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Letters to the Editor

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LETTERS TO THE EDITOR

Letters should be addressed to the Editor, Graduate School of Business, 401 Uris Hall, Columbia University, New York, New York 10027.

The article on "Information Systems and Public Planning Organizations" in the June 1971 issue of *Management Science* presents a grossly distorted view of its title subject as evidenced by the number of misleading and incorrect statements which it contains. Building an elaborate rhetoric of assertions around the truth that among the large number of information systems that have been studied, designed, or implemented, some have been ill conceived and poorly designed, the article contains in essentially every paragraph one or more sentences which are either false or misleading.

The article begins with a "straw man" of four "apriorities," purports to "analyze the principal elements with which they are concerned: (1) information, (2) systems, (3) information system," discusses examples of information systems for public planners, and raises the spectre of "invasion of privacy." It is clear from reading the article that the author understands neither information, system, nor information system.

The analysis of information opens with the statement "Information, data, and, especially in military parlance, intelligence, are terms used interchangeably and frequently equated with facts or knowledge," associates data with "the values of the Protestant Ethic," "CIA," and "Vietnam," discusses data as something "gotten" rather than "given", and concludes with a quotation from Churchman on the use of "information" in social policy. Those who work with intelligence information systems know that, in military parlance, the word "intelligence" is not used interchangeably with "data." Information as used in the context of "information system" is a technical term which was given a quantitative definition over twenty years ago by Claude Shannon. It is the logarithm to the base two of the ratio of the number of ways in which the data structure of a query can be configured before it is presented to the information system to the number of ways in which the data structure can be configured after the information system has responded to the query. Stated less formally, information is a measure of the change in uncertainty produced by the response. People use information systems to reduce the uncertainty in the situations with which they have to deal. The data in an information system are the set of names of objects and of relations defined on those objects that is stored in the system.

On the word "system," the article presents seven dictionary definitions. The author is uncertain as to which of the first six definitions the word system denotes in the context of information system. The first of these definitions is the one that is pertinent to the term information system.

Information system is analyzed as a "remarkable metamorphosis" when the words "information" and "system" are "joined together," "a tidy and finite entity, a commodity for sale by hardware and software merchants, the sine qua non of planners, business executives, and public administrators."

An information system is an aggregation of machines, programs, and procedures, organized to acquire, process, and produce information in support to people in their performance of some function, such as management, planning, analysis, etc. In actual business and government operations, only a small portion of the information which people utilize in performing their jobs is derived from such formally organized systems. Most of the acquisition and utilization of information by people is done in an informal

manner. People talk to people; they see things; they read newspapers, books, and reports; they write memoranda, letters, and reports; they look up information in files or in libraries; they hold meetings; they make individual and collective analyses; etc. A management information system does not manage an organization. It provides information support to the manager who does, helping him reduce the uncertainty in his knowledge of the situations with which he has to deal.

The author appears to interpret the words "more information" in her first assumption as implying more pages of computer output. In fact, more pages of computer output may imply less information rather than more. Her association of more information with bulk output is probably due to observing the output of computer systems, most of which today function as bulk processing plants producing bulky reports, which must be further processed by manual means to produce information useful to managers and planners.

The author cites four information systems which have been studied or proposed for public planning. Two, which are welfare information systems, are criticized because they have not solved the welfare problem. She does not appear to have evaluated them on whether or not they would aid the people responsible for welfare work by improving the effectiveness of their utilization of information in dealing with welfare problems. One system concerned with law enforcement information is criticized because it deals with crime information "as measured by law enforcement activity and definition" and the author asks "Will it (1) maintain order? (2) protect society? (3) get individuals to conform? (4) increase respect or fear of the law? (5) improve administration of the law?" An information system will, of course, do none of these things directly. It may aid the people who are responsible for these functions.

Land use information systems seem particularly to draw out the author's venom. "Among the happiest of all hunting grounds for proponents of information systems are those dealing with land use. Attracted by large federal grants and descending upon anxious planners persuaded that a data bank is a prime necessity for their and the community's good 'information experts' of all stripe busily vend their wares. And it may be noted that they meet little sales resistance. Quite the contrary. Uncertain as to goals and defensive as to bailiwick, naive about computer technology and oversold on Space Age management methods, public officials invite feasibility studies by persons who claim expertness in such matters. To ask an aspiring contractor for a feasibility study is, of course, tantamount to inviting a fox into one's henhouse." One might guess from this text that quite a number of land use information systems studies must have been undertaken. In fact there have been very few; but one seems to have aroused her ire, the California Regional Land Use Information System Project.

The author bases her comments on this project on the Final Summary Report, a brochure prepared by the contractor, TRW, at the request of the State of California for use in promoting the California Land Data System proposed in it. She seems to be upset that the brochure is a brochure—"looking and sounding more like a sales brochure than the result of professional analytic effort." She makes no mention of two reports referenced in the brochure as containing technical descriptions of the project. Most information systems serve at most a few types of users within a single organization. A unique feature of the California Land Data System and one that importantly affects its design is that it must serve "many different organizations at many different levels, i.e: major agencies of the federal government within the state; major agencies of the state government; counties; cities; industrial and commercial businesses; special

intergovernmental organizations and districts," but she regards this as a "platitude." She is concerned that the brochure makes use of white space, half-size pages, and pictures. The brochure presents some data obtained from a survey of users of land use information which she labels "artificially hardened facts." She argues that an information system will not contribute to "better resource allocation" because "most pertinent decisions take place at the ballot box anyway."

The author's discussion of "information systems and invasion of privacy," a very important subject, contains her usual number of misstatements; e.g., "The Credit Data Corporation, for example, maintains personal credit files of millions of persons, possibly some 70 % of the U.S. population." The correct number is closer to 17 %. In another sentence she states, "his privacy is eroded with every technological advance that is adopted;" a great many technological advances in information systems have provided tools which aid in protecting privacy—e.g., memory protect hardware for multiprogramming, code word software methods for restricting access to data bases, etc. In modern computer-based credit information systems, the privacy of the persons who apply for credt is given considerably more protection that it was given in the old manually-operated credit bureaus.

The four apriorities or assumptions which the author asserts are the basis of information systems for public planning are: "(1) if, as public planners, they had more information, they would make better plans, and perhaps arrive at better decisions; (2) more and faster moving information would improve the "efficiency" of governmental operations; (3) greater "efficiency" would better serve the needs of the community in particular and society at large; and (4) the design of information systems is a technical matter and best assigned to an "information expert," whose moveable talent is universally applicable." They are phrased so as to enable her to cast aspersions on information systems without making any factual analysis. "More information" is interpreted as "inundated by an overwhelming amount of data" and "efficiency" is used as a criterion, allowing her to avoid looking into how public planners use information and to avoid evaluating information systems on the basis of whether they aid or hinder such information use. Her charge that "information experts" design systems with insensitivity to the special problems involved, while true in a number of cases, is not supported by the systems she chose as examples. In each of the projects cited, the technologists worked under the guidance of people who were the information users; they worked with these people to develop statements of information requirements; and the users participated in developing system concepts. In the California Regional Land Use Information System Project, the TRW personnel worked under the guidance of a steering committee composed of members representing the many agencies who would be users of the system. A large number of interviews of land use information users were made. A survey questionnaire was developed in association with the California Supervisor's Association Property Subcommittee. It was field tested and modified in accordance with field test results. Its reception by the land use information users is indicated by the fact that over 65 % of those surveyed filled out and returned the questionnaire. System design concepts were reviewed and approved by the California State Office of Planning and the steering committee.

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On "Information Systems and Public Planning" by Ida R. Hoos

Dr. Hoos' commentary points out some of the current fallacies in understanding, obtaining and using information:

a. "Flip-chart analysis" in lieu of honest staff work, including the substitution of glibness for thoughtfulness.

b. The use of information to support a position taken instead of its use to understand the extent to which various courses of action are fruitful.

c. Enchantment by computer activity instead of management by objectives.

Probably the glibness is a symptom of the difficulty in formulating specific and meaningful effectiveness definitions in the context of the "information system." I think this difficulty stems, in part, from a lack of operational definition of "system," as Dr. Hoos suggests.

In most applications the phrase "information system" is used in lieu of the more appropriate phrase "information process." A process is a specified set of resources transforming one or more inputs to one or more outputs. For example, Proctor and Gamble devised a process to transform certain raw materials into an edible and packaged product called "JIF."

Frequently I find it useful to call an information process a system as part of a name to help sell an idea. But, I do not think I have ever been exposed to an "information system." In my mind, "system" has very well-delineated meaning:

1. *System.* An identifiable set of definable components so organized that it selectively uses available performance capabilities of the components to establish and/or maintain relationships with other identifiable systems in a specified operational environment.

2. *Operational Environment.* A definable time-space domain in which significant systems, relationships and physical conditions are observable.

These definitions permit me to grapple with effectiveness and cost in the specific. I define these items as:

1. Effectiveness is the expression of the extent to which desired benefits are accomplished as attributed to a system. (Desired benefits: those changes in the present or anticipated operational environment which are desired.)

2. Cost. Those resources which are allocated to establishing, maintaining, operating, and salvaging a system. (Allocated resources: consumed, and/or committed and fully recoverable, and/or committed and partially recoverable.)

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Mr. Nelson's heated defense of his craft sheds little enlightenment. It contains little more than the usual iterative retreat to technicalities (*viz.*, information is "the logarithm to the base two of the ratio of the number of ways . . ." etc.) and resort to buzz words (e.g., "improving effectiveness"). His resumé of my article is totally unreliable. I need merely to refer your readers to the materials which I cited, for, as the Bible says, "By their works shall ye know them."

If Mr. Nelson had read my paper more carefully, he would have learned that I did not criticize information experts for failing to solve the welfare and other problems but for claiming that they could or would. He would also have learned the correct title of

my paper and not referred to it erroneously. Moreover, he might have identified correctly the bitter taste he was experiencing in connection with the Land Use Project. It was not venom but gall, his and that of his fellow information system experts, who presume that their fabrications are "cures for chaos" and whose reports satisfy two rules of the well-known game, "One for the money, two for the show." The two reports he "referenced" [*sic*], neither add one bit of useful information nor change the quality of the 10 million characters so proudly hailed as the product of the TRW study. As for the State officials who approved the project, *De mortuis nil nisi bonum* ("Of the dead, nothing but good"), most of them having gone to their reward in the political mortality that occurs with party changes in Sacramento. No bouquets are due them, however. They bought pseudo-solutions and shortchanged the taxpayers.

It is understandable that Mr. Nelson would attempt a defense. But, even if mine were the "straw men" he avers, why does he concoct his out of papier-mâché? Is it because he, like Lockheed,[1] is trying to find a practical use for the miles of computer printout paper consumed in the busy work of data collection?

P.S. My figures on instances of invasions of privacy came from testimony presented and recorded in Senate Hearings. I do not know where Mr. Nelson got his. But this demonstrates again that "usually reliable sources of information," on which so many data systems bank, aren't.

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[1] Item in *Computers and Automation*, "Lockheed to Recycle Miles of Computer Paper," (June 1971), p. 52.