the principal self-contained and equivalent organizational nodes in the network, so that they could be utilized as a basis for snowball sampling. That is, county planning agencies exist in all counties, do not generally split planning functions with other county agencies, have relatively similar functions and structure and provide a standard base for an initial tabulation of names.

In each county we attempted to interview: (1) the planning director, and (2) the transportation, environmental and energy planners, so that the widest possible variety of planning modes could be included. After most of the county interviews were completed, contacts were tabulated and a list was created of all individuals mentioned four or more times. Along with the list of "stars," this provided a major part of the municipal, township, state and regional sample. This snowball technique, by itself, was not enough to assure that the individuals mentioned at or above some criterion level of times were the only key actors in a process, however. From an interorganizational perspective, isolates who have key organizational planning functions will be excluded if the snowball technique is not supplemented (for a related critique of snowball methods, see Barnes 1972).

In approaching the state and regional agencies for interviews, our procedure was to recontact the individuals who had been interviewed informally (though in some cases these were first-time contacts), to present them with our list of names (derived from the county interviews) for their agency, and to ask for their suggestions. A subset of the listed individuals--with additions from the agency informants--were eventually interviewed.

Two municipalities from each county sampled were included in the sample.

After towns were identified, specific people in each town had to be interviewed. This was difficult because there appears to be no standard means of assigning planning activities in New Jersey towns. Very few have a professionally-staffed planning board. Therefore individuals were chosen based upon information obtained in the county interviews. These individuals were often not on a "planning board" *per se*, but rather in the mayor's office or the town engineer's office.

## The Questionnaire

The questionnaire contains three major sections: Section I, on the respondent's career; Section II, on his or her professional contacts ("links"); and Section III, on attitudinal and opinion items. Section II asks respondents to identify (from a list of 76 federal, state, regional, county and municipal agencies) those agencies with which they had personal contacts (on a professional level) between the interview date and January, 1978. For each agency mentioned, respondents were then asked to identify by name the specific individuals in that agency with whom they had contact. The name of each individual was recorded by the interviewers, after which the respondents were asked to specify the following information for each of these contacts:

- (1) whether the contact was by letter, telephone, and/or in person, and whether the contact occurred once, several or many times;
- (2) the predominant direction of flow of information;
- (3) whether the respondent felt each person contacted was currently in his debt, was owed the next "favor," or whether exchanges of favors were about even or not involved in the relationship;
- (4) whether contacts were usually initiated by the respondent or the respondent's contact; and
- (5) whether the respondent judged the relationship to be "smooth" or "not smooth."

After this information was obtained, the respondent was asked to identify his or her contacts with the state and regional core community discussed above. Members of this core community were mentioned to the respondent by name as an aid to memory. This information permits measurement of the validity of the initial assumption of the centrality of this core community.

The purpose of Section II is to approximate the inter-agency, inter-level "informal" network of information

and favor flow that characterizes transportation planning and management in New Jersey. By examining responses to the questions in this section by individuals, by agencies and by governmental levels, and through comparative analysis of both sides of a contact, it is possible to construct the larger network of information and favor exchange, and even to model certain phenomena, such as the development and speed of the spread of information, optimal entry points in the system, bottlenecks and resistances, policy recommendations for who ought to talk to whom, etc..

## Administering the Questionnaire

An initial decision was made to administer the questionnaire to respondents in person rather than by mail or by telephone. This choice was based on a tradeoff between sample size and questionnaire complexity. Because Section II would have been especially difficult to administer by mail or by telephone, the choice was made to decrease the sample size and administer the questionnaire in person.

Interviews were conducted with planners in the sample between August 23 and December 11, 1978, (a period of under four months) by five graduate students of Princeton University. All were given special training in administering the instrument, and conducted trial interviews before conducting actual ones. Furthermore, the first interviews of each new interviewer were supervised by experienced interviewers. A total of 113 interviews were scheduled, and all were conducted, although two were only partially completed. In both cases, the respondents answered the attitudinal questions but refused to complete the section on professional contacts (Section II).

The 113 interviews were with upper-level officials from 43 distinct governmental units, including two regional commissions, five state departments, 16 county planning boards, 11 township planning boards and nine municipal planning boards. Interviews were distributed across government levels as follows: 11 regional, 36 state, 43 county, 12 township and 11 municipal. Of the 76 governmental units listed in the "Agencies" section of Section II of the questionnaire, 43 are represented by interviews. The distribution of interviews across governmental units posed by name in the questionnaire itself assures that a maximum amount of information about the overall planning network can be inferred from the number of interviews actually undertaken.

## Interviewing Strategies

We learned one thing which both surprised and encouraged us a result of this study, namely, that respondents who are professionals and who have sufficient interviewer guidance are willing to provide large and detailed amounts of information in interviews lasting up to two hours. This was accomplished by means of an instrument which has great potential in network studies and a strategic interview flow which conceals from the respondent in each question what is to come in future questions.

In designing a method for acquiring detailed information on a respondent's relationships with other professionals in the network, four considerations are paramount: (1) A maximum number of contacted individuals is desirable. That is, the respondent should not be allowed to select, according to subjective criteria of "importance" or "relevance," which of his relationships he will mention to the interviewer. (2) Though memory will exercise a constraint on the entire process, as many specific names as possible should be collected. (3) The respondent must not be allowed to let the prospect of what is to be done interfere with the task at hand. (4) Information on the specific nature of the relationship must be acquired in terms of many rather than one or a few dimensions.

The first three requirements are met by asking progressively more detailed questions about the nature of the respondent's contacts. First, we presented the respondent with a list of 76 agencies and asked him or her to make a check beside each agency with which he or she has had contact (of any kind) in a specified period of time. Next, the interviewer reads down the list of checked agencies, asking for specific names of individuals which have been contacted in each agency, and writing these down beside the agency on the "links" form (Section II). Finally, the "links" forms are given to the respondents together with a set of oral instructions as to how these forms should be completed.

It is important not to tip the respondent ahead of time about the extent of the information that will be required for each contact. After helping the respondent fill out the first couple of rows, the interviewer busies himself taking notes and answering occasional questions while the rest of the forms are completed. On the average, respondents complete one form (information on 14 contacts) in about five to seven minutes.

The links form is the core of the method and satisfies the fourth requirement. Fundamentally, it is designed to

provide a large amount of information about each particular contact of the respondent. It is self-administered for the most part, though an interviewer's presence is required. The structure is quite simple, consisting of rows of names and columns specifying various dimensions of the relationship. The specific dimensions used will depend on the research questions and may easily be modified to apply to various types of networks and respondents. All that is required are a series of commodities or properties as column heads together with some simple response codes along the top of the form. In order to produce the maximum amount of information, these codes should involve either quantities (e.g., once, several, many) or directed flows (e.g., in/out, me/them).

Although the dimensions of relationships may be stated in specific terms, we chose to focus upon five which describe general properties of any social network. Four of these are standard in the network literature: frequency of contact (disaggregated by letter, phone, in person), direction of information flow, initiation of contact, and smoothness (cooperativeness). We found it was easiest for respondents to think of relationships from their own perspectives and established response categories accordingly. Two of the five dimensions (frequency of contact and smoothness) are scaled ordinally; the other three ask for directional flows (of information, initiation and favors).

Flows of favors through networks have not, to our knowledge, been previously investigated and require some explanation here. Given the theoretical notion of a network through which various commodities are exchanged in the operation of processes, and the assumption that information was only one type of commodity which may be involved in transactions between nodes, the need for some other generalized medium was apparent. The concept of favors, originally the idea of Mr. Shrum, offered more than a few possibilities.

Faced with a choice as to whether to define "favor" for respondents or to let them interpret it as they chose, we decided on an intermediate option. If the respondent seemed to have no trouble in deciding what a "favor" was, we let him or her proceed. If, as in many cases, he or she balked or questioned the meaning of the term, we stressed that no wrongdoing was implied in our use of the term and provided the rough synonyms "service" or "courtesy" as a guide. A typical lead into the favors question might go as follows:

"The next column has to do with what we call 'favors' for lack of a better term. Instead of 'favors' you can think of 'services' or 'courtesies' done.

What we have in mind is when someone helps out or assists you, or when you do something for someone you don't really have to. It doesn't have to be a big thing; it could be going out of your way to get some information for someone, though giving information would not always be a favor. If you give someone a special consideration, or give his request first priority over someone else, this might be a favor."

What was surprising was the number of respondents who took it for granted that many favors are necessarily exchanged in the course of planning activities. It may be that those respondents who insisted that no favors were ever involved in their transactions and that they never did any favors were simply being truthful. Nevertheless, the concept is so widely used and understood in the language and so expressive of a generalized medium of exchange (Parsons 1976) that we felt justified in its inclusion.

For the favors column we allowed four possibilities. Our initial categories were "PLUS--They owe me a favor," "MINUS--I owe them a favor," "E--Favors about even," and "N--NO favors involved." It quickly became apparent in the pilot interviews that the concept of "owing favors" greatly increased the likelihood of refusal. Therefore we altered the first two alternatives to "PLUS--I've done favors" and "MINUS--They've done favors" with somewhat better results. It was felt unwise to exclude the neutral category "E--Favors about even" given the already substantial reluctance of respondents to answer questions about favors.

## Conclusions

A similar hierarchical control system, like that governing the exchange of information and favors among coastal zone planners in New Jersey government, or the exchange of drug-related information and referrals of young drug users among various professions in Baltimore and San Francisco, might be expected to characterize a wide range of institutionalized social systems in modern post industrial societies. For example, a well-specified system for the control of innovation in science, including the location of various organizations and individuals in the exchange dominance hierarchy, is likely to prove a useful tool in the management and funding of innovation processes in American science (Wuthnow et. al. 1979).

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