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Development of Multimedia Computer-Based Training for VXI Irradiated Fuel Monitors

R. Keeffe, T. Ellacott, Q.S. Truong
Atomic Energy Control Board of Canada

Introduction

The VXI Irradiated Fuel Monitor (VIFM) developed by the Canadian Safeguards Support Program (CSSP) is a generic radiation monitor that is based on the international VXI instrument bus standard. Complying with the IAEA Integrated Safeguards Instrumentation Program (I^2SIP), the architecture of this new equipment is based on the modular VXI computer bus and interface format. VXI software uses LabView graphical software language in order to simplify the development of automated measurement and instrumentation systems by using a virtual instrument concept with a graphical user interface (GUI) as the front panel. A component of this development effort was the production of an effective training package for the primary users of the technology; namely, the IAEA inspectors and technicians.

Training Requirements

Although two distinct groups of end-users are involved, a portion of the training can be considered generic and covers topics such as an overview of system components, a general description of system specifications and functionality, software features, signal paths and familiarization with the various LabView screens that serve as the user interface. More specific information on the topics of data retrieval, malfunction identification, anomaly identification, data analysis and reporting is required by the inspector whereas the technician is more concerned with system performance, troubleshooting testing and maintenance. The training package is to be produced in CD-ROM format, with future possibility of making it available on internal or external networks.

Training Development

The software that controls the VIFM system has a GUI which incorporates a computer screen and/or a number of dialogue windows for each function. The information on each screen consists of areas associated with VIFM system identification, information on and control of subsystems, status of components, control of functions, and display of messages. All user interfacing is performed through active buttons on these screens via a mouse. Because of this unique method of accessing the system, it was felt that training should be presented in a computer-based, interactive format using emulations of the actual screens that would be encountered at the field installations. As an added feature, a "canned" version of the actual VIFM software would be installed to give the users an opportunity to explore some real situations as if they were navigating the virtual panel of the equipment located at site. These combined features would provide a simulator/actual environment for the trainee and, by making the sessions available on CD-ROM, they would be totally portable and accessible to users at all times. This eliminates the

need for specially scheduled individual training and provides a consistent training approach by removing instructor variability. The CD-ROM also provides the capability for refresher training and eliminates the need for IAEA staff to prepare and present training materials. The use of a multimedia approach using text, sound, graphics, animations, photos and video has proven to be an effective training technique that is superior to videos, lectures and other forms of instruction. In addition, a complete set of manuals (Instructor's and Maintenance &Service Manuals) will be incorporated in CD-ROM training package. The manuals will be available, on demand, by the users, for looking up more detailed information.

Development of the computer-based training (CBT) sessions was contracted to a commercial supplier of multimedia training systems. One of the prime considerations was that the contractor be familiar with instructional design and its implementation in multimedia interactive modules. Both operating and maintenance activities, including troubleshooting, were included in the requirements specification. Non-sequential access was mandatory for all segments of the program through the use of a standard panel of "live" buttons appearing on the screen at all times to create a stable user interface. The overall presentation is constructed in modular format to allow easy access for the different user groups and convenient expansion of current modules or addition of new modules. The basic groups include:

- standard introduction (for all users);
- basic operation (for inspectors only);
- operational checks (for inspectors and technicians); and
- troubleshooting (for technicians only).

The standard introduction includes an overview of VXI technology with actual pictures of system components, orthographic drawings and other graphical representations, and short descriptions of current VIFM applications and the capability of this general-purpose equipment to be used in an integrated or stand-alone mode. The inclusion of animations and full narration was also considered to be a requirement as was a self-testing feature that would allow users to keep track of their own performance on the subject matter and determine if there were any areas of potential misunderstanding. This feature could also be expanded for the purpose of formal testing under controlled conditions.

The sequence of development activities includes the following elements:

-technical review of the system and existing training materials with equipment developer;
- preparation of a video shot list and working script;
- preparation of graphics and text for on-screen use;
- video taping and photographing of equipment and user interactions;
- preparation of an audio track (including voice-over narration, sound effects and music);
- digital editing of video and compression of video using QuickTime;
- implementation of the multimedia module using Macromedia Director;
- review of the alpha version of the CD-ROM by CSSP staff and IAEA users; and
-production of a CD-ROM master in ISO 9660 format and delivery of a specified number of copies.