

- Carroll, Stephen J., and Dennis J. Gillen. "Are the Classical Management Functions Useful in Describing Managerial Work?" *Academy of Management Review* 12, no. 1 (1980): 38—51.
- Fayol, Henri. *General and Industrial Administration*. London: Sir Issac Pitman & Sons, Ltd., 1949.
- Koontz, Harold, and Cyril O'Donnell. *Principles of Management: An Analysis of Managerial Functions*. New York: McGraw-Hill Book Co., 1955.
- Lamond, David. "A Matter of Style: Reconciling Henri and Henry." *Management Decision* 42, no. 2 (2004): 330—356.
- "Managing Millenials: A Survival Guide." *BNET*. Available from: http://www.bnet.com/2436-13059_23-202082.html.
- Marquis, Bessie L., and Carol J. Huston. *Leadership Roles and Management Functions in Nursing: Theory and Application*. 6th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2008.
- Mintzberg, Henry. *The Nature of Managerial Work*. New York: Harper & Row, 1973.
- Robbins, Stephen P. and Mary Coulter. *Management*. Upper Saddle River, NJ: Prentice Hall, 1999.

MANAGEMENT INFORMATION SYSTEMS

All businesses share one common asset, regardless of the type of business. It does not matter if they manufacture goods or provide services. It is a vital part of any business entity, whether a sole proprietorship or a multinational corporation. That common asset is information.

Information enables one to determine the need to create new products and services. Information tells companies to move into new markets or to withdraw from other markets. Without information, the goods do not get made, the orders are not placed, the materials are not procured, the shipments are not delivered, the customers are not billed, and the business cannot survive.

But information has far lesser impact when presented as raw data. In order to maximize the value of information, it must be captured, analyzed, quantified, compiled, manipulated, made accessible, and shared. In order to accomplish those tasks, an information system (IS) must be designed, developed, administered, and maintained.

INFORMATION SYSTEMS

An information system is a computer system that provides management and other personnel within an organization with up-to-date information regarding the organization's performance; for example, current inventory and sales. It usually is linked to a computer network, which is created by joining different computers together in order to share data and resources. It is designed to capture, transmit, store, retrieve, manipulate, and or display information used in one or more business processes. These systems

output information in a form that is useable at all levels of the organization: strategic, tactical, and operational.

Systems that are specifically geared toward serving general, predictable management functions are sometimes called management information systems (MIS). A good example of an MIS report is the information that goes into an annual report created for the stockholders of a corporation (a scheduled report). The administration of an information system is typically the province of the MIS or information technology (IT) department within an organization.

Some applications have infringed on the familiar MIS landscape. Enterprise resource planning (ERP) software and executive information systems (EIS) both provide packaged modules and programs that perform the same functions as traditional MIS, but with greater functionality, flexibility, and integration capabilities.

Mainframes. The original computerized information systems were based on mainframes. "Mainframe" is a term originally referring to the cabinet containing the central processor unit or "main frame" of a room-filling computer. Firms such as IBM were instrumental in the mid-twentieth century in helping businesses integrate and operate information systems and technology into their business operations. After the emergence of smaller minicomputer designs in the early 1970s, the traditional large machines were described as "mainframe computers," or simply mainframes. The term carries the connotation of a machine designed for batch rather than interactive use, though possibly with an interactive time-sharing operating system retrofitted onto it. It has been conventional wisdom in most of the business community since the late 1980s that the mainframe architectural tradition is essentially dead, having been swamped by huge advances in integrated circuit design technology and low-cost personal computing. Despite this, in the twenty-first century there are still uses for mainframe systems that store vast amounts of data.

The Internet. The Internet has opened up further developments in information systems and the exchange of information via Web-based e-mail, intranets, and extranets. These technologies allow for much faster data and information exchange and greater access for more users. Web-casting and videoconferencing allow for real-time information exchanges. Mobile computing technologies accessed by handheld devices, such as multi-functional mobile phones, personal digital assistants, and podcasting (via iPods), are offering further modes of communication.

Information systems are also crucial if a firm decides to practice telecommuting, or teleworking. Telecommuting is defined as when employees can conduct full operations without being inside the business's office, instead working from a location such as an employee's home.

Telecommuting is seen as an asset both in improving employees' quality of life, and with allowing an organization more flexibility. A 2005 article in *Technovation* noted a firm's ability to adapt to telecommuting as a policy is directly linked to its information technology resources. As some scholars note, these advances in technology can fundamentally change the nature of management.

However, some have also argued that security of a company's data has increased in importance with the increase in information technology. A 2007 *Software World* article stated that such practices as telecommuting make information systems vulnerable to attack. Due to the range of threats to information systems (including viruses and hackers), information security—such as passwords, firewalls, and so forth—are crucial to an organization.

INFORMATION SYSTEM DESIGN AND ADMINISTRATION

The design of an information system is based on various factors. Cost is a major consideration, but there certainly are others to be taken into account, such as the number of users; the modularity of the system, or the ease with which new components can be integrated into the system, and the ease with which outdated or failed components can be replaced; the amount of information to be processed; the type of information to be processed; the computing power required to meet the varied needs of the organization; the anticipated functional life of the system and/or components; the ease of use for the people who will be using the system; and the requirements and compatibility of the applications that are to be run on the system.

There are different ways to construct an information system, based upon organizational requirements, both in the function aspect and the financial sense. Of course, the company needs to take into consideration that hardware that is purchased and assembled into a network will become outdated rather quickly. It is almost axiomatic that the technologies used in information systems steadily increase in power and versatility on a rapid time scale. Perhaps the trickiest part of designing an information system from a hardware standpoint is straddling the fine line between too much and not enough, while keeping an eye on the requirements that the future may impose.

Applying foresight when designing a system can bring substantial rewards in the future, when system components are easy to repair, replace, remove, or update without having to bring the whole information system to its knees. When an information system is rendered inaccessible or inoperative, the system is considered to be “down.”

A primary function of maintaining an information system is to minimize downtime, or hopefully, to eradicate downtime altogether. The costs created by a department, facility, organization, or workforce being idled by

an inoperative system can become staggering in a short amount of time. The inconvenience to customers can cost the firm even more if sales are lost as a result, in addition to any added costs the customers might incur.

Another vital consideration regarding the design and creation of an information system is to determine which users have access to which information. The system should be configured to grant access to the different partitions of data and information by granting user-level permissions for access. A common method of administering system access rights is to create unique profiles for each user, with the appropriate user-level permissions that provide proper clearances.

Individual passwords can be used to delineate each user and their level of access rights, as well as identify the tasks performed by each user. Data regarding the performance of any user unit, whether individual, departmental, or organizational can also be collected, measured, and assessed through the user identification process.

The open systems interconnection (OSI) seven-layer model attempts to provide a way of partitioning any computer network into independent modules from the lowest (physical/hardware) layer to the highest (application/program) layer. Many different specifications can exist at each of these layers.

A crucial aspect of administering information systems is maintaining communication between the IS staff, who have a technical perspective on situations, and the system users, who usually communicate their concerns or needs in more prosaic terminology. Getting the two sides to negotiate the language barriers can be difficult, but the burden of translation should fall upon the IS staff. A little patience and understanding can go a long way toward avoiding frustration on the part of both parties.

There is more to maintaining an information system than applying technical knowledge to hardware or software. IS professionals have to bridge the gap between technical issues and practicality for the users. The information system should also have a centralized body that functions to provide information, assistance, and services to the users of the system. These services will typically include telephone and electronic mail “help desk” type services for users, as well as direct contact between the users and IS personnel.

INFORMATION SYSTEM FUNCTIONS

Document and record management. Documenting and recording management may well be the most crucial aspect of any information system. Some examples of types of information maintained in these systems would be accounting, financial, manufacturing, marketing, and human resources. An information system can serve as a library. When properly collected, organized, and indexed in accordance

with the requirements of the organization, its stored data becomes accessible to those who need the information.

The location and retrieval of archived information can be a direct and logical process, if careful planning is employed during the design of the system. Creating an outline of how the information should be organized and indexed can be a very valuable tool during the design phase of a system. A critical feature of any information system should be the ability to not only access and retrieve data, but also to keep the archived information as current as possible.

Collaborative tools. Collaborative tools can consist of software or hardware, and serve as a base for the sharing of data and information, both internally and externally. These tools allow the exchange of information between users, as well as the sharing of resources. As previously mentioned, real-time communication is also a possible function that can be enabled through the use of collaborative tools.

Data mining. Data mining, or the process of analyzing empirical data, allows for the extrapolation of information. The extrapolated results are then used in forecasting and defining trends.

Query tools. Query tools allow the users to find the information needed to perform any specific function. The inability to easily create and execute functional queries is a common weak link in many information systems. A significant cause of that inability, as noted earlier, can be the communication difficulties between a management information systems department and the system users.

Another critical issue toward ensuring successful navigation of the varied information levels and partitions is the compatibility factor between knowledge bases. For maximum effectiveness, the system administrator should ascertain that the varied collection, retrieval, and analysis levels of the system either operate on a common platform, or can export the data to a common platform. Although much the same as query tools in principle, intelligent agents allow the customization of the information flow through sorting and filtering to suit the individual needs of the users. The primary difference between query tools and intelligent agents is that query tools allow the sorting and filtering processes to be employed to the specifications of management and the system administrators, and intelligent agents allow the information flow to be defined in accord with the needs of the user.

KEY POINTS

Managers should keep in mind the following advice in order to get the most out of an information system:

- Use the available hardware and software technologies to support the business. If the information system does not support quality and productivity, then it is misused.
- Use the available technologies to create and facilitate the flow of communication within your organization and, if feasible, outside of it as well. Collaboration and flexibility are the key advantages offered for all involved parties. Make the most of those advantages.
- Determine if any strategic advantages are to be gained by use of your information system, such as in the areas of order placement, shipment tracking, order fulfillment, market forecasting, just-in-time supply, or regular inventory. If you can gain any sort of advantage by virtue of the use of your information system, use it.
- Use the quantification opportunities presented by your information system to measure, analyze, and benchmark the performances of an individual, department, division, plant, or entire organization.

INFORMATION SYSTEMS AND OUTSOURCING

With companies outsourcing significant portions of their business operations (such as supply chain management), information systems can play an important role. General Motors (GM) is one company that outsourced many of its information technology operations in 2003. Doing so required coordinating operations and information systems among GM's internal IT operations and numerous other companies. One major task in this process has been standardizing information technology and other software processes.

Others note that globalization and, indeed, multinational operations would simply not be possible without sophisticated information systems.

An information system is more than hardware or software. The most integral and important components of the system are the people who design it, maintain it, and use it. While the overall system must meet various needs in terms of power and performance, it must also be usable for the organization's personnel. If the operation of day-to-day tasks is too daunting for the workforce, then even the most humble of aspirations for the system will go unrealized.

A company should not view information systems as ancillary. As management school professor Petter Gottschalk notes, information technology operations should be central to a company's management. The emergence of the CIO, or chief information officer, as a top management position also speaks to the importance of information systems and information technology.

A company will likely have a staff entrusted with the overall operation and maintenance of the system and that staff will be able to make the system perform in the manner expected of it. Pairing the information systems department with a training department can create a synergistic solution to the quandary of how to get non-technical staff to perform technical tasks. Oft times, the individuals staffing an information systems department will be as technical in their orientation as the operative staff is non-technical in theirs. This creates a language barrier between the two factions, but the communication level between them may be the most important exchange of information within the organization. Nomenclature out of context becomes little more than insular buzzwords.

If a company does not have a formal training department, the presence of staff members with a natural inclination to demonstrate and teach could mitigate a potentially disastrous situation. Management should find those employees who are most likely to adapt to the system and its operation. They should be taught how the system works and what it is supposed to do. Then they can share their knowledge with their fellow workers. There may not be a better way to bridge the natural chasm between the IS department and non-technical personnel. When the process of communicating information flows smoothly and can be used for enhancing and refining business operations, the organization and its customers will all profit.

SEE ALSO *Knowledge Management*

BIBLIOGRAPHY

- Caddy, Ian N., and Mammy M. Helou. "Supply Chains and Their Management: Applications of General Systems Theory." *Journal of Retailing and Consumer Services* 14, no. 5 (2007): 319.
- Caldelli, A., and M.L. Parmigiani. "Management Information System: A Tool for Corporate Sustainability." *Journal of Business Ethics* 55, no.2 (2004): 159–171.
- Denton, D.K. "Focus on Data Context, Not Content." *Communications News* 40, no. 12 (2003): 50.
- Gellis, Harold C. "Protecting Against Threats to Enterprise Network Security." *Software World* 37, no. 2 (2006): 14.
- Gottschalk, Petter. *Business Dynamics in Information Technology*. Hershey, PA: Idea Group Publishers, 2007.
- Hoffman, Thomas. "GM's Global Positioning." *Computerworld* 26 November 2007.
- King, William R., and Paulo Roberto Flor. "The Development of Global IT Infrastructure." *Omega* 36, no. 3 (June 2008): 486.
- Kotabe, Masaaki, Michael J. Mol, and Janet Y. Murray. "Outsourcing, Performance, and the Role of e-Commerce: A Dynamic Perspective." *Industrial Marketing Management* 37, no. 1 (2008): 37.
- Lail, P.W. "Improving IT's Support of Business Strategy." *Pulp & Paper* 79, no.1 (January 2005): 23.
- Lawrence, F.B., D.F. Jennings, and B.E. Reynolds. *ERP in Distribution*. Mason, OH: Thomson/South-Western, 2005.
- McKenna, Christopher D. *The World's Newest Profession*. Cambridge, MA: Cambridge University Press, 2006.
- Mitchell, Robert L. "Driving Economies of Scale in IT." *Computerworld* 26 October 2006.
- Pawlowski, S. D., and D. Robey. "Bridging User Organizations: Knowledge Brokering and the Work of Information Technology Professionals." *MIS Quarterly* 28, no. 4 (2004): 645–672.
- Pérez, Manuela, et al. "The Differences of Firm Resources and the Adoption of Teleworking." *Technovation* 25, no. 12 (2005): 1476.
- Yourdon, Edward. *Modern Structured Analysis*. Englewood Cliffs: Yourdon Press, 1989.
- Zehir, C., and H. Keskin. "A Field Research on the Effects of MIS on Organizational Restructuring." *Journal of American Academy of Business* 3 (September 2003): 270–279.

MANAGEMENT LEVELS

Managers are organizational members who are responsible for the work performance of other organizational members. Managers have formal authority to use organizational resources and to make decisions. In organizations, there are typically three levels of management: top-level, middle-level, and first-level. These three main levels of managers form a hierarchy in which they are ranked in order of importance. In most organizations, the number of managers at each level is such that the hierarchy resembles a pyramid, with many more first-level managers, fewer middle managers, and the fewest managers at the top level. Each of these management levels is described below in terms of their possible job titles and their primary responsibilities and the paths taken to hold these positions. Additionally, there are differences across the management levels as to what types of management tasks each does and the roles that they take in their jobs. Finally, there are a number of changes that are occurring in many organizations that are changing the management hierarchies in them, such as the increasing use of teams, the prevalence of outsourcing, and the flattening of organizational structures.

The "Dean" of business history, Alfred Chandler, saw the managerial class as one of the great leaps forward in the business world. Chandler noted that managers and management levels arose from the need to further allocate responsibility and coordinate activities as large corporations emerged in the nineteenth century. For example, railroads were faced with the enormous task of coordinating activities (including scheduling) over wide geographic areas. Clear managerial roles helped this process. Chandler also reasoned that managers, because they had more specialized educational backgrounds, would tend to desire lifelong careers within a single corporation. As a result, managers favored long-range planning as opposed to short-term profits. Simply put, it is unlikely that the modern corporation