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DESIGNING INFORMATION SYSTEMS TO SUPPORT CUSTOMER FEEDBACK: AN ORGANIZATIONAL MESSAGE SYSTEM PERSPECTIVE

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ABSTRACT

Because technological and feature advantages are short-lived, service after the sale is emerging as an important source of competitive advantage. One way for an organization to differentiate itself from its competitors on the basis of service is the way the organization handles customer feedback. However, before customer feedback can provide competitive advantage or even serve as a basis for decision support, the incoming messages must be captured and routed to the appropriate decision makers in the organization. This paper explores issues related to the design of information systems to support customer feedback from an organizational information processing perspective. After developing the position that all transaction processing systems are in fact organizational message systems, the paper reviews the logistical properties associated with three approaches for customer feedback systems based on the nature of the transaction processing activity associated with each approach: structured (comment cards), semi-structured (toll-free telephone lines), and unstructured (mail). Trade-offs between efficiency and information richness, and the potential roles for information technology are described for the three approaches. The paper concludes by describing the potential relationship between product attributes and the design of customer feedback systems.

1. INTRODUCTION

Service after the sale is emerging as an important source of profits as well as competitive maneuvering for all types of organizations. First, given basic similarities in many of the products and services currently available, competitive advantage may be especially difficult to sustain where the advantage sought is based solely on the design of the product or service. Lele (1986) and Lele and Karmarkar (1983) note that both technological and feature advantages are short lived. As a result, both firms and customers are focusing on service as a key differentiator (Sellers 1988).

One basis for an organization to differentiate itself from its competitors is the way the firm handles complaints from its customers. Two national consumer surveys conducted during the late 1970s found that between 10 percent and 32 percent of all consumers reported dissatisfaction with products or services that they purchased, and that a substantial number of these dissatisfied consumers complained to the firm providing the good or service. The actual complaint rates rose as the price of the product or service increased, with better than 90 percent of the consumers surveyed complaining when a product or service costing more than $1,000 failed to measure up to their expectations (Andreasen and Best 1977; TARP 1979). A follow-up study also sponsored by the Office of Consumer Affairs found that the volume of complaints received by business has increased since the 1979 study (TARP 1986).

Second, the message currently echoing across the United States is "get better or get beat" (*Business Week* 1987). Improved quality in the production and delivery of goods and services is essential if America is to compete successfully in the emerging global economy (for example, Peters and Austin [1985] and Reich [1987]). More than a decade ago, Fornell (1976) suggested that "gaps" in the upward communication between customer contact personnel and top management may account for top management having a less than full understanding of the consumer's expectations. The same warning was recently repeated by Zeithaml, Berry and Parasuraman (1988).

Improved quality is also dependent on effective horizontal communication to coordinate necessary adjustments to the various primary activities in the value chain (Porter and Millar 1985), such as the coordination of design change between engineering and manufacturing. The routing of customer feedback on a timely basis to the appropriate organizational units is a necessary component of the horizontal and vertical communication needed to promote quality and to maintain a competitive advantage. Feedback which occurs after the sale also serves as one input into the process of continuous innovation required to maintain a foothold in global markets (Reich 1987).

A variety of evidence suggests, however, that in fact communication gaps do exist between an organization's management and its customers, and among various functions within the firm. For example, a 1987 study

conducted by the Gallup Organization for the American Society for Quality Control found that only 13 percent of their sample of top executives relied on customer complaints to determine the quality of their firm's products or services (Skrzycki 1987). Consumers continue to express widespread dissatisfaction with the way business handles their complaints (Sellers 1988; Sterling 1979; TARP 1979, 1986).

While responding to complaints in a timely and satisfactory manner can prevent a customer from making an "exit" decision about the organization (Hirschman 1970), it can also be a source of revenue. One study found that for firms manufacturing consumer durables, every $1 invested in customer service resulted in $2 in benefits to the firm (Sellers 1988); another survey found the return on investment by corporate complaint handling units to range from 15 percent to 400 percent depending on the industry (TARP 1986).

In addition to registering complaints, consumers may contact a firm for a number of other reasons such as to pay a compliment, to seek information about the firm or its products, or to make suggestions. For example, NBC Television receives approximately 250,000 unsolicited suggestions, ideas and questions a year (Due 1987). When combined with complaints, all of these inputs can provide an important source of intelligence for organizations by serving as an early warning system to management about emerging problems, opportunities or trends, providing this information is routed on a timely basis (Keen 1986; Moriarty and Swartz 1989).

In responding both to complaints and other forms of inquiry, organizations also have an opportunity to structure the dialogue with consumers on its own terms. Prior research, however, provides few insights on how customer feedback is managed from the organization's perspective. Research on the development and use of systems to support customer feedback is also largely absent from the literature (Ives and Vitale 1988). However, before customer feedback can provide competitive advantage or even serve as a basis for decision support, the incoming messages must be captured and routed to the appropriate decision-makers in the organization.

The purpose of this study is to explore issues related to the design of information systems to support customer feedback from an organizational information processing perspective. The paper will first develop the position that all transaction processing systems are in fact organizational message systems. Next, the logistical properties associated with organizational message systems will be reviewed. Third, three approaches to designing customer feedback systems based on their respective logistical properties will be discussed. Finally, some of the product attributes which should influence the configuration of a customer feedback system will be introduced.

2. THEORETICAL BACKGROUND

2.1 Introduction

The traditional view of transaction processing is that transactional data processed at the bottom of the organization are routinely aggregated and communicated upward where they serve as one input to decision-making by top and middle managers (Anthony 1965). Organizations gain efficiency by developing rules to structure the handling of large volumes of routine data and procedures for handling the exceptions which invariably arise (Markus 1984). Transaction processing systems (TPS) play two important roles within an organization: as a major producer of information for other information systems, and as an organizational boundary spanner linking the organization with its external constituencies (Laudon and Laudon 1988). Viewed this way, transaction processing systems can be more generally characterized as one form of organizational message systems.

Figure 1 depicts this organizational message system view of TPS as a "figure 8" with upward and downward information flows converging at the point where individual transactions are processed. Messages from the external environment, in the form of both raw and summarized transaction data and exception reports, flow upward, providing feedback for management control. At the top of the organization, aggregated transaction data are combined with other sources of intelligence and used by top management to formulate the organization's strategy. The resulting goals are subsequently communicated downward and are used to adjust the rules used to make operational -- level decisions associated with the processing of individual transactions at the bottom of the organization.

2.2 Transaction Processing as an Organizational Message System

When transaction processing systems are viewed as systems to facilitate the routing of messages throughout the organization, transaction processing systems may then be designed and evaluated in terms of four fundamental logistical processes which characterize all message systems: message routing, message summarizing, message delay and message modification (Huber 1982). **Message routing** causes any particular message to be selectively distributed, thereby minimizing the risk of information overload by not routing messages to receivers who have little or no use for the information. **Message summarizing** serves a similar role by reducing the physical size of the message without any loss in content. Summarized messages, however, have the potential to convey less richness than the full message (Daft and Lengel 1986; Tamurz 1988). **Message delays** may be routine or excessive, and may occur in conjunction with message summarization. **Message modification** refers to the distortion of the meaning of the message, whether due to the motivations or the cognitive limitations of the sender or receiver (Huber 1982).
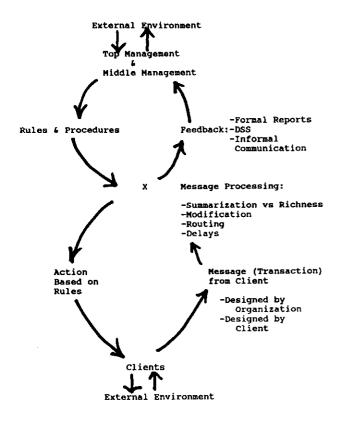
Figure 1. Information Processing Model of Transaction Processing

siting money to a bank account, charging a purchase to a credit card, or filling a sales order from inventory. Because the scope of these transaction processing activities is initiated or anticipated by the organization, the resulting transactions handled by these applications tend to be repetitive and homogeneous. In many cases, it is likely that the organization may have an ongoing relationship with the originator of any given transaction reflected by a master record in a database which also facilitates processing of the incoming transactions. Once these data have been captured, access to them can be provided through a wide variety of computer-based information systems ranging from structured reporting systems to decision and executive support systems.

Because customer feedback transactions are initiated by the customer, these transactions potentially represent a source of equivocality for organizations that may not exist with the homogeneous and repetitive transactions described above for two reasons. First, an individual may contact an organization on a wide range of unanticipated topics for which the organization may have no standard response, resulting in a large number of exceptions. Second, many of these transactions may be text-based (e.g., complaint letters), and natural language text is inherently more ambiguous than numeric data. If the organization does not intervene, both the format and the content of each transaction remain under the control of the sender. However, by designing systems for gathering customer feedback, much of this equivocality can be reduced. The remainder of the paper discusses alternative designs for customer feedback systems from an organizational message processing perspective.

These four processes affect the availability of information for decision-making or coordination by either facilitating or inhibiting the timely dissemination of information. The efficiency of the message system is a function of its ability to route and summarize messages. Delays and distortion occur when organizational sub-units exercise discretion in message processing (Huber 1982). The failure of "messages" from the processing of customer feedback transactions to reach the appropriate decision-makers in an appropriate format and in a timely manner can negatively affect the organization's overall performance (Fornell 1976; Fornell and Westbrook 1984). However, as stated above, these logistical issues reflected by the right side of the "figure 8" in Figure 1 have received little attention in the literature.

3. DESIGN ALTERNATIVES FOR CUSTOMER FEEDBACK SYSTEMS

A range of methods exist for customers to communicate with organizations, and each method carries with it a different set of costs and benefits to the organizations. Table 1 summarizes the logistical properties and the potential role for information technology for three approaches to the design of customer feedback systems. The three approaches are based on the extent to which rules may be formulated to structure the processing of the incoming transactions (Gorry and Scott Morton 1971). In the next section of the paper, one representative application for each approach will be discussed in turn. This discussion will focus on the issues related to the upward transmission of messages generated from customer feedback transactions as pictured by the right side of the "figure 8" diagram in Figure 1. While the rules used to structure the processing of transactions within a given approach as reflected by the left side of the "figure 8" diagram in Figure 1 has a direct relationship on the messages subsequently transmitted to management, a discussion of these issues is beyond the scope of this paper.

2.3 Customer Feedback versus Other Transaction Processing Applications

For most of the primary activities in the value chain (Porter and Millar 1985), the related transaction processing activities involve highly formatted, fixed-field numeric transactions such as submitting a purchase order, depo-

Table 1. Summary of Customer Feedback Options

Nature of Transaction Processing Activity:

	More Structured ————>		More Unstructured
FEEDBACK MECHANISM	Formatted Questionnaire or Comment Cards	Toll-Free Telephone Lines with Database	Mail/Letters Videotapes Unstructured Comment Cards
EXAMPLES	Most hotels Other firms	GE Answer Line · OTISLINE IBM's INFOexpress	All Organizations (mail) British Airways (video)
POTENTIAL ROLE FOR IT	HIGH————>		LOW
Capture/Record	OCR/Key Entry Build DBMS for statistical analysis	Key Entry	OCR/Key Entry
Process	Word Processing	DBMS to answer questions	Word Processing
Reporting	DSS/MIS	DSS/MIS	Tabulate WP replies Image DBMS
LOGISTICAL PROPERTIES:			
Routing	FASTER————>		SLOWER
Summarization	EASIER————>		MORE DIFFICULT
Delays	FEWER————>		MORE
Distortion	LESS LIKELY————>		MORE LIKELY
MSSG RICHNESS	LOWER————>		HIGHER

3.1 Structured Transaction Processing: Comment Cards

The majority of hotels in the United States provide "comment card" forms in the guest rooms to gather feedback from their customers. These pre-addressed forms generally consist of a one-page questionnaire which asks the guest to rate his/her satisfaction with various aspects of the hotel such as the quality of the room, restaurants, and service received from hotel personnel. Space is also provided for the guest's name and address. Comment cards are also used by a wide range of other organizations.

Where the comment card processing activity is supported by a computer-based information system and a database, the **routing and summarizing processes** of the message system are likely to promote widespread availability of information which can support decision making. If summary reports are available by product or service, the probability of overload to the message recipient is minimized. If the database is available throughout the organi-

zation, messages within the database are widely available to support decision-making rather than having access independent of perceptions of message relevance to a given individual (Huber 1982).

The extent to which message availability may be jeopardized by either **delay or modification** is also a function of technology. Where individual forms may be scanned by optical character recognition equipment, delays are minimized. At the other extreme, manual processing of forms is likely to result in delayed routing of summarized messages. However, manual processing may insure that individual exceptions meriting immediate attention are handled without delay.

Message content may also be subject to delay or modification depending on the point where the forms enter the organization. In the case of hotel chains, if comment forms are returned to the management of the individual hotels, message delays are likely to result in transmission from the individual hotel to the corporate offices. In this situation, there is also a greater probability that messages about poor performance will be distorted by the offending hotel before the message is transmitted upward (Huber 1982).

Finally, the use of the questionnaire as the vehicle for gathering customer feedback may cause the actual message the customer intends to send to be modified. First, the physical design of the questionnaire may convey a distorted message because the physical form and/or the questions themselves are poorly designed. The nature of individuals who choose to return comment cards represent another potential source of distortion, although this is less of a potential problem when a large volume of cards are returned. For example, Marriott estimates that it receives approximately 750,000 completed cards per year (Sellers 1988).

3.2 Semi-Structured Transaction Processing: Toll-Free Lines

A number of organizations including General Electric and Polaroid have installed toll-free telephone lines (800 numbers) to respond to customer inquiries and complaints. Often these systems are supported by a database containing product information (Porter and Millar 1985; TARP 1986). These systems are examples of semi-structured transaction processing applications because unlike the comment cards described above, where the information is collected by means of a fixed-format form, the operator who receives the call must exercise judgment to match the caller's query with the appropriate section of the database, at which point further processing becomes routine. Comment cards which include narrative comments are also examples of semi-structured transactions as the written comments may require analysis based on individual judgment before they can be processed.

As with the comment cards, the database system provides a means to generate "messages" about customer satisfaction with and attitudes about the organization and its products. As the operator pages through the database to locate the answer to the caller's query, the system can develop the "text" of the message by recording the identity of the various screens that are viewed. For example, General Electric may receive a number of calls about how to operate a certain feature on one of its products. From these messages, management may infer that it needs to improve the documentation accompanying the product. This type of system also has the potential to tag messages with demographic data about the caller such as the caller's location if these data are gathered by the operator.

The logistical properties of a toll-free number supported by a database system are similar to those for structured comment cards described above. **Message routing** is likely to occur in the same way as with the comment cards. Safeguards against information overload are again provided by the system. Whether the system is supported by a computer or not, **summarization** provides the potential for loss of message content when the text of the original message conveyed by a rich communication medium, voice, is summarized either by the person taking the call or by the system as it records screens which are viewed. Technology will also affect **message delay and message modification**. Without automated data collection, delays in information availability are likely to occur as the workload of the unit processing the incoming calls increases (Huber 1982). Message modification is more likely to occur as the number of links over which a message must travel increases (Huber 1982).

Two variations on this type of system are Otis Elevator's Otisline System, which is used to manage customer service, and IBM's INFOExpress system which allows certain IBM customers direct online access to technical support information and information about various IBM publications, rather than accessing the system through an intermediary. While neither system was specifically design to support customer communication, both Otis Elevator and IBM still have the ability to electronically track "inquiries" by customer (Bruns and McFarlan 1987; IBM 1985; Stoddard and McFarlan 1986).

3.3 Unstructured Transaction Processing: Individual Letters

All organizations that deal with the public receive mail, whether or not they have instituted other mechanisms such as those described above to promote access to the organization from the client's perspective, and to facilitate message processing and information availability from the organization's perspective. Unless an organization is the target of an organized mail campaign, where a large volume of identical letters or postcards are received, mail processing tends to be a highly labor-intensive activity as

every letter must be read and analyzed and tabulated in order to create messages which are potentially useful to management. For example, a major hotel chain which developed a sophisticated decision-support system to analyze comment cards was unable to apply the same system to letters it received. For the letters, the primary "messages" developed for consumption by management consisted of simple cross-tabulations for each property.

One way that an organization may facilitate the creation of **summarized messages** about the mail is to develop a computerized library of standard responses and to answer all letters using this library. New entries are created for the library as new issues arise. When a letter is answered, the obvious assumption is that the reply is responsive to the subject of the incoming letter. By tabulating the number of times a particular paragraph or letter is sent, the system generates messages similar to those generated for toll-free lines when the system records the screens used by an operator to respond to a phone call. To fully utilize these procedures, however, all letters must be answered as unanswered letters will not be counted in the summary totals. In addition, by using structured fields in the reply letter, the organization may augment the message content with demographic information such as zip code (Malone et al. 1987). In the event of mass mailing campaigns, another form of summarization occurs when the identity and position of the organization behind the mailing campaign is learned (Culnan 1989).

Routing delays may occur because of the amount of manual screening that is required or because letters are not addressed to the unit within the organization which is assigned responsibility for answering mail. For example, an individual may write to the CEO of an organization when, in fact, the mail is to be answered by the unit with actual responsibility for the customer's concern. If the text of the letter is ambiguous, additional routing delays may result. In contrast, for the case of the comment cards, the cards are pre-addressed to arrive at the department which has responsibility for their processing, thereby minimizing routing delays.

Messages resulting from the processing of mail are more prone to **modification** than messages resulting from either comment cards or toll-free lines. Due to the amount of individual handling required to process a single letter, there is a high probability that the unit responsible for processing the mail will be subject to overload; message distortion is one strategy to cope with this overload (Huber 1982). For example, anecdotal evidence exists about employees destroying correspondence when the volume of incoming mail exceeded the ability of existing personnel to process this mail within the workrules of the sub-unit (Farnham 1989).

Because letters consist of unstructured text, technology plays a minimal role in improving the efficiency of message processing. While advances in scanning and imaging

technologies may facilitate the recording of text-based transactions, automatic indexing is currently feasible only for fixed-field records. As a result, letters must still be indexed or tabulated manually. Further, unless the customer has an ongoing relationship with the organization, there may be no sound business reason for creating a permanent record of all incoming letters.

These logistical issues aside, letters and other messages consisting primarily of unstructured text such as the videotaping of passenger complaints by British Airways (Sellers 1988) are substantially richer than the messages which are communicated by other media. As a result, these text-based messages are likely to be more successful in gaining the attention of top managers than traditional structured reports consisting of summarized numeric data (Daft and Lengel 1986). For example, at Lands End catalog company, a computer printout of customer comments is routed to managers once a month (Sellers 1989). In other organizations, the CEO sees a sample of incoming mail on a regular basis (Culnan 1989; Sellers 1988).

3.4 Summary of Logistical Issues

In summary, customer feedback systems are likely to function most efficiently when the data are received and processed at a single location, when the incoming data are structured, and when the system itself is computer-based with online access. The descriptions of the three methods suggests, however, that a number of trade-offs are involved in the design of effective customer feedback systems.

The use of a highly-structured application such as formatted questionnaires or comment cards, for example, makes it feasible to develop computer-based systems facilitating organizational access to the information, but at the expense of the richness conveyed by natural language (Daft and Lengel 1986; Tamurz 1988). When organizations develop systems in order to make use of information technology to summarize and route customer information very rapidly, they may lose the early warning capabilities that may exist in a system which accepts less structured inputs and as a result requires more human judgment to process individual transactions. However, the inherent difficulties in building computer-based systems which promote access to text increase the probability that messages will be subject to delays and other logistical errors (Huber 1982; Keen 1986; Malone 1987) As the use of imaging technology becomes more widespread, some of these obstacles will be eliminated, assuming there is business value to be derived from creating a permanent record of all incoming customer communications.

4. PRODUCT ATTRIBUTE INFLUENCES ON SYSTEM DESIGN

Logistical issues alone provide no clear guidance for the appropriate design of a customer feedback system. The design of an effective system should also be a function of the product attributes. The remainder of the paper will briefly review some of these factors, and will develop examples for illustration. An exhaustive treatment of these issues, however, is beyond the scope of the present paper. The nature of the product has a direct bearing on the design of a customer feedback system. Product attributes affect the relationship between the organization and its customers, and subsequently shapes the opportunities for gathering customer feedback. In the marketing literature, products are classified into three groups according to their durability or tangibility (Kotler 1986, 1988):

1. Nondurable, tangible goods normally consumed in one or a few uses,

2. Durable, tangible goods that normally survive many uses, and

3. Services consisting of essentially intangible activities, benefits or satisfactions. Because services are typically produced and consumed simultaneously, customers are participants in the production and delivery processes (Bowen and Schneider 1988).

In addition, services may accompany a tangible good such as a warranty or a maintenance contract on an appliance, or tangible goods may accompany a service such as food and drinks that are served during a flight (Kotler 1988). The specific attributes of a particular product determine whether or not the customer has an ongoing relationship with the organization, and in part shapes the opportunities for structuring customer feedback.

An organization's product mix consists of the set of all product lines and individual items that an organization offers to its customers (Kotler 1988). The dimensions of an organization's product mix include its **width** (number of different product lines), **length** (total number of items), **depth** (variations within a product line) and **consistence** (how closely related are the various product lines). The following examples are illustrative of some of the ways that product attributes might be matched with the three types of customer feedback systems.

4.1 Comment Cards for Hotels

Hotel accommodations are a service which is largely produced and consumed in a single location, the hotel itself, and which is characterized by shallow depth. The limited number of variations within the product line make it feasible for a well-designed comment card to capture all relevant dimensions of the service. As large hotel chains represent a long and consistent product line, use of a standard comment card allows top management to readily compare performance across properties. Because the service is consumed on-site, distributing comment cards to clients is a low-cost proposition for the organization, and the cards are readily accessible to the customers.

4.2 Toll Free Lines for an Appliance Manufacturer

Appliances are durable goods where use occurs away from the production site and the product life for the customer may extend over a long period. The organization's product mix is likely to be wide, long, and lack consistency. The use of a toll-free line makes the organization accessible to the customer over the entire life cycle for all products in the mix, and centralizes the collection of data for the entire product mix using a single system in a single location, minimizing the probability of logistical errors. In addition, this option has the advantage of providing immediate responses to customer questions related to the ongoing use of any product in the mix.

4.3 Letters for a Pet Food Manufacturer

Pet food is a non-durable good where use occurs away from the production site and the product life is very short. As a result, the customer is likely to have contacted the organization after the product has been consumed. The manufacturer may encourage customer feedback and minimize some logistical errors by printing its address on the label of the can or box. It is also assumed that the product mix is characterized by narrow width, short length, shallow depth and consistency. These characteristics eliminate much of the equivocality which may characterize mail handling in other contexts (Culnan 1989).

5. CONCLUSION

Customer feedback may serve as a potential source of competitive advantage for organizations, provided these inputs are captured and routed to management in a timely and efficient manner. However, issues related to the design of customer feedback systems has been largely neglected in the information systems literature. Customer feedback transactions differ from other familiar transaction processing applications which tend to be repetitive and homogeneous because, in the former case, it is the customer who initiates the transaction. Since an individual may contact an organization on a wide range of unanticipated topics for which the organization may have no standard response, customer feedback transactions have the potential to represent a source of equivocality for organizations. The challenge to organizations is, then, to structure the dialogue with their customers through the design of customer feedback systems which minimize the potential for logistical errors that may plague all organizational message systems, while maximizing the probability that the system will gather useful information (Huber 1982).

The paper reviewed three approaches for designing customer feedback systems which vary in the extent to which the associated transaction processing activity could be structured, discussed the logistical properties associated with each approach, and the potential supporting roles for information technology. The paper concluded with a brief discussion of the influence of product attributes on the design of customer feedback systems. This paper represents a preliminary discussion of the issues related to the design of customer feedback systems. In particular, product attributes and other issues drawn from the marketing literature merit further attention if accurate prescriptions about the type of system which will be most appropriate for a specific product mix or industry are to be developed.

There is also a need for both conceptual and empirical work which seeks to understand the relationship between the logistical characteristics of various system configurations and organizational variables in order to make similar prescriptions for a variety of organizational contexts. For example, future research could focus on the influence of workflow technology, organizational structure or culture on the functioning of various system configurations.

Finally, it will be important to understand the appropriate role information technology should play in these systems which process unstructured text. How can new imaging, storage and communications technologies enhance the processing of customer feedback transactions, and at what costs? Will new technologies allow for automated processing of very rich incoming messages? As it is expected that organizations will face external environments which are increasingly turbulent, an understanding of the issues which lead to appropriately-configured customer feedback systems will be needed in order to facilitate intelligent decision-making by organizations and subsequently to promote competitive advantage.

6. ACKNOWLEGEMENTS

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