# Will Cross Functional Information Systems Work?

*Yes, if the corporate culture fosters cooperation, not conflict, among individuals and work groups.*

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**A culture that supports cooperation encourages managers to share information.**

With the latest advances in computer technology, information can be shared more easily across corporate functional areas and departments—a potential opportunity for accountants and others who want to take a more proactive role in decision making. These cross functional systems use the benefits of database technology to allow collaboration among a company's managers, which has become increasingly important in the emerging global business environment.

Shared information systems have not received unanimous acceptance because of concerns about increased intergroup conflict and information overload. To maximize the benefits and minimize the concerns, decisions about sharing an information system must consider both *people* issues and *technological* issues. People issues include organization culture, work units, and individual decision makers. Technological issues include information system elements and level of access.

## PEOPLE ISSUES

The impact of an information system on people should be addressed at three levels: organizational, work units, and individual. Organizations, the broadest level, have distinct cultures that affect interactions among employees. Work units, the next level, are functional areas or departments. They are related to or dependent on each other in a number of ways—from totally independent to mutually dependent for all resources. The type of relationship affects the interactions among work units. Individual decision makers, the third level, use various decision-making styles to handle different types and quantities of information.

*Organization Culture.* Corporate cultures support cooperation or encourage conflict. A culture that supports cooperation encourages managers to share information about business decisions. Its performance measures are designed to foster a cooperative atmosphere and are more companywide in orientation. In general, managers in this type of environment are less tense, feel that group interactions are beneficial, and are willing to continue to work together and share resources.

A competitive corporate culture, which thrives on individual and work unit competition, provides an opportunity for conflict. In a competitive environment, performance measures focus an individual decision maker on those issues that will maximize local performance. In this case, managers usually are not interested in working together. They are more tense, are not willing to share resources, and feel that group interactions are a waste of time and are potentially dysfunctional.[1]

**TABLE 1/COMBINATIONS OF INFORMATION SYSTEM ELEMENTS**

| Number of Shared Elements | Shared Elements |
|---|---|
| None | None |
| One | DATA<br>DECISION MODELS<br>REPORTS |
| Two | DATA and DECISION MODELS<br>DATA and REPORTS<br>DECISION MODELS and REPORTS |
| Three | DATA, DECISION MODELS, and REPORTS |

Performance measures may reflect organizational goals (for example, profit, cash flows, return on investment, market share), work unit goals (such as cost minimization, forecast accuracy, sales maximization), or individual goals (for example, promotions or raises). When these performance measures reinforce each other, the decision maker can use the shared information system to achieve the congruent goals. When these performance measures do not reinforce each other, the individual decision maker faces a dilemma. The decision maker faced with incongruent goals may use a shared information system to maximize his/her own goals, which may be dysfunctional to other individuals and to the organization.

*Work Units.* Functional area work units are a result of organizational decentralization, which is intended to allow specialization of efforts, to reduce resource duplication, and to establish lines of authority for control and for streamlining decision making. One advantage of specialization is an increase in efficiency of operations, which helps achieve organizational goals. A disadvantage of specialization along functional areas is the potential to lose sight of the necessity for coordinating functional area decisions.[2]

Interdependence, which occurs when one group is dependent upon another functional area for resources, work, or information, increases the need for coordination among work units.[3] Functional areas are laterally interdependent when products and/or information is shared between them. There are many interdependent relationships within an organization, for example, the relationship between sales and manufacturing. Sales provides information to manufacturing about what products to produce, in what quantities, and when they will be needed. Manufacturing provides information to sales about what products are available, the quantities available, and future availability. The specific nature of the relationship—the direction of the flow of resources—may impact the outcomes of a shared information system. A cross functional or shared information system has the potential to foster coordination of interdependent groups.

*Unfortunately, a cross functional information system can be a double-edged sword...spurring conflict as well as cooperation.*

The desired outcome of sharing information is the cooperation of interrelated functional area groups, assuming that the managers making the decision will have a more complete picture of the organization. The broader picture allows the manager to consider all ramifications of the decision and choose the alternative that will benefit the organization most.

Unfortunately, a cross functional information system can be a double-edged sword. One possible negative outcome is the introduction of or increase in conflict between the interrelated areas. Historically, middle-level managers, who make the decisions for the functional area, have been perceived as specialists, not integrators. In a shared information environment, some managers may experience increased job-related tension and feel that other managers, who may be reacting to increased tension, are uncooperative.[4] In addition, functional area goals, performance evaluations, and/or the organization's reward structure may encourage competition. As managers use the newly available cross functional information to improve their local performance, competition increases as they fail to assist each other and look out only for their own interests.[5]

*Individual Decision Maker.* Although groups or functional areas are associated with certain types of decisions (for example, marketing makes forecasting decisions), individuals *make* the decisions. With the advances in information technology, a greater quantity and variety of information is available for them to use to decrease uncertainty about the decisions. Automated decision models that structure problems help managers organize and process larger quantities of information, further reducing uncertainty in decision making.

At some point, the additional information has no marginal value, or the decision maker no longer is capable of processing the information. Even with the aid of decision models, the quantity of information becomes too great, and the decision maker no longer is able to use the additional information effectively. Such information overload is costly in both decreased decision-making performance and increased costs associated with providing the additional information.

Another concern about sharing information systems is that a manager unintentionally may misinterpret or misuse the cross functional information system, perhaps because of lack of training or incomplete information (for example, the manufacturing manager may not know that the sales forecast was off because of an unusual event). Cross functional training may alleviate some of the problems associated with the lack of understanding of another manager's information system. Face-to-face meetings may give managers necessary informal information. Presumably, a manager who understands a colleague's responsibilities would be less likely to take advantage of power shifts, less likely to be overloaded, and more likely to demonstrate improved decision making at the organization level.

A shared information system has the potential to provide positive or negative effects at both the work group and individual level, and, ultimately, organization goal achievement is affected. The effects on the people within an organization can be controlled by careful consideration of the type of technology the company implements.

## TECHNOLOGICAL ISSUES

Technological issues consider the three elements of an information system (inputs, processors, and outputs) and the level of access users have to these elements. The level of access ranges from a minimum—information is

## TABLE 2/SHARING THE ELEMENTS OF INFORMATION SYSTEMS

| Elements | DATA | DECISION MODELS | REPORTS |
|---|---|---|---|
| Levels of Access | NONE | NONE | NONE |
| | READ only | READ output, rerun existing models | READ only |
| | READ and TRANSFER | READ and TRANSFER | READ and TRANSFER |
| | READ, TRANSFER and WRITE | READ, TRANSFER and WRITE | READ, TRANSFER and WRITE |

available only to those who "need to know"—to a maximum—all parts of the information system are accessible to all users. In today's advanced technological environment, various combinations of information system elements and levels of access are possible to meet organizational needs.

*Information System Elements.* Sharing an information system is not necessarily an "all or nothing" proposition. The data (inputs) or the decision models (processors) or both may be shared. One of the underlying assumptions in sharing data and decision models is that improved communications and decision making will result by reducing the uncertainty associated with incomplete information.[6] Shared data provide a more complete picture of the cross functional manager's environment. Decision models help organize the data and provide additional insight as to how the cross functional manager makes decisions.

The reports (outputs) produced by the information system may be shared via paper copy or computer access. Feedback reports that provide information about performance after an event has occurred tend to improve individual decision making and are used to guide future decision making.[7] Reports from other functional areas are one possible mechanism to coordinate work groups that are interdependent. When managers review performance reports from cross functional areas, they should get a broader picture of the effect of a prior decision and an understanding of the cross functional manager's abilities.

Taking into consideration the three elements discussed above, eight different information system combinations are possible (see Table 1). At the minimum, no components of the information system are shared between the functional area managers, and, at the maximum, *all* components of the information system are shared. When deciding what elements to share, management should weigh the benefits of the technology (that is, minimize redundancies in data and model storage and report generation; ease updating of data items, model modifications, and report formats; increase the consistency of data, models, and reports across functional areas) against the cost of the technology (that is, hardware, software, personnel, and costs to implement and maintain advanced technology).

Another important consideration is how often specific data items, decision models, and reports are used. Some data items may be basic business knowledge and need to be verified only when their value changes (for example, wage rates, selling prices, material costs). Other information may provide ongoing benefits and may need to be accessed regularly—for instance, productivity reports.

*Level of Access.* Advances in computer technology also let companies regulate access to each element of an information system. Often this regulation is part of the internal control structure of the information system. In fact, some users may have no access (no rights) to certain elements of the information systems (for example, pay rate data usually are confidential, and access to them is strictly limited). The most basic form of sharing the elements of an information system is to permit users to see the formal information system of a colleague, verify information, and perhaps rerun existing decision models or application (READ). Users may not manipulate or change the information system in any way.

To increase access, users are given rights to READ and TRANSFER elements of the cross functional information system to their work space. The ability to TRANSFER the contents of an information system permits additional analyses (for example, "what if" and modifications of decision models or applications), but the user may not change the original information system.

The most extensive form of access is to permit users to READ, TRANSFER, and WRITE (update, modify, or change) to the cross functional information system elements (Table 2). This level of access gives multiple users, including the manager of another functional area, the ability to change the original information system. Users may change the cross functional information system by accessing an information system element directly or by transferring an element to their work space, making a change, and transferring the modified element back to the original storage area.

The issues of control and in-

## TABLE 3/AN EXAMPLE OF SHARED INFORMATION SYSTEM ELEMENTS

| | SALES MANAGER | MANUFACTURING MANAGER |
|---|---|---|
| DATA | historical sales, open orders, prices, sales force availability | inventory on hand, open orders, bills of materials, vendor requirements, labor force availability |
| DECISION MODELS | forecasting models, pricing models | inventory models, labor scheduling models |
| REPORTS | forecast accuracy, productivity, sales force utilization | inventory status, machine utilization, productivity |

tegrity of the information are inherent in a shared information environment. When managers have the ability to TRANSFER and manipulate the contents of the information system, the potential exists for discrepancies between the manipulated information and the information maintained by the organization. Additionally, as new pieces of information become available, the information that was transferred to an individual's work space will not be updated. These discrepancies may cause confusion in group decision making.

Discrepancies may be minimized when several managers have the ability to update an information system, but when more than one user can change an information system, the technical issues of multiprocessing must be addressed. Also, ownership of the contents must be established to assure the ongoing accuracy of the information system.

*When several users can change an information system, ownership of the contents must be established to assure accuracy.*

## SHORT-TERM SALES AND MANUFACTURING: AN EXAMPLE

A number of sales/manufacturing interdependence situations occur where cooperation is needed but where there is a strong likelihood of conflict. For this example, we'll concentrate on the information flow for short-term sales and production scheduling decisions.

The basic information flow consists of a forecaster from sales providing forecasts and orders to manufacturing, a manufacturing manager making scheduling decisions and informing sales of product availability, and the sales staff making selling decisions. This situation is an example of a reciprocal interdependence relationship at the operational level within an organization. Decentralization implies that the sales and manufacturing managers are highly specialized in their area.

To prepare forecasts and write orders, the sales department relies on the formal information system for data about historical sales, open orders, prices, and the available sales force, among other items. The sales manager uses forecasting models and pricing models to assist in the decision-making process. Reports indicating forecast accuracy, sales force use, and productivity provide information on performance and help adjust the decision-making process for upcoming periods.

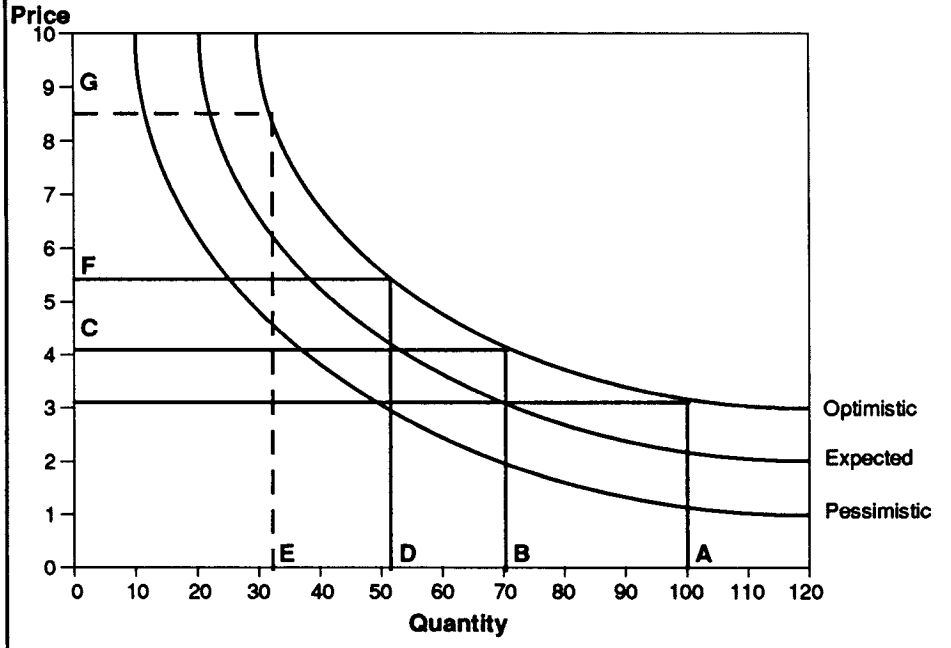
To schedule production, the manufacturing manager relies on the formal information system for data about open orders, inventory on hand, bills of materials, vendor requirements, and the labor force, among other items. The manufacturing manager uses inventory models and labor scheduling models to assist in the production scheduling process. Feedback reports on inventory status, labor productivity, and machine utilization provide information on performance and help adjust the production scheduling for the upcoming periods. The level of shared access for each of these information system elements may take any of the forms described above (see Table 3).

One example of sharing a subset of the data items is the open orders report. Manufacturing relies on open orders reports, generated in the sales area, to facilitate production scheduling. Sales prices, however, usually are not on the manufacturing department's copy of the report.

Here's an example of sharing a complete set of cross functional information system elements: When the manufacturing manager has access to the historical sales, the forecasting models, and the forecasting accuracy reports, then this access might encourage cooperation or conflict between the sales and manufacturing work units.

Cooperation is fostered if the

**FIGURE 1/POSSIBLE SALES–MANUFACTURING REACTIONS**




The following example is a basic illustration of intergroup conflict in a shared information environment. Sales submits an optimistic forecast (A) to manufacturing. Because the production manager has access to the sales information system, the quantity produced is reduced to the expected amount at the stated selling price (B) to avoid carrying excess inventory and incurring additional production costs. The sales manager, observing that manufacturing reduced the production quantity, increases the selling price (C) to improve sales revenue and not get caught short on product availability. Given this cycle of events, the production manager reacts to the increased selling price by again reducing the quantity produced to D (conservative reaction) or E (extreme reaction). The sales manager reponds by raising the selling price to point F (or G). In short, the two managers, by the nature of their reactions, are no longer able to work together for the good of the organzation. At some point, a higher level of management will have to step in and arbitrate the situation; which is not usually the best way to build a cooperative environment.
(Adapted from Ackoff, 1967)

manufacturing manager uses the sales histories and forecasting models to understand better any requests for products and then schedules production to support the sales force. Reports on the forecast accuracy further support cooperation between sales and manufacturing by indicating the sales department's accuracy in forecasting and hence its expertise in the area.

Alternatively, the manufacturing manager may question the request for products based on historical sales. Using the available forecasting models, the manufacturing manager may re-evaluate demand to avoid being "stuck" with excess inventory in the factory. Intergroup conflict between sales and manufacturing will result if the sales manager perceives that the manufacturing manager does not trust his or her decisions.

In the iterative process between sales and manufacturing, the sales department increasingly will be inclined to submit optimistic forecasts, while manufacturing will continue to re-evaluate to a lesser forecast (Figure 1). The manufacturing manager's access to the sales department's feedback reports, indicating the accuracy of the sales forecasts, should decrease the above dysfunctional interaction. As the iterations between sales and manufacturing continue, however, forecast accuracy will worsen, providing additional evidence for the manufacturing manager.

Access to the cross functional information system elements also will affect the individual sales and manufacturing managers. Additional information may reduce uncertainty about manufacturing decisions (for example, by providing an explanation as to why sales forecasts are higher than previous periods) or reduce uncertainty about the motives or qualifications of the sales manager (for instance, by indicating a good "track record" in forecast accuracy). Because decentralization emphasizes specialization of labor efforts, too much sales information may overload the manufacturing manager as sales is not his/her specialization. Also, the manufacturing manager is not likely to be as familiar with forecasting as is the forecaster and may spend unnecessary time attempting to duplicate the efforts of the sales force.

## CONCLUSIONS AREN'T UNANIMOUS

Improved cooperation and integration among functional areas is one goal of cross functional information systems.[8] Individual managers have access to a broader information set, which is proposed to reduce uncertainty in the decision-making process, provide insight into interrelated areas, and encourage a more holistic approach to decision making. Although the technology exists and has been implemented to some extent in a few organizations,[9] these advances have not received unanimous acceptance.

The objections raised by functional area managers include the possibility that other managers may use the shared information to maximize personal goals at the expense of others, significant redistributions of power may occur, information overload may result, and the lack of knowledge necessary to interpret and/or use information from another functional area properly may cause unintentional problems. Both the advantages and disadvantages of cross functional information systems must be evaluated at the work unit level and at the individual level, given the organization culture. The evaluation process should consider the possible levels of providing access and the combinations of the elements of the information system (see Table 4). Only then can a company decide whether to share information across functional areas and what tradeoffs will be involved. ■

**TABLE 4/OPPOSING OUTCOMES OF SHARED INFORMATION**

| | BENEFITS | COSTS |
|---|---|---|
| Elements | minimize redundancies, ease of updating, increased consistence, organize data, global view, understand cross functional view | hardware, software, personnel, increased quantity of data, decision models, reports for each manager, unfamiliarity, lack of training |
| Access | broader understanding, extended analysis | control, integrity, accuracy (ownership) |
| Organization/Work Units | cooperation | conflict |
| Individual | minimize uncertainty, improved decision making | overload, unfamiliar information |

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