PUBLIC ATTITUDES AND SYSTEMS ANALYSIS: NEED FOR A COMMUNICATIONS FRAMEWORK

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Introduction

It is certainly well known that urban and environmental problems are too complex to be amenable to complete quantitative solution. Most systems analysts have responded by constructing simulations that operate at a level of aggregation which allows for the use of some form of quantitative methodology. In doing so we have lost the ability to incorporate disaggregated and qualitative public attitudes in the overall system's analysis. Yet, public attitudes play a major role in the structure and function of urban and environmental systems and must be communicated to the analyst to avoid their being left outside the system boundary.

It is the purpose of this paper to describe the major specifications of a communications framework between the public or its representatives and the systems analyst. The public sector decision making process has several areas in need of Improved Communications (IC) as indicated in Figure 1. Only one of these, the feedback communication between the analyst and the public, is being addressed here.

The Environmental Impact Statement (EIS) process in the U.S.A. exemplifies the paradox a systems analyst faces by neglecting to incorporate public attitudes in his analysis. As required by law, any development project involving federal government funds must be screened environmentally by having an EIS written.[1,2] Figure 2 gives a pictorial sketch of the present EIS process. Although not prescribed in full detail, the writing of the EIS quite often involves systems analysis techniques. Most often, the technique is computer modelling or linear programming. (Close to one half of all EIS written by or for the

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federal government involve transportation routing, and thus would find LP particularly useful in analysis.) The EIS incorporating this systems analysis is considered a draft EIS to be reviewed by the public affected by the proposed project. During a 90-day public hearing process, public attitudes relative to the proposed project are expressed but rarely, if ever, with any regard for the systems view incorporated in the draft EIS. In addition, the systems analysis performed is usually too inflexible to account for the public attitudes expressed. Asked to revise the draft EIS after public review, the analyst is usually faced with the following paradox: he can neither defend his analysis in light of non-systematic public review, nor can he incorporate the qualitatively stated attitudes in his analysis for he has no basis for relating these attitudes to analysis variables.

Although not as obvious as in the EIS process, the urban analyst is often faced with the same paradox. A good example can be found in the area of new town planning where systems analysis has been welcomed as a most useful tool by many new town planning groups. Initial planning of a new town proceeds with systems concepts in mind. However, because the planning staff fails to communicate these concepts to the public, citizen attitudes fail to view the new town as a system. Similarly, public attitudes as expressed by representatives of the public (usually the village board) can not be incorporated in systems analysis variables for the analyst has no basis for relating these attitudes to system variables. Again the systems analyst is met with the above mentioned paradox.

As we progress to human settlements on a larger scale the paradox may be more subtly expressed but is nonetheless present.

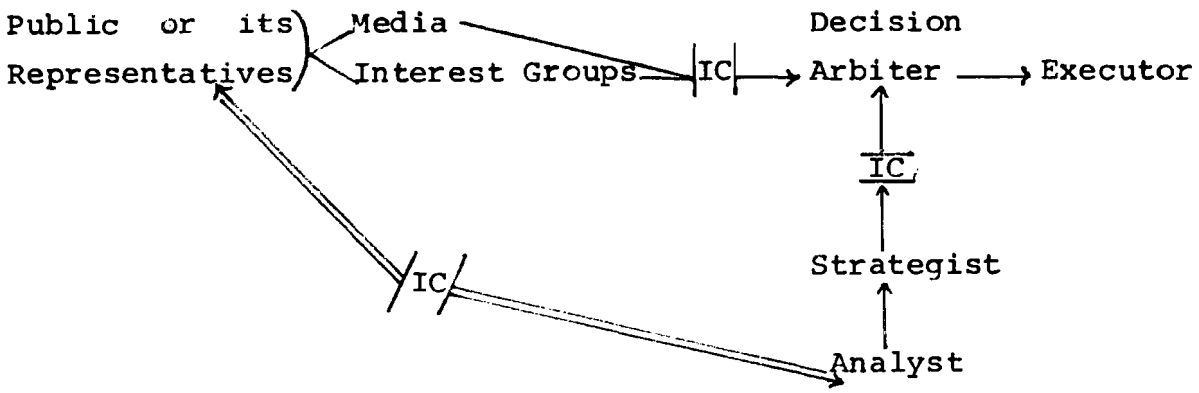

Figure 1. Generalized public decision making process.

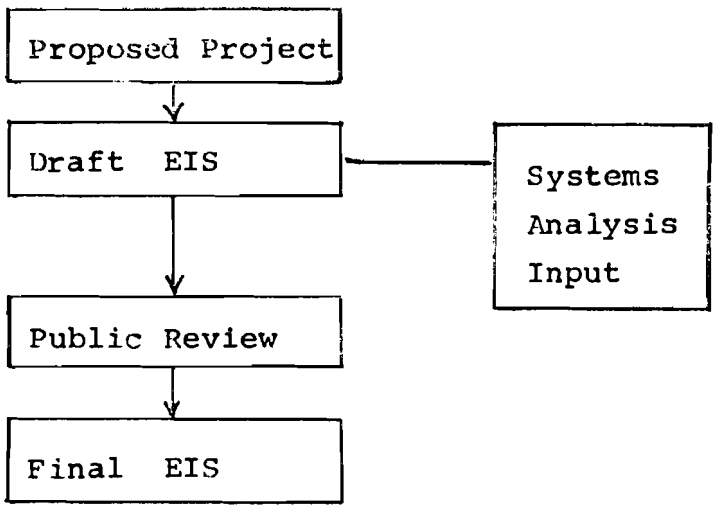

Figure 2. The EIS review process.

In addition, the increased size of the bureaucracy may place a level of strategists between analysts on the one hand, and the public, its representatives and interest groups on the other. Yet the strategist must attempt to integrate the highly quantitative statements of the systems analyst with diverse and highly qualitative public attitudes. Again the analyst is asked whether he can defend his conclusions in light of public attitudes and incorporate these attitudes into his analysis. He usually cannot.

Specification of a Communications Framework.

Given the above problem statement, it appears that a framework for incorporating public attitudes into the analysis of urban and environmental systems is needed. In addition, a means of communicating a systems view to the public is also needed. Several major specifications must be kept in mind in attempting to develop such a communications framework:

1. Problem Focus as against methodology focus.

The mathematical tools associated with systems analysis deal with solving problems that have already been represented systematically and symbolically. Problem solving in the present context is less a struggle in analysis than in the definition of the problem. The starting point in analysis should be a problem that needs to be solved rather than the methodology that needs to be applied. Concentration on the symbolic representation, the model, rather than the problem, is self-defeating to the approach of urban and environmental systems analysis.

2. Transparency. Any framework used to interface public attitudes with analyst's models must be readily understood by that public. A transparent framework may be faulty due to oversimplification but a simple framework that involves as many as possible of the interested public remains a higher priority.

3. Representativeness. Though obvious, the framework must be able to accomodate and communicate a whole spectrum of public

attitudes. Public participation with a broad base and the proper conveyance of diverse attitudes is essential if the framework is to be representative.

4. Conveying Gestalt. While still maintaining simplicity, the essential task of the analyst is to convey a systems view to the interested public. Conveying a systems view in the use of common environmental resources or the distribution of financial resources to multiple urban objectives is recognized as crucial to the solution of environmental and urban problems.[3,4] Thus a first criterion for conveying gestalt: conveying a systems view.

But conveying gestalt means more than a systems view. A second criterion is the ability of the framework to express real behavior of participants. Though obvious, evaluative measures must be used to assess the framework on this point.

5. Conveying Goal Sets. Effective urban and environmental analysis must be directed towards articulated public goal sets as well as a systems perspective. The analyst has no way of determining concensus on goals of area constituencies let alone for the entire region being modelled. Even political sophistication on the part of the analyst will not allow him to intuit these goal sets. The framework we are seeking must be able to: first, create goal sets (rank ordered) for sub-system areas (e.g., the community level) and second, aggregate and rank order area goal sets for the entire system (e.g., a river basin or regional transit district).

In addition to articulated goal sets themselves, the conveyance of these goal sets to the analyst in the sense here defined means the ability to incorporate these goal sets into the systems analysis. Thus, the framework should also include a mechanism that interfaces articulated goal sets with systems variables.

Suggested Frameworks

Using the principles above we are now in a position to criticize various techniques of public attitude determination and formulation.

1. Surveys. The most common is, of course, the survey technique. Most public attitude surveys fail to meet two of our specifications.

With respect to transparancy, representativeness and problem focus surveys can be minimally satisfactory tools. However, surveys as usually administered, do poorly in conveying the analyst's gestalt. Although there may be subject reactivity to a survey questionnaire, attitude change and information gained as a result of answering a questionnaire has not been systematically measured or delineated by social scientists. The statistical tabulation of individual responses to the questionnaire does permit the analyst to determine the gestalt of the individual and of the group.[5]

Although not usually used to produce concensus on goal sets, survey instruments could be utilized to give feedback to individuals and groups about their specified goals. This would require the analysis of the data, description of goal sets as they were found by the instrument, and reporting of these findings back to the individuals and groups involved. Given the feedback conceivably the groups could redefine goal sets to reach concensus.

2. The Public Hearing Process. The meeting of interested parties to convey their attitudes creates a greater feeling of gestalt than does the survey technique, although it is usually less representative. Rarely is any attempt made to achieve concensus amongst the diverse attitudes expressed as can be done statistically in surveys. In addition, no attempt is made to convey a systems view. Thus, it is impossible to expect goal sets to be available to the analyst after a public hearing process.

3. Normative Group Process. A technique which has met with some success in the planning process of the U.S. human settlement--especially new towns--is the normative group process.[6]

A well publicized open meeting (usually with invitations to key community decision makers) is called by the planning office or community government. During an evening's work:

(a) participants are broken into groups of 10 to 20, each group having a facilitator to rank order as well as define (in precise wording) the 10 most important issues in the community;
(b) the participants as a whole clarify the definition of issues eliminating redundant issues; and
(c) vote to rank order the final list of community issues.

Thus a collective discussion with several rounds of voting is used to gain concensus on a rank ordering of commonly understood community problems. This technique definitely meets the criteria of problem focus and transparency and begins to address the criteria of conveying gestalt and goal sets. In some ways it is less representative than the survey for the "questionnaire" is being formulated by a subset of community citizens. It is lacking in gestalt for each participant brings with him only his/her view of the environment of interest (e.g., a new town setting). The rank ordered issues are commonly understood by members of the system of interest and thus might be called a goal set. However, no effort is first made to establish a common definition of the system being considered. Again each participant's subjective view of the system undermined the goal set. Most importantly for the analyst, one must still intuit relationships between the analyst's model and the defined goal set.

In U.S. new town planning, the end result of the use of the normative group process, has been the loss of credibility for, and use of, systems analysis.[7] Supported by the defined community goals the new town government has unknowingly convinced the planning staff to abandon inflexible systems analyses when incorporating the defined goals in the community master plan.

4. Frame Games. A slightly more complicated, though still transparent technique, is that of issue-oriented or "frame" games.[8] The basic framework for any gaming-simulation exercise consists of:

a) Roles
b) Scenario
c) Accounting system
d) Rules and procedures.

If it is acceptable that gaming-simulations can be viewed in terms of these four components then the basis for development of "frame" games is provided by components c and d. The degree of transparency largely depends on the degree to which the rules and procedures and the accounting system are "structured"/"unstructured".

Thus frame games are a framework which can be "loaded" with appropriate subject matter. The manner in which roles and scenario are defined determines the issue orientation. In particular, frame games can be loaded with the analyst's system level data and content. In this way a common view of the system under study can be presented to a representative public involved in formulating goal sets. The most commonly known frame game is probably the crossword puzzle which has a frame consisting of open and black boxes, rules for play, and filled with the individual puzzle designer's own clues and content.

It is clear that frame games can meet the criteria of problem focus and transparency very well. Representativeness can be expected to be as good or better than in the

normative group process. Although frame games appear to be a good mechanism for conveying gestalt and goal sets in practice, results have been somewhat mixed.[9] In some instances urban and environmental analysts have found the frame game structure too general and qualitatively oriented to correlate public attitudes with quantified system variables. More field tests are needed to properly assess this technique.

5. Model-Specific Games. Still another technique is the use of model-specific games to relate goal sets to changes in model variables while at the same time better conveying gestalt. In using games such as Community Land Use Game (CLUG),[10] and Water and Land Resources Utilization System (WALRUS),[10] one is also gaining increased complexity. Yet these games are just as transparent as frame games if the representative public can afford two to four evenings of interaction as compared to the one or two evenings for both the normative group process and frame games. Being non-computerized these games are flexible enough to allow a specific problem focus as well as have the capability to be representative.

Used as commercially available, the CLUG and WALRUS games may be found to fall short of frame games in conveying gestalt and eliciting goal sets. However, given the large data base of these games, the perceived gestalt can be enhanced beyond that of frame games with judicuous use of visual display techniques. Eliciting goal sets that can be related to model variables is a more challenging task. By combining the survey technique with model specific games, the criteria for the needed communications framework can be met.[11]

Using the CLUG and WALRUS games--both based on the Lowry Model for transportation, industry, and housing in an urban setting[12]--we are developing a methodology for evaluating within game goals and behaviors. We are working on a

questionnaire which:

1) determines the individual's community and personal goals prior to the game play;
2) reassesses the individual's community and personal goals at the end of the play;
3) assesses the individual's feelings/attitudes toward the actual goals achieved in the game process; and
4) determines the individual's assessment of the interactions within his own group and with other groups playing the game.

This individual data will be correlated with actual decisions made in the game, e.g., amount of land bought, industry built, housing constructed, money gained, etc. to evaluate the participant's achievement of idealized goals. Participants can translate personal goals into achieved goals through concensus, coalition-forming, vote trading or "shrewd" game playing. Thus we are working toward utilizing a model such as Ofshe and Ofshe's[13] or Haefele's[14] to predict actual behavior from survey gathered data. However, recall that the framework we are seeking must be able to not only create goal sets for any one group of participants (e.g., at the community level), but also aggregate goal sets generated by several participant groups of the larger area of concern (e.g., the river basin, metropolis or regional transit district). On considering this last criterion, the vote trading approach of Haefele seems quite promising. Once the several participant group goal sets are determined, the aggregation of goal sets would take place using Haefele's vote trading algorithm.

The study of model specific games described above, is too early in the experimental phase to judge this technique as a framework for incorporating public attitudes in systems analysis. Yet it is just such research that must be undertaken to fully realize the communications framework.

Conclusion

We have discussed a partial list of framework for enhancing communication between the public and systems analysts. Given that public attitudes are usually stated by a representative subset of the public, we have concluded that frame games and model specific games incorporating survey techniques may be substantially improved frameworks over presently used techniques. This is based on the evaluation of all suggested frameworks as the five criteria of:

1. Problem focus
2. Transparency
3. Representativeness
4. Conveying gestalt
5. Conveying goal sets.

The results of this brief study suggest that a more in-depth analysis by IIASA may result in manifold returns.

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