STANDARDS AND DOCUMENTATION

Standards are uniform practices which govern the methods by which systems are developed and operated, and provide a basis for assessing both system and personnel performance in terms of quality and quantity.

They give a clear understanding of what is required to both management and data processing staff. Standard procedures have to be established for the development and operation of computer systems, but this is not enough. Once set up and agreed, they must also be enforced.

- Documentation is much more than the communication and enforcement of standards. Modern system development methods rely upon full and comprehensive documentation. Every step is fully documented and all through the designs, the coding and the testing, information on each of the steps is set out in manuals.
- Subsequently, the auditors, manager and quality assurance people can check the documentation to obtain information on the steps. After implementation, the documentation will greatly aid the maintenance staff.

TYPES OF STANDARDS

- ***Development Controls***

This type of control standards specify the method of planning and controlling the progress and quality of systems development. They are concerned with the content of the work rather than its method of execution.

- ***Performance Standards***

Performance standards set base lines against which actual performance is measured. In this sense, performance standards are not estimates of how long tasks will take, but are used to specify how long tasks **should** take. Their primary use is for comparison with actual performance to pinpoint deviations that call for investigation and, possibly, action.

- ***Operating Standards***

The operating environment is, in many ways, a more difficult function than systems and programming for management control.

- Operating standards will need to cover:
- Physical security procedures
- File security procedures
- Work log procedures
- Error log procedures
- Definition of staff responsibilities (probably complete job specifications)
- Data control procedures
- Computer operating procedures.

Benefits of Standards

(a) Saving Time

Good standards reduce the amount of repetitive work and leave more time for the more challenging aspects of development work – for example, problem analysis.

(b) Management Control

- The management of all aspects of the department is greatly assisted by the use of standards.
- All work is carried out to a prescribed quality that can be measured.
- Monitoring of progress of work is easy, since all tasks follow a defined sequence. Precise responsibilities can be allocated to staff.

- Estimates of time-scales can be more accurately predicted.
- Schedules of work can be prepared more easily.
- Staffing levels can be determined.

(c) Improved System Design and Development

- Standard procedures provide a checklist to ensure that important aspects of the development of a system are not ignored.
- Adequate documentation is produced at all stages.
- Standard design methods ensure that similar systems are designed in similar ways, thus aiding maintenance.

- Programming standards ensure that reliable and well-controlled software is produced, and that standard problems are solved in a standard way.
- Well-defined maintenance procedures ensure that this expensive aspect of software development is well controlled.

(d) Computer Operations

- The standards in this area ensure that all computer and related operations are carried out correctly, reliably and fully.

User Documentation

- User documentation is a reference manual for experienced users, who will need to refer to it when queriesor exceptional circumstances arise; it also provides the basics for training of new staff.
- Some modern on-line systems include "help" facilities, which reduce user documentation, but do not make it completely unnecessary.
- In general, users require documentation which tells them:

- What the system does and how it works.
- How to provide input data to the system and how to control it. How to identify and correct errors.
- What are their particular responsibilities

- As described above, each user manual must be tailored to suit the system and the particular users but, in general, the contents will include:
- (a) An introduction giving a simple overview of the system.
- (b) Running the system; when users run the system themselves, the user guide must include details of how to switch on the equipment, call up the programs they use, and also how to end sessions. In some cases, instructions for taking back-up copies of data, etc. will need to be included.
- (c) Input requirements: with some users, data input forms will need to be completed and sent to the data input department. In other cases, users will themselves input the data, either from individual source documents or in batches which have been assembled in the user department.
- (d) Output with examples of all the different types relevant to the particular users. Some of these will be screen displays whilst others will be printed reports available either as standard output or on request.

- (e)Error messages: an explanation of all the error messages which might occur, together with the appropriate action to be taken. This section should include details of the person to contact if problems are experienced.
- (f) Logging procedures: each installation should set up standards for manual logging of any exceptional occurrences, with details of the action taken.
- (g) A glossary of terms used.
- (h) Index: all except the shortest of manuals should have a comprehensive index, since the experienced user is likely to refer to it only occasionally but wants to be able to find the specific item quickly.

THE IMPLEMENTATION PROCESS

- The purpose of implementation is to put the theoretical design into practice. It can involve the installation of a complete system or the introduction of a small subsystem.
- A particular project was selected. Its objectives, requirements and constraints were defined in the requirement specification. A designer, or a team of designers, has specified a suitable system, in the systems design specification.
- Now, the designed system must be developed and implemented. So, we can say that the aim of this phase is: to implement a fully-documented operational system which meets the original requirements according to the design given in the systems design specification.

- Implementation involves the following activities:
- (a) Writing, documentation and testing of all the programs required.
- (b) Creation of all the master files required in the system.
- (c) Preparation of user and data processing department operating instructions.
- (d) Commissioning of the new system.
- (e) Education and training of all staff who will use the system.

System Testing

- System testing will follow a similar pattern to the testing of programs. First, simple files will be created and the sequence of the data flow diagram followed. The output from each program will be scrutinized to see that the data has been processed correctly.
- One of the main errors that may come to light is the misinterpretation of the design specification, so that, although a program works correctly in its individual tests, its input or output is not compatible with another program. For example, one program may expect a data item to be three digits without allowing a space at the beginning of a two-digit number (so that, for example, 12 has to be entered as 012), while another will allow a space.
- When the programs can pass data reliably between themselves, then the data is made more complex, until there is sufficient confidence to use live data.
- Systems testing builds up the confidence and experience of the users and data processing staff.

File Conversion/Creation

- When a new system is to be implemented, it is likely that the master files either do not exist, or, if they do, that they are not organized as required by the new system. Before the system becomes operational, the master files must be created.

Education and Training

- An essential feature of the implementation of a new computer system is the education and training of all staff associated with it. All staff must appreciate the objectives of the new system, and how it will operate, as well as the facilities it will provide. Those staff who prepare data, operate the system and use the output will require detailed training and practice. The detailed training must be supported by adequate documentation.

- This will be the user manual which is written by the system designer. There must be practice in the training programme. Special practice sessions must be arranged, especially where there is a direct changeover, when there is no "running-in" practice period of pilot or parallel running. Training must also cover the procedures to be followed when something goes wrong.

Implementation Planning

The successful implementation of any system is based upon the following points:

- A project control monitoring time, cost and quality of output.
- Managerial commitment and involvement at all levels.
- Analysts who are good communicators and have a thorough knowledge of the organization's operations and applications.
- The users' knowledge of and agreement with the system objectives.
- Recognition of user responsibilities in the system development.
- A computer manager capable of getting user support and of instilling confidence in users.

- ***User Involvement***

The object of the transfer to operational status is to shift responsibility for the system from development staff to the users. So users need to be involved in both testing and then transfer.

CHANGEOVER STRATEGIES

- We are changing from a **development environment** (old system working, new system being developed) to a **maintenance environment** (old system abandoned, new system working).
- The changeover implies changes in working practices: from clerical to computerized, from centralized computing to distributed computing; from one type of machine to another; and so on. Staff tend to resent change, and so to ease the way they must be kept fully informed, and in a direct manner. Any individuals adversely affected must be told personally.

- Thus, prior to changeover, management must verify that the system does actually satisfy defined information needs; that the equipment, software and staff necessary for successful changeover are available; that control and audit procedures are in existence.
- It is the **analyst's** responsibility to ensure that staff information is complete and accurate, the object being to obtain co-operation and a smooth, trouble-free changeover.

Methods of Changeover

- ***Direct Changeover***
- Using direct changeover, at a specified time the old system is switched off and the new switched on. This is advantageous in that resources are spared – the method involves the immediate discontinuance of the old system. However, the new system must have been thoroughly tested so as to minimize risks in initial operation. Should the new system meet with unexpected problems – hardware, software, or design – then the old system may not be able to be retrieved.

- As you will realize, this technique is potentially dangerous since it implies transfer of dependence from a current working system to a new system which, although tested, has not been used in a real situation. However, there are several situations where the technique is applicable or unavoidable:
- In very small systems it is often not worthwhile considering any other technique, owing to the inherent simplicity of the system.
- In very large systems it is sometimes not feasible to maintain two systems simultaneously (as in parallel and pilot running) owing to the work involved.
- Where there is little similarity between the old and new systems, the simultaneous running of both systems may be unhelpful.

Parallel Changeover

- In parallel changeover the old and new systems are run with the same data until there is confidence in the new system, whereupon the old system is dropped.
- Parallel changeover or parallel running of the old and the new systems simultaneously allows a comparison of output to be made between them. Any shortcomings of the new system can be rectified,
- and continuous cross-checks made. This is the most common method of changeover, but it is important to identify objectives, and a timescale must be established.
- This method may be regarded as an extension of the testing of the new system, but this is really only a sound approach if the two systems are really comparable, a somewhat unusual condition in real life.
- Parallel changeover is often used so that the old system may still be operated when there is a breakdown in the new system.

- What has to be remembered in this particular context is that running in parallel means double the cost.
- Another problem concerns the staff and other resources used to run the two systems together. There may well need to be separate controls for the two systems, to be maintained and then reconciled. Where the reconciliation is difficult, the period of parallel running may have to be prolonged. A delay such as this could create tension and strain for the user department(s) because of the need to undertake two operations.
- The objective should be to terminate the running of the old system as soon as is conveniently possible.

Phased Changeover

- Within the two basic methods discussed above we find a number of variations, of which the most common is **phased changeover**, where the new system is introduced in phases or stages as each stage is implemented and operating correctly. The phases continue until the whole system is in operation.
- This method would be used for very large information systems which possess many complex components and which cross organizational frontiers.
- The method consists of a series of direct changes. The implementation of each phase can be controlled, and risk to the user department is thus reduced considerably.

- This method allows easier transfer of staff and is probably the most satisfactory method of working, where it is possible. It permits thorough testing under real conditions while limiting the risk of system failure.
- It requires, however, that part of the system functioning can be conveniently separated from the rest. It also requires some additional clerical effort in handling two different systems simultaneously.

Pilot Running

- Pilot running is usually used to mean where the new system is run under controlled conditions using **old data**, where a small representative part of the old system is used as a test area
- This is a similar concept to parallel running but is less disruptive – data from one or more previous periods is run first on the old system and then on the new one. Timings are thus less critical, although realistic timing and data capture/conversion are not simulated.