

ISSUES AS ELEMENTS OF INFORMATION SYSTEMS

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## ISSUES AS ELEMENTS OF INFORMATION SYSTEMS

### Abstract

Issue-Based Information Systems (IBIS) are meant to support coordination and planning of political decision processes. IBIS guides the identification, structuring, and settling of issues raised by problem-solving groups, and provides information pertinent to the discourse. It is linked to conventional documentation systems but also activates other sources. Elements of the system are topics, issues, questions of fact, positions, arguments, and model problems. The logic of issues, the subsystems of IBIS, and their rules of operation are outlined. Three manually operated versions of IBIS are in experimental operation by governmental agencies; computerization of system operations is in preparation.

### Argumentative Processes

1. This paper introduces a type of information system meant to support the work of cooperatives like governmental or administrative agencies or committees, planning groups, etc., that are confronted with a problem complex in order to arrive at a plan for decision. The concept of these Issue-Based Information Systems (IBIS) rests on a model of problem solving by cooperatives as an argumentative process.

2. An initially unstructured problem area or topic denotes the task named by a "trigger phrase" ("Urban Renewal in Baltimore," "The War," "Tax Reform"). About this topic and its subtopics a discourse develops. Issues are brought up and disputed because different positions are assumed. Arguments are constructed in defense of or against the different positions until the issue is settled by convincing the opponents or decided by a formal decision procedure. Frequently questions of fact are directed to experts or fed into a documentation system. Answers obtained can be questioned and turned into issues. Through this counterplay of questioning and arguing, the participants form and exert their judgments incessantly, developing more structured pictures of the problem and its solutions. It is not possible to separate "understanding the problem" as a phase from "information" or "solution" since every formulation of the problem is also a statement about a potential solution.

3. Four categories of information exchange occur during this process:

- between the participants (opinions, expertise, reference to previous questions and decisions, similar questions, etc.);
- with the experts about specific questions;
- information from documentation systems (for literature support of a position, for factual reference, etc.);
- in the case of dependent cooperatives: with the client or decision maker (directives, quest for decisions, reports, etc.).

IBIS is designed to support, to document, and to coordinate these information processes.

4. There are various reasons for the design and implementation of IBIS-type systems. First, there is a "missing link" between the organization of conventional documentation systems and the structure of the discourse in such cooperatives. To many questions arising descriptor strings selected from a thesaurus cannot be adequately designed. Thus, the issue "Shall we legalize private manpower banks?" is not sufficiently represented by the descriptors "Legalization," "Manpower Banks," "Private." Depending on the participants' image of the problem, the relevant context may become the associative neighborhood of "Equal Opportunity," "Private Eyes," "Exploitation of the Needy," "Systematic Unemployment," etc. A very precise picture of the state of discourse must be conveyed to the documentation system incessantly. Second, the description of the subject matter in terms of librarians or documentalists may be less significant than the similarity of an issue with issues dealt with previously and the information used in their treatment. Third, the discourse developing is notoriously centering around concepts expressed by ad hoc vocabulary which is rapidly changing, defying thesaurization. Many central terms used are proper names for long stories specific of the particular situation, with their meaning depending very sensitively on the context in which they are used.

Another reason is the desire for a more transparent working procedure for such cooperatives. IBIS ought to stimulate a more scrutinized style of reasoning which more explicitly reveals the

arguments. It should help to identify the proper questions, to develop the scope of positions in response to them, and assist in generating dispute. The role of external experts also deserves clarification. Precise questions should be directed to them which have their well-defined place within the problem-solving process. IBIS is also a documentation and reporting system which permits fast and reliable information on the state of discourse at any time.

#### The Logic of Issues

5. Issues are the organizational "atoms" of IBIS-type systems. Among their properties are these:

- Issues have the form of questions.
- The origins of issues are controversial statements.
- Issues are specific to particular situations; positions are developed by utilizing particular information from the problem environment and from other cases claimed to be similar.
- Issues are raised, argued, settled, "dodged," or substituted.

6. There are several kinds of relationships between issues, forming networks between the items of the "issue bank" which can be used to aid the search for similar issues, the history of an issue, the consequences of previous decisions, etc.:

- Issue  $I_2$  is a direct successor of issue  $I_1$ :  $I_2$  challenges a statement made in support of one of the positions maintained in view of  $I_1$ .

- Issue  $I_2$  is a generalization of  $I_1$ .
- $I_2$  is a relevant analogy to  $I_1$ : the arguments used in  $I_2$  are transferred into arguments regarding  $I_1$ , mutatis mutandis.
- Positions taken in response to  $I_1$  can be compatible, consistent, or incompatible with a position assumed in response to  $I_2$  (by the same or another proponent).

7. With regard to content, the following types of issues can be distinguished:

- factual issues: "Is X the case?"
- deontic issues: "Shall X become the case?"
- explanatory issues: "Is X the reason for Y?"
- instrumental issues: "Is X the appropriate means to accomplish Y in this situation?"

To each issue a logically closed set of possible positions or an open list of possible positions may be assigned.

8. Other elements of the system are these.

- Topics as introduced above serve as a crude organization principle for denoting the foci of concern.
- Questions of fact (F-questions) request information which is not assumed to be controversial. Doubting the credibility of an answer leads to an issue.
- Model problems are not specific to a particular situation. They correspond to scientific or managerial models meant to deal with whole classes of problems (location models, cost-benefit models, etc.). Much literature is dealing with

model problems. Since they are always defined over a closed set of descriptors (variables), their usefulness for structuring a particular problem depends on the importance of those factors which have not been included.

#### The Structure of IBIS-type Systems

##### 9. IBIS-type systems contain several subsystems:

S-1: Issue bank: File of living (S-11), settled or abandoned (S-12), and latent (S-13) issues.

S-2: Evidence bank: File of F-questions and their answers (S-21, answered; S-22, open).

S-3: "Handbook": Collection of model problems.

S-4: Topic list.

S-5: Issue map: Representation of the various relations between issues, F-questions, etc., by graphic display of the state of argument.

S-6: Documentation system: Search and analysis in view of living or latent issues and positions (S-61), descriptor index and thesaurus construction (S-62), regular scanning in view of the topic list (S-63).

##### 10. All the items are numbered consecutively to ease reference.

The formats for describing issues, F-questions, model problems also indicate the various relationships between them, defining an "IxI-Matrix" for each of the types of relationships between issues and "IxT-Matrix" (assignment of issues to topics), etc. These matrices are used for tracing connections between items and for constructing issue maps

(S-5). In addition, literature sources are assigned (by accession number) to the various items and vice versa. In this way, several layers of search networks are established.

#### Operation of the System

11. To describe only the main operations, "treatment of issues":
  - 0-1: Participant  $M_k$  raises the  $r^{\text{th}}$  issue  $I_r$  in the context of topic  $T_j$ . An "issue form" is filled in, identifying the preliminary issue, the list of alternative positions, administrative indicators.
  - 0-2:  $I_r$  is edited (in context with  $M_k$ ), relationships to other issues are established (aided by S-1, S-4, S-5, S-62).
  - 0-3: For each position  $P_{rs}$  an "argument sheet" is prepared. Sources are mainly the deliberations between  $M_k$  and his opponents.
  - 0-4: File  $I_r$  is processed by S-61, where supporting evidence and opinion is retrieved from the literature (the argument sheets are amended and literature evaluation sheets are added to the file).
  - 0-5: The issue map S-5 is updated.
  - 0-6: File  $I_r$  becomes the basis for discussion.  $I_r$  is either settled by accepting one of the positions or further evidence is required from an "expert" (through F-questions which are treated similar to the processing of issues), or a supporting statement for a defended



position is challenged, thus leading to another issue (GOTO S-1). Finally, the significance of  $I_r$  can be denied and substitute issues may be introduced (GOTO S-1).

#### Further Developments

12. Currently three IBIS-type systems are operated experimentally. IBIS-1 serves a supranational agency in order to support the development of recommendations for information policy. IBIS-2 is used by an interdepartmental government committee dealing with a national plan for information networks. IBIS-3 is applied in a project of university planning. These systems follow the principles outlined, but each of them had to be tailored to the specific conditions of application. The most astonishing result is the eager acceptance by the users, although the implementation induced major changes in organization and working styles. Still being operated manually, computerization of several operations is being programmed. Publication of the theory of IBIS and the systems manuals is in preparation.

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