Chapter 5. Program Development - Training

Training is a vital communication vehicle for the implementation of a Human Factors program within the Maintenance organization. For this reason, the program should be developed and implemented utilizing a sound instructional development process. A preferred method is the **Instructional Systems Design (ISD) model** as it places a strong emphasis on developing a program that fully meets the end user's needs as well as incorporating extensive user testing during the design and development phases [Taber97]

This document will address program development using the ISD model, although other instructional development processes may be used if they better fit your organization's culture or available resources.

As identified in [Chapter 3], a crucial element of an Aviation Maintenance Human Factors Program is management/workforce cooperation. A collaborative approach towards the design, validation, adoption, and implementation of the program will result in a well-rounded, mutually accepted tool for human factors training.

Once initiated, the training, in whatever format, must be an evolving and on-going process. Historical data strongly suggests that positive cultural change takes place only when an organization supports and reinforces the values espoused in the training program.

5-1. Needs Assessment/Analysis

The aim of this step in the process is to determine the goals and objectives of Human Factors training as well as the needs and constraints of the customer base (organization and trainees).

The goals and objectives of MRM training should be consistent with the overall Maintenance Human Factors program in which it is an element. In some cases, Human Factors initiatives may be effectively linked. For example, data from one's error management system may help prioritize safety issues to be incorporated into the MRM curriculum. Similarly, incorporation of human factors principles into briefing policies may be accompanied by MRM training for effective communication. Training is only one type of error prevention strategy, but it is an important front-line defense against human error. As with other elements of the Human Factors program, it requires both corporate and workforce commitment and support.

Identifying the needs and constraints of the user group helps to focus MRM training on known problem areas within the organization. It helps to tailor training content to specific workforce attributes, e.g., experience level, training requirements, skill mix and to specific issues related to the workplace, e.g., norms, new policies, procedures, technologies, change in resources.

There are at least three broad categories that can be applied to human factors training;

- Awareness training or introduction to MRM concepts
- Recurrent training, which focuses on the practice and refinement of MRM skills

- Integration of MRM skills and principles into technical training.

5-2. Design Phase

This step further refines the training goals and objectives in order to select content as well as instructional and evaluation strategies for each major topic identified in the needs analysis. Consistent with the ISD process, training developers should clearly define pre-requisite knowledge and skills, as well as standards for the desired training, post-training knowledge and skills. On this basis, both individuals and training programs can be evaluated with respect to the learning objectives stated.

At this point the selection of media and media mix should be considered so that the media that best suit the learning process can be utilized. In addition, decisions regarding the feasibility of using off-the-shelf products and/or developing one's own training materials.

Interaction is an important part of the training program. Although lecture is necessary to insure the trainees are at an equal knowledge level in basic human factors terminology and concepts, it is equally important that the trainees become directly involved in the learning process.

Exercises should be developed which are consistent with the basic curriculum of the program and which promote trainee involvement. Some exercises may appear "light" in application, but can directly support the goals and objectives of the basic curricula. Visual media also support the program's curriculum. "Shock" videos have a profound effect on the trainee; however, they must be incorporated into the program consistent with the topic of discussion and have the ability to tie in directly to the job performance of the attendees.

5-3. Basic Curriculum

The basic curriculum may be organized into subject matter areas that can be applied in both human factors awareness and skills training. The subject matter areas can be further organized into individual modules. Typical candidate modules may include maintenance human error, error chains and contributing factors, verbal and written communication skills, teamwork, leadership, norms, decision-making, situation awareness, and stress management. Modules are then prioritized and scheduled for development. Media selection may be further defined at this step in the process. Sample curricula may be found in the FAA MRM Handbook [FAA98b] .

Delivery of the training program may involve the use of professional instructors, facilitators selected from management and the workforce, or other personnel as appropriate to each individual organization. Regardless of the position of the delivery people, they must be credible and accepted by the trainees.

The use of accident/incident case studies to illustrate particular human factors modules has been found to be a useful teaching tool. These are particularly effective if the case study is from the trainee's own organization, with due consideration for anonymity.

5-4. Prototype

The prototyping of the program includes:

- Delivery of all training materials in whatever media were selected during the design phase
- Training of facilitators
- walk-throughs of all sections of the program to insure that the flow of material is correct and all learning objectives are supported.

Meetings should be held and feedback solicited from facilitators, potential students, management, and subject matter experts.

5-5. Validation

Validation of the program occurs after the prototype modifications and testing have been accomplished. This includes delivery of the entire program in a typical training environment. All of the training materials should be used and trainees should perform all of the course exercises. Meetings should be held to discuss the evaluation of the prototype in an effort to fine-tune the program. A continuing evaluation process should be established to insure the program objectives are being met.

5-6. Adoption

Adoption is the scheduling and formal announcement of the human factors program. It is important that senior members of the company management team show strong support of the program. There should be consensus on all aspects of the training by all participants of the development team (designers, validation team, facilitators, etc.).

Prior to implementation, the nature and scope of the program should be communicated to the workforce. The purpose and goals of the program should be clearly stated so that misunderstandings about the focus and implementation of the training program can be avoided.

5-7. Implementation

The implementation phase is the actual roll out of the training program and is usually done in stages or steps with groups based on need, work assignment, or geographic location. This allows the continuing evaluation of the program and promotes the program by demonstrating positive results.

The entire maintenance organization should attend these sessions, with emphasis on cross-functional training groups.

5-8. Trainee Evaluation

It is important to evaluate the trainees' comprehension of the course material. This may be done by any means deemed appropriate and should be done at the conclusion of the training program as well as at later dates in order to determine effectiveness and application of their training. Examples of trainee evaluation measures include:

- Trainee attitudes and human factors knowledge
- Trainee reaction to the class
- Trainee performance on the job after training.

5-9. Program Measurement

It is important to identify or develop valid and reliable processes for measuring training program effectiveness. Pre-training baselines are needed for making post training comparisons. Because there are multiple ways to assess program effectiveness, it is advantageous to collect a variety of measures when possible.

Measurement data may be acquired through various means: surveys, observations, and existing organization metrics, e.g., on-the-job injuries, ground damage incidents. [Chapter 6], Error Management, provides a source of information to measure the program's effectiveness. In addition, it is often useful to collect data at specified intervals in order to assess whether effects are short vs. long term, immediate vs. slow to appear, etc.

Facilitator evaluations should be conducted as part of the overall feedback loop. See [Section 5-10] for additional information.

5-10. Feedback

Feedback is a valuable part of the MRM training program that allows the end product to influence the training program in a constant cycle of evaluation and improvement. This feedback may be in the form of class and facilitator evaluations, on the job evaluations of trainee's performance, or the achievement of organizational goals. The important thing is that it be honest and that it be heard and allowed to impact course content and implementation where needed.

Feedback that is related to topics covered in the course or brought up by the trainees in the course of the training should be addressed by the appropriate personnel at the first opportunity and the information relayed to the trainee as soon as possible. This direct feedback channel will do much to enhance the credibility of the training program. Examples of good feedback channels include company newsletters, bulletins, e-mail, case studies, success stories, etc.