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DEPARTMENT OF COMPUTER APPLICATIONS

II BCA B

MANAGEMENT INFORMATION SYSTEM

COURSE CODE:21UCP302

UNIT-III

Systems development is systematic process which includes phases such as planning, analysis, design, deployment, and maintenance. Here, in this tutorial, we will primarily focus on −

- Systems analysis
- Systems design

Systems Analysis

It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components.

System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose.

Analysis specifies **what the system should do**.

Systems Design

It is a process of planning a new business system or replacing an existing system by defining its components or modules to satisfy the specific requirements. Before planning, you need to understand the old system thoroughly and determine how computers can best be used in order to operate efficiently.

System Design focuses on **how to accomplish the objective of the system**.

System Analysis and Design (SAD) mainly focuses on −

- Systems
- Processes
- Technology

System Development Life Cycle (SDLC) is a conceptual model which includes policies and procedures for developing or altering systems throughout their life cycles.

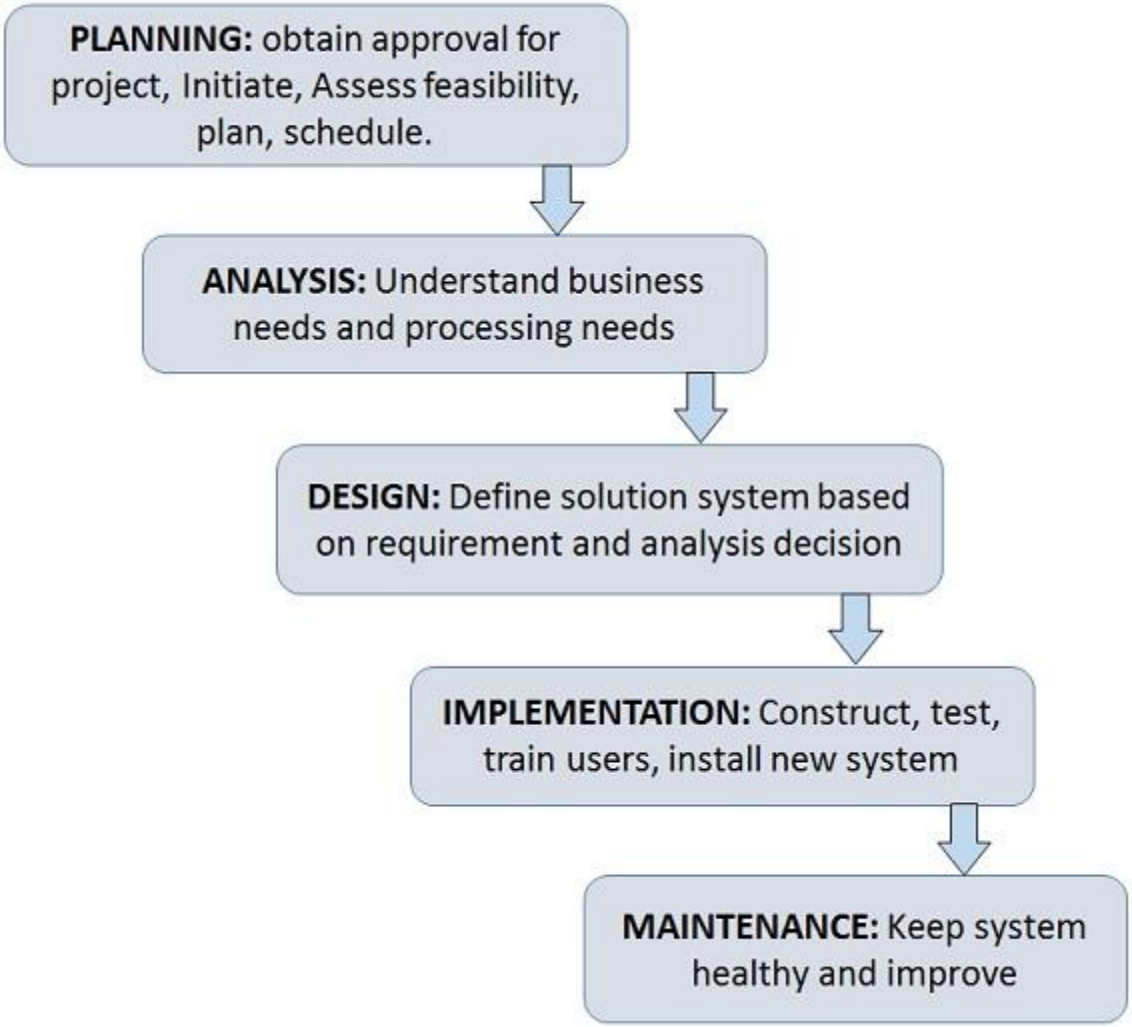
SDLC is used by analysts to develop an information system. SDLC includes the following activities −

- requirements
- design
- implementation
- testing
- deployment

- operations
- maintenance

Phases of SDLC

Systems Development Life Cycle is a systematic approach which explicitly breaks down the work into phases that are required to implement either new or modified Information System.



Feasibility Study or Planning

- Define the problem and scope of existing system.
- Overview the new system and determine its objectives.
- Confirm project feasibility and produce the project Schedule.
- During this phase, threats, constraints, integration and security of system are also considered.
- A feasibility report for the entire project is created at the end of this phase.

Analysis and Specification

- Gather, analyze, and validate the information.

- Define the requirements and prototypes for new system.
- Evaluate the alternatives and prioritize the requirements.
- Examine the information needs of end-user and enhances the system goal.
- A Software.
- e Requirement Specification (SRS) document, which specifies the software, hardware, functional, and network requirements of the system is prepared at the end of this phase.

System Design

- Includes the design of application, network, databases, user interfaces, and system interfaces.
- Transform the SRS document into logical structure, which contains detailed and complete set of specifications that can be implemented in a programming language.
- Create a contingency, training, maintenance, and operation plan.
- Review the proposed design. Ensure that the final design must meet the requirements stated in SRS document.
- Finally, prepare a design document which will be used during next phases.

Implementation

- Implement the design into source code through coding.
- Combine all the modules together into training environment that detects errors and defects.
- A test report which contains errors is prepared through test plan that includes test related tasks such as test case generation, testing criteria, and resource allocation for testing.
- Integrate the information system into its environment and install the new system.

Maintenance/Support

- Include all the activities such as phone support or physical on-site support for users that is required once the system is installing.
- Implement the changes that software might undergo over a period of time, or implement any new requirements after the software is deployed at the customer location.
- It also includes handling the residual errors and resolve any issues that may exist in the system even after the testing phase.
- Maintenance and support may be needed for a longer time for large systems and for a short time for smaller systems.

Development of MIS:

Phases of MIS development:

1. Planning
2. Requirement gathering and analysis
3. Design
4. Development
5. Testing
6. Maintenance
7. Feedback

1. Planning:

1. It is necessary to understand and define the requirements of MIS.
2. There should be effective communication between the developers and system users.
3. Cost should be decided.

4. Time required for MIS development planning.
5. Planning of development methods.

2. Requirement gathering and analysis

1. Verbal communication for requirement gathering.
2. Non verbal communication (Email, Internet, etc.) for requirement gathering.
3. Contacting experienced persons.
4. Review of old MIS.
5. Functional requirements gathering.
6. Non functional requirements gathering.

3. Design

1. Interpret the requirements into architectural, logical and physical designs of how the information system to be implemented.

4. Development

1. On the basis of above design system in implemented.
2. System is first developed in small units.
3. Than these small units are integrated to get a large system.
4. Development may involve engineers, system users, stack holders etc.

5. Testing

1. The system developed in above phased required to be tested.
2. Unit testing test each small programs individually.
3. After unit testing Integration testing is performed which combines all the small programs.
4. Alpha Testing is carried out by the test team within the developing organization.
5. Beta Testing is performed by a selected group of users, customers, or users other than development team.
6. Acceptance Testing is performed by the customer to determine whether software is acceptable or not by the user.

MIS - Decision Support System

Decision support systems (DSS) are interactive software-based systems intended to help managers in decision-making by accessing large volumes of information generated from various related information systems involved in organizational business processes, such as office automation system, transaction processing system, etc.

DSS uses the summary information, exceptions, patterns, and trends using the analytical models. A decision support system helps in decision-making but does not necessarily give a decision itself. The decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

Programmed and Non-programmed Decisions

There are two types of decisions - programmed and non-programmed decisions.

Programmed decisions are basically automated processes, general routine work, where −

- These decisions have been taken several times.
- These decisions follow some guidelines or rules.

For example, selecting a reorder level for inventories, is a programmed decision.

Non-programmed decisions occur in unusual and non-addressed situations, so −

- It would be a new decision.
- There will not be any rules to follow.
- These decisions are made based on the available information.
- These decisions are based on the manger's discretion, instinct, perception and judgment.

For example, investing in a new technology is a non-programmed decision.

Decision support systems generally involve non-programmed decisions. Therefore, there will be no exact report, content, or format for these systems. Reports are generated on the fly.

Attributes of a DSS

- Adaptability and flexibility
- High level of Interactivity
- Ease of use
- Efficiency and effectiveness
- Complete control by decision-makers
- Ease of development
- Extendibility
- Support for modeling and analysis
- Support for data access
- Standalone, integrated, and Web-based

Characteristics of a DSS

- Support for decision-makers in semi-structured and unstructured problems.
- Support for managers at various managerial levels, ranging from top executive to line managers.
- Support for individuals and groups. Less structured problems often requires the involvement of several individuals from different departments and organization level.
- Support for interdependent or sequential decisions.
- Support for intelligence, design, choice, and implementation.
- Support for variety of decision processes and styles.
- DSSs are adaptive over time.

Benefits of DSS

- Improves efficiency and speed of decision-making activities.

- Increases the control, competitiveness and capability of futuristic decision-making of the organization.
- Facilitates interpersonal communication.
- Encourages learning or training.
- Since it is mostly used in non-programmed decisions, it reveals new approaches and sets up new evidences for an unusual decision.
- Helps automate managerial processes.

Components of a DSS

Following are the components of the Decision Support System −

- **Database Management System (DBMS)** − To solve a problem the necessary data may come from internal or external database. In an organization, internal data are generated by a system such as TPS and MIS. External data come from a variety of sources such as newspapers, online data services, databases (financial, marketing, human resources).
- **Model Management System** − It stores and accesses models that managers use to make decisions. Such models are used for designing manufacturing facility, analyzing the financial health of an organization, forecasting demand of a product or service, etc.
  Support Tools − Support tools like online help; pulls down menus, user interfaces, graphical analysis, error correction mechanism, facilitates the user interactions with the system.

Classification of DSS

There are several ways to classify DSS. Hoi Apple and Whinstone classifies DSS as follows −

- **Text Oriented DSS** − It contains textually represented information that could have a bearing on decision. It allows documents to be electronically created, revised and viewed as needed.
- **Database Oriented DSS** − Database plays a major role here; it contains organized and highly structured data.
- **Spreadsheet Oriented DSS** − It contains information in spread sheets that allows create, view, modify procedural knowledge and also instructs the system to execute self-contained instructions. The most popular tool is Excel and Lotus 1-2-3.

- **Solver Oriented DSS** − It is based on a solver, which is an algorithm or procedure written for performing certain calculations and particular program type.
- **Rules Oriented DSS** − It follows certain procedures adopted as rules.
- **Rules Oriented DSS** − Procedures are adopted in rules oriented DSS. Export system is the example.
- **Compound DSS** − It is built by using two or more of the five structures explained above.

Types of DSS

Following are some typical DSSs −

- **Status Inquiry System** − It helps in taking operational, management level, or middle level management decisions, for example daily schedules of jobs to machines or machines to operators.
- **Data Analysis System** − It needs comparative analysis and makes use of formula or an algorithm, for example cash flow analysis, inventory analysis etc.

- **Information Analysis System** − In this system data is analyzed and the information report is generated. For example, sales analysis, accounts receivable systems, market analysis etc.
- **Accounting System** − It keeps track of accounting and finance related information, for example, final account, accounts receivables, accounts payables, etc. that keep track of the major aspects of the business.
- **Model Based System** − Simulation models or optimization models used for decision-making are used infrequently and creates general guidelines for operation or management.

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Elements of a system

Various elements of a system are as follows:

1. Outputs

Inputs

1. Processor
2. Control
3. Environment
4. Feedback
5. Boundaries and interface

1. **Outputs**

A system must be capable of producing an output that must be of value to the user. Whatever be the nature of the output (goods, services or information), it must be in accordance or inline with the user's expectations. Output is the outcome of processing.

2. **Inputs**

Inputs are the elements that enter the system for processing.

The essential characteristics of the input are:

- **Accuracy:** If the input data is not accurate, the output will be inaccurate\wrong.
- **Proper Format:** The input must be in a proper format.
- **Timeliness:** If the data is not available at the time, the whole system may fail.
- **Economical:** It is required that the data must be produced at a low cost.

3. **Processor**

The processor is the operational component of a system. This involves the programs and the way in which data is processed through the computer.

4. **Control**

This element is needed to control all the activities governing\concerning input, processing and producing the output. The system is always guided by control.

For example, in an organization, management as a decision making body controls the flowing activities of the organization:

- Handling
- Outflow etc.

Hence, each system should have the control to operate within tolerable performance levels. For example, a slight deviation in the normal human body temperature causes an imbalance in the health condition. If it continues for long, it may lead to the death\end of the system.

5. **Environment**

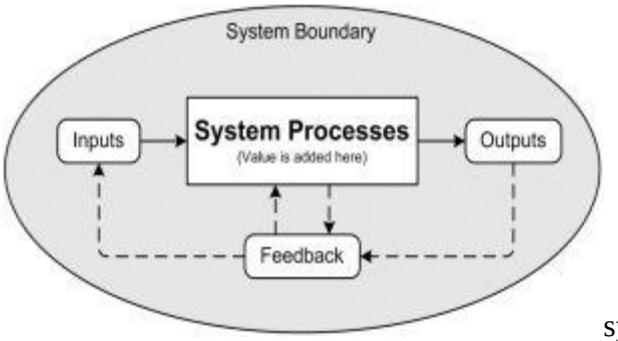
It refers to the external elements that affect the system. It determines how a system must function.

For example, the environment consisting of vendors, competitors and others may influence the actual performance of a business system.

Thus, a system must be capable enough to adjust to its environment. It should change according to the changing environment.

6. **Feedback**

The information supplied by comparing results with standard and informing the control elements about the differences is termed as " Feedback".



system boundary feedback result

Feedback is a way to measure\compare output against a standard output. Feedback may be positive or negative. Positive feedback reinforces the system performance. Negative feedback provides information for action.

This feedback is an important element of systems. The output of the system needs to be observed and feedback from the output is considered in order to improve the system and make it achieve the laid standards.

7. **Boundaries and Interface**

The limits of a system are specified by its boundaries. Every system has defined boundaries within which it operates. It enables to know which elements lie or do not lie within the system.

The limits or boundaries of a system help to identify its components, processes, and interrelationships when it interfaces with another system.

Choice of information Technology:

NATURE OF IT DECISIONS

The choice of IT is a strategic decision making the long term impact on the effectiveness of MIS enterprise. The IT affects the people processes and organization of the system. It is a strategic business decision but not a financial decision taken on least cost approach.

The modern IT offers the number of different system configuration each being a solution to satisfy the needs of MIS. Therefore the IT decision is technical decision where it required deciding between the various configuration alternatives made of various hardware-software options. In case of multiple sites of the organization, IT decision must consider the communication problem and the interface between 2 hardware options so that the data sharing is optionally feasible. The choice of IT is made on the basis of availability of the people in the organization to run hardware software system.

IT design is made for current trends as well as the futuristic needs of the organization. IT decisions are complex and governed by a number of factors.

4 STRATEGIC DECISION

The information needs of the users in the organization arise from the process or the style by which the management runs the business. The quality of management process depends on the culture which affects the decision making process in centralized system; the delegation isn‘t effective and depends on central authority. In distributed system it is dependent on different nodal points. There are 3 types of IT decision:

1. Decision affecting the operational management.
2. Decision affecting the execution and control of the business.
3. Strategic decision.

In such cases the IT choice would be the front end processing connected back to the back office control system. Front end system takes care of operations management while the back office takes care of strategic control and operational planning. Every business has one or more business critical application, serving the other information need of the critical strategic decisions.

The entire process values these applications. The organization IT choice is therefore based on the requirement of these applications serving the critical function. Due to the organizations infrastructure and the nature of business IT choice will be distributed at different decision center.

4 BUSINESS OPERATIONS

There are many organizations where the business operations are typical and their information needs are largely proceed. E. banking organization.

The decision making process i rule based governed by policies and guidelines in the organization. The IT should specify all the needs in the organization.

e. marketing system- In the marketing of the product, IT processes the data about sales, receipt and other inventory related information, procurement, actions etc.

e. there are certain business organizations, operations where the organization takes care of one or two function and most of the information needs would be satisfied by the hardware software resources. If the organization requires a mix of special platform then the IT choice will be based on the integration possibility of different IT platforms satisfying the information needs. IT considers the operational feasibility of the system in terms data sharing, resource sharing transaction processing etc. the number of possibilities emerges unless these factors are properly considered IT choice may go wrong. The IT choice therefore is strategic to the performance.

Configuration design:- The details of IT are based on the following features:

1. Data type: Numeric, word, Image, voice and the capable software-hardware to handle these data type.
2. Data volumes: Floppy drive, hard-disk, CD-ROM with their capacities.
3. Storage capacity: Based on processing needs of the system.
4. Input/output operation: It decides the controller and speed of I/O processing.
5. Data sharing: If data is to be shared then storage capacity will be decided based on the size of the ***databases.***
6. Process speed: Speed of processing decides CPU, memory processing architect.
7. RDBMS/4GL: Decided on the basis of volume, special data handling, integrity and security level.

Applications of MIS:

1. To carry out market surveys to collect information about competitors so that decisions regarding product quality, quantity, and sale can be easily taken.

2. To acquire knowledge about new processes and technology.

3. Forecasting

4. For inventory management

5. For long term planning

6. For scheduling of problem

7. To search for new opportunities

8. For reservation system in airlines

9. For appropriation of financial resources

10. For controlling daily activities

11. To know government policies related to the organization.

Computer system Architecture:

An information system architecture is a formal definition of the business processes and rules, systems structure, technical framework, and product technologies for a business or organizational information system. An information system architecture usually consists of four layers: business process architecture, systems architecture, technical architecture, and product delivery architecture.

The architecture of an information system encompasses the hardware and software used to deliver the solution to the final consumer of services. The architecture is a description of the design and contents of a computerized system. If documented, the architecture may include information such as a detailed inventory of current hardware, software and networking capabilities; a description of long-range plans and priorities for future purchases, and a plan for upgrading and/or replacing dated equipment and software.

Components of information systems

The main components of information systems are computer hardware and software, telecommunications, databases and data warehouses, human resources, and procedures. The hardware, software, and telecommunications constitute information technology (IT), which is now ingrained in the operations and management of organizations.

Computer hardware

Today throughout the world even the smallest firms, as well as many households, own or lease computers. Individuals may own multiple computers in the form of smartphones, tablets, and other wearable devices. Large organizations typically employ distributed computer systems, from powerful parallel-processing servers located in data centres to widely dispersed personal computers and mobile devices, integrated into the organizational information systems. Sensors are becoming ever more widely distributed throughout the physical and biological environment to gather data and, in many cases, to effect control via devices known as actuators. Together with the peripheral equipment—such as magnetic or solid-state storage disks, input-output devices, and telecommunications gear—these constitute the hardware of information systems. The cost of hardware has steadily and rapidly decreased, while processing speed and storage capacity have increased vastly. This development has been occurring under Moore's law: the power of the microprocessors at the heart of computing devices has been doubling approximately every 18 to 24 months. However, hardware's use of electric power and its environmental impact are concerns being addressed by designers. Increasingly, computer and storage services are delivered from the cloud—from shared facilities accessed over telecommunications networks.

Computer software

Computer software falls into two broad classes: system software and application software. The principal system software is the operating system. It manages the hardware, data and program files, and other system resources and provides means for the user to control the computer, generally via a graphical user interface (GUI). Application software is programs designed to handle specific tasks for users. Smartphone apps became a common way for individuals to access information systems. Other examples include general-purpose application suites with their spreadsheet and word-processing programs, as well as "vertical" applications that serve a specific industry segment—for instance, an application that schedules, routes, and tracks package deliveries for an overnight carrier. Larger firms use licensed applications developed and maintained by specialized software companies, customizing them to meet their specific needs,

and develop other applications in-house or on an outsourced basis. Companies may also use applications delivered as software-as-a-service (SaaS) from the cloud over the Web. Proprietary software, available from and supported by its vendors, is being challenged by open-source software available on the Web for free use and modification under a license that protects its future availability.

Telecommunications

Telecommunications are used to connect, or network, computer systems and portable and wearable devices and to transmit information. Connections are established via wired or wireless media. Wired technologies include coaxial cable and fibre optics. Wireless technologies, predominantly based on the transmission of microwaves and radio waves, support mobile computing. Pervasive information systems have arisen with the computing devices embedded in many different physical objects. For example, sensors such as radio frequency identification devices (RFIDs) can be attached to products moving through the supply chain to enable the tracking of their location and the monitoring of their condition. Wireless sensor networks that are integrated into the Internet can produce massive amounts of data that can be used in seeking higher productivity or in monitoring the environment.

Various computer network configurations are possible, depending on the needs of an organization. Local area networks (LANs) join computers at a particular site, such as an office building or an academic campus. Metropolitan area networks (MANs) cover a limited densely populated area and are the electronic infrastructure of "smart cities." Wide area networks (WANs) connect widely distributed data centres, frequently run by different organizations. Peer-to-peer networks, without a centralized control, enable broad sharing of content. The Internet is a network of networks, connecting billions of computers located on every continent. Through networking, users gain access to information resources, such as large databases, and to other individuals, such as coworkers, clients, friends, or people who share their professional or private interests. Internet-type services can be provided within an organization and for its exclusive use by various intranets that are accessible through a browser; for example, an intranet may be deployed as an access portal to a shared corporate document base. To connect with business partners over the Internet in a private and secure manner, extranets are established as so-called virtual private networks (VPNs) by encrypting the messages.

A massive "Internet of things" has emerged, as sensors and actuators have been widely distributed in the physical environment and are supplying data, such as acidity of a square yard of soil, the speed of a driving vehicle, or the blood pressure of an individual. The availability of such information enables a rapid reaction when necessary as well as sustained decision making based on processing of the massive accumulated data.

Extensive networking infrastructure supports the growing move to cloud computing, with the information-system resources shared among multiple companies, leading to utilization efficiencies and freedom in localization of the data centres. Software-defined networking affords flexible control of telecommunications networks with algorithms that are responsive to real-time demands and resource availabilities.

Databases and data warehouses

Many information systems are primarily delivery vehicles for data stored in databases. A database is a collection of interrelated data organized so that individual records or groups of records can be retrieved to satisfy various criteria. Typical examples of databases include employee records and product catalogs. Databases support the operations and management functions of an enterprise. Data warehouses contain the archival data, collected over time, that can be mined for information in order to develop and market new

products, serve the existing customers better, or reach out to potential new customers. Anyone who has ever purchased something with a credit card—in person, by mail order, or over the Web—is included within such data collections.

Massive collection and processing of the quantitative, or structured, data, as well as of the textual data often gathered on the Web, has developed into a broad initiative known as “big data.” Many benefits can arise from decisions based on the facts reflected by big data. Examples include evidence-based medicine, economy of resources as a result of avoiding waste, and recommendations of new products (such as books or movies) based on a user’s interests. Big data enables innovative business models. For example, a commercial firm collects the prices of goods by crowdsourcing (collecting from numerous independent individuals) via smartphones around the world. The aggregated data supplies early information on price movements, enabling more responsive decision making than was previously possible.

The processing of textual data—such as reviews and opinions articulated by individuals on social networks, blogs, and discussion boards—permits automated sentiment analysis for marketing, competitive intelligence, new product development, and other decision-making purposes.

Human resources and procedures

Qualified people are a vital component of any information system. Technical personnel include development and operations managers, business analysts, systems analysts and designers, database administrators, programmers, computer security specialists, and computer operators. In addition, all workers in an organization must be trained to utilize the capabilities of information systems as fully as possible. Billions of people around the world are learning about information systems as they use the Web.

Procedures for using, operating, and maintaining an information system are part of its documentation. For example, procedures need to be established to run a payroll program, including when to run it, who is authorized to run it, and who has access to the output. In the autonomous computing initiative, data centres are increasingly run automatically, with the procedures embedded in the software that controls those centres.