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AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
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Standard Guide for Training Users of Computerized Systems¹

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1. Scope

1.1 This guide presents a six-phase plan for training users of computerized systems. Training, like other system development activities, moves more effectively by an orderly plan. In this guide, “users” include operators, people who maintain the system, people who use information or other output produced by the system, and their supervisors. This guide does not explicitly cover training for system developers.

1.2 This guide is intended primarily for training people to work with a newly installed system. New users of a previously-installed system need somewhat different training (see Section 7 and Section 10).

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

E 622 Guide for Developing Computerized Systems²

E 1340 Guide for Rapid Prototyping of Computerized Systems²

3. Significance and Use

3.1 In this guide, training is viewed as a system with inputs, outputs, and transformations. This is further described in Section 5. Creation of a training system follows a very general system development process. The process of developing a new system or modifying an existing one can be accomplished in six phases. These six phases are as follows:

3.1.1 *Definition*—Develop a brief statement of what is to be accomplished and why.

3.1.2 *Functional Requirements*—Identify and describe all inputs and outputs, and the transfer functions that produce the outputs from the inputs.

3.1.3 *Functional Design*—From the functional requirements, produce detailed descriptions that are independent of particular implementations. These descriptions include all

flows of information and timing diagrams.

3.1.4 *Implementation Design*—Select components and develop implementation, operation, and maintenance procedures.

3.1.5 *Implementation*—Acquire, assemble, install, and place the system into operation (E 622 identifies this for a computer system. The process, applied in this guide, applies to placing the training program into action - training the employees).

3.1.6 *Evaluation*—Compare what is accomplished against the functional requirements to determine how well the requirements are met, to determine possibilities for growth and improvement, and to formalize the lessons of this project in preparation for the next one.

3.2 *Documentation*—Document and retain the previous 5 phases as the project proceeds, not as a separate phase.

3.3 Many kinds of problems can be solved by this very general systems approach. This approach is applied elsewhere to the creation of computerized systems (see 3.1). It is applied in this guide to the creation of training programs for users of computerized systems.

3.4 The approach to developing training that is described in this guide is very general. While it is assumed that the training program is being developed for users of a NEW system, the basic method can be applied to the development of any training program for users of computerized systems.

3.5 This guide applies the same six phases that guide development of an entire computerized system to development of the training program for users of the system. The six phases of the training program usually take place within two phases of the overall project. Part of the implementation design phase of the overall project is planning the training program. The plan for the training program is carried out in the implementation phase of the overall project.

4. Definition of the Training Program

4.1 The training program is limited to training its participants to deal with the completed and operating computerized system. The program covers training for system operators, maintenance people, users of system outputs, and supervisors. Training for users is the principal purpose of this guide. Training for system developers may also be conducted using these principles, but this guide does not explicitly cover such training.

4.2 Training requires people's time, so managers and supervisors of people who deal with a computerized system must be

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² Annual Book of ASTM Standards, Vol 14.01.

willing to make the people available for training. Costs of training are usually smaller than the costs of not training (see 7.5). Identification of these costs is essential in gaining necessary management commitments.

5. Functional Requirements for the Training Program

5.1 To begin development of the training program, prepare a functional requirements document for it. In preparing the functional requirements, involve users who are to be trained, people who will conduct the training, concerned supervisors, and the training manager.

5.1.1 Consider building on the strength of active collaboration and involve the staff as appropriate.

5.2 The training program manager is a key person. Identify the person to fill this position, and describe the duties. The training manager may or may not be directly involved in any of the training, but is responsible for its accomplishment. The training manager must become involved in developing the training program during its functional requirements phase.

5.3 The principal inputs and outputs of the training program are people. Identify each potential trainee as specifically as possible: by name, present position, experience, education, likely attitudes toward the system, present skills, and constraints on training the person.

5.3.1 Consider surveying potential trainees as to their inherent thoughts about working with the system and use the survey during planning of the program.

5.4 Trainees will graduate into positions related to the computerized system. Describe the new duties of these people as completely as possible. For example, include detailed operating and maintenance procedures in the descriptions of duties for system operators and maintenance people. Attach the system operating and maintenance procedures, to the functional requirements document for the training program.

5.5 Training develops new skills in people and should create positive attitudes towards the system. After identifying potential trainees and describing their duties relating to the computerized system, list skills for their proposed duties. Distinguish between general requirements for dealing with any computerized system, and specific requirements for dealing with a specific system. The training program objective is to transform trainees into graduates who have all the required skills.

5.6 Training is easier if the trainees want to learn. The new system and the training program must avoid negative incentives if at all possible. Specific positive incentives may be required for trainees and instructors.

5.7 Trainees should have some sense of how the part of the system that they are using fits into the overall system. This sort of familiarization needs to be part of the training course as well as learning the skills to perform the duties the training if its appropriate (see 5.4).

5.8 Consideration should be given to the training of supervisors or at least their familiarization with the training being given to those they supervise.

5.9 It is important to distinguish between familiarization as an aspect of training and a formal training course.

6. Functional Design of the Training Program

6.1 From the functional requirements developed in Section

5, prepare a functional design similar to the design described in Guide E 622.

6.2 Trainees must receive certain essential information in the training program. Identify this information and its sources, along with supplemental information that may be helpful to the trainees. Break the information that must be communicated to the trainees into workable elements. Each element of information requires one or more training elements to communicate that information. Add training elements to provide practical experience in applying the new knowledge. Provide some means for testing whether the essential information and required attitudes and skills have been communicated, and follow through with additional training elements to be used if needed.

6.3 After the training elements have been identified, assign related elements to specific training units. These are the smallest pieces of training that are scheduled, although they need not all be the same size. One unit may include training for several elements of information. For example, a 1-h practical problem may require the student to apply several newly learned skills.

6.4 From the training units, prepare a rough schedule for the training program, indicating how much time is required to train each person. Organize the training units into manageable courses.

6.5 Certain techniques are useful for identifying information elements and their associated training elements, units, and courses. For example, write a brief description of each training element on a small card, then sort and group the cards when organizing training elements into units and courses.

7. Implementation Design of the Training Program

7.1 During (and not before) the training program's implementation design phase, select methods for communicating information to the trainees. Select the trainees from the group of potential trainees (5.3) at the beginning of this phase. Select training methods on the basis of

- (1) conformance to the functional design, and
- (2) cost.

7.2 The following kinds of training are sometimes used singly or in combination:

- 7.2.1 Supplier training courses (see 7.11),
- 7.2.2 University continuing education courses (see 7.10),
- 7.2.3 Professional and technical society continuing education courses (see 7.10),
- 7.2.4 Training institute courses and seminars (see 7.10),
- 7.2.5 Self-paced or programmed instruction text books and audio-visual materials,
- 7.2.6 Computer-assisted instruction (CAI) courses,
- 7.2.7 System help text and on-line documentation,
- 7.2.8 Lectures,
- 7.2.9 Individual and small group tutorial training,
- 7.2.10 Hands-on training,
- 7.2.11 Simulator or mock-up training,
- 7.2.12 Observation of system development (see 7.7 and 7.8),
- 7.2.13 Participation in system development (see 7.5 and 7.9),
- 7.2.14 Demonstrations,
- 7.2.15 Reading assignments,