

technician and manager the principles of a useful MIS and remembering that the productivity and contribution of tomorrow's MIS man bares a direct relationship to the relevancy of his preparation.

#### FUTURE MIS: HYPOTHESIZED BEHAVIORAL CONSEQUENCES

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A management information system may be viewed as part of the communication procedure of an organization. Communication is basically a relationship between a pair of participants defined as a sender and receiver. Our approach to communication focuses primarily on the effects that procedure may have on the receiver.

#### Definitions

Communication may occur between a sender and receiver whose organizational positions are either adjacent or nonadjacent. Adjacent positions are within management, between supervisor and worker, and within the workforce itself.

Communication may also be described as flowing upward or downward. Communication flows upward when a message is directed toward top management, and downward when it is directed toward the rank-and-file of the workforce.

### Dimensions

Procedure may be understood as having four dimensions: reference and requisition, and reciprocity and redundancy. Each of these dimensions may be observed in at least two states. Reference is concerned with the organizational position of sender and receiver. The states of reference are concerned with whether or not a message is received. Requisition refers to whether or not the receiver makes a request for communication. Reciprocity refers to the degree to which communication flows back and forth between sender and receiver. Reciprocity may assume one of three states: two-way, one-way, and zero-way. One-way communication means that only one receiver is included in the communication. Zero-way means that communication, which may be expected to flow between two positions, does not in fact take place. Redundancy refers to the ascriptive similarity between sender and receiver. Redundancy may be assumed to be high within management and within the workforce, and to be low between management and the workforce. This assumption, however, may be tested empirically in specific cases.

### Effects on Conduct

The observed state of each dimension is assumed to generate a vector that affects the conduct of the incumbent in the receiver's position. A vector may be positive, negative, or neutral in its direction; a neutral vector may or may not add stress to the incumbent.

Positional conduct refers to the stress, status, and strain on the incumbent of a position as the result of vectors aggregated from procedure. Stress is defined as the total pressure on the position. Status is defined as the degree of esteem accorded a position because of communication. Strain represents the ratio between status and stress: if all the pressure is in the same direction, strain is lowest.

Organizational conduct refers to the input, output, efficiency, and stratification resulting from vectors generated by procedure. Input includes all vectors in the system. Output refers to the direction that these vectors take. Efficiency is the ratio of input to output. Stratification refers to the differences in status between positions as the result of communication procedure.

### Conditions

The present and three future conditions of procedure are considered in terms of the hypothesized effects they may have on positional and organizational conduct.

At present, reception is assumed to occur between adjacent positions, upon request. Reciprocity may be either two-way or one-way, and redundancy is assumed to be high within organizational segments and low between segments.

Future management information systems are examined under three conditions: (1) Reception is between adjacent positions, without the need for request. Reciprocity is

two-way, and redundancy is unaffected. (2) Reception is between adjacent positions and also upward, without requisition. Reciprocity is two-way between only adjacent positions, and one-way for upward positions. Redundancy is not affected. (3) Reception occurs between all positions, without request. Reciprocity is two-way between all positions, and redundancy remains the same as at present.

The definition of the present situation takes into account that communication proceeds up and down the line through formal channels, each showing reciprocation, but each requiring a requisition in order to be informed. The first future condition, involving a management information system, assumes only that the need to requisition information has been changed: system utilization requires that all positions input information to the bank, and that adjacent positions have direct access to such information without formally requesting it. The second future condition builds on this assumption, adding that each upward position in the organization has access to all downward positions' informational inputs: positions within the line structure continue their adjacent relationships, however, the more upward one's position, the more access he has without request to information from downward positions. The third future condition assumes that all positions input to the information system, and all have access to that information, without requesting it.

Hypothesized Effects

The hypothesized effects of the present and future management information systems are presented in Table 1. We will consider these effects comparatively.

At present, stress is greatest upon the lower ranking managers and higher ranking members of the workforce. A minimal shift, as in the first condition, should not change this emphasis. Under the second future condition, stress increases on lower and middle management, and substitutes top management for the skilled workforce. In the third condition there is more stress on all positions.

Status is moderate at present, for both the rank-and-file and other positions. The first and second future management information conditions increase status, but the third condition reduces the rank-and-file's status while improving that of other positions.

Lowest strain is 1.0, meaning that all vectors contribute in the same direction to a position. Under the present condition, strain is greater toward the middle of the organization. The first future condition reduces strain on middle management and the skilled members of the workforce more than for other positions. The second condition increases the strain on top management, reducing it on other positions; while the third condition increases the strain on the rank-and-file, while reducing it for other positions.

Input is not affected under the first condition,

Table 1

## Hypothesized Effects of Future Management Information Systems

DIMENSIONS	PRESENT	FUTURE CONDITIONS		
		FIRST	SECOND	THIRD
Reference	Adjacent	Adjacent	Adjacent & Upward	All Ways
Requisition	Yes	No	No	No
Reciprocity				
2-way	Adjacent	Adjacent	Adjacent	All ways
1-way			Upward	
Redundancy				
Within	High	High	High	High
Between	Low	Low	Low	Low
CONDUCT				
Positional				
Stress	Middle Management Skilled Workforce	Middle Management Skilled Workforce	Top & Middle Management	All Positions
Status				
Rank-&-File	Modest	More	More	Less
Others	Modest	More	More	More
Strain				
Top Management	2.0	Less	More	Less
Middle Skilled Workforce	4.0	Much Less	Less	Much Less
Rank-&-File	4.0	Much Less	Much Less	Less
Rank-&-File	2.0	Less	Less	Much More
Organizational				
Input	12	12	18	24
Output	+4	+10	+10	+10
Efficiency	.33	.83	.56	.42
Stratification	0	1	1	4

but increases with condition two, and again under condition three. Output is low at present, and more than doubles under any future condition. Efficiency, input divided by output, appears low at present and under the third condition, and best under the first future condition: where messages do not have to be requested along the line. Stratification is low between positions at present, increases slightly under the first two future conditions, and greatly when communication proceeds without request in every direction.

#### Summary

We have presented hypotheses as to the effects on the conduct of incumbents of positions and organizations as management information systems change the procedure of communication. Our intention has been to stimulate empirical study and concern for the practical effects of possible alterations in access to information.

#### EDUCATION IN MIS

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In a recent paper, W. J. Peticord, Vice President for Personnel of the IBM Corporation, forecasts a need for approximately 200,000 management information systems specialists by the year 1975.<sup>1</sup> Meeting at the IBM Systems

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<sup>1</sup>W. J. Peticord, "Some Manpower Implications of the Computer Revolution," IBM private distribution.

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