Introduction

The computerization of laboratory instruments is a complex endeavor and requires a diversity of scientific and engineering skills to ensure cost-effective implementation that meets the desired goals. Too often the scientific community has considered computerization to be just another programming exercise. In the past, computerization projects were initiated and the first topic addressed was the question of computer size, instruction set, and available software. Project goals and system design specifications were usually incomplete or nonexistent. In November 1970 the need for developing a scientific and systematic approach to the computerization of laboratory instruments was recognized and ASTM Committee E-31 was organized to address itself to the development of guidelines and standards for the definition, implementation, evaluation, and documentation of computerized laboratory systems. Concurrent with the development of these guidelines and standards, terms (nomenclature) would be identified and defined for communication purposes.

Initially, ASTM Committee E-31 decided to restrict its work to the computerization of instruments which might be found in an analytical chemistry laboratory; however, it quickly became apparent that the need for guidelines and standards spilled over into other instrumentation areas such as medical, physical testing, and industrial process control. Therefore, in order to assess the current, broad-based methodology being used to develop computerized laboratory systems, the committee recognized that a contributed paper symposium would be an effective and timely means for bringing this information together. The committee also recognized that there was a great wealth of information that had not been published which might offer new ideas or methods previously overlooked by the various E-31 technical subcommittees. As a result, the first symposium to be sponsored by this relatively new ASTM Committee was organized.

The symposium was organized to present actual examples of the methods used to specify, implement, and document computerized laboratory systems. In most cases, these papers outline the philosophy of the work that is being done by ASTM Committee E-31. One final paper was added, "A Feasibility Study and Functional Design for the Computerized Automation of the Central Regional Laboratory EPA Region V, Chicago."

This paper is an actual completed working document that the reader will find helpful in that it contains detailed definitions, specifications, and functional designs for a laboratory automation system which is being developed by the Lawrence Livermore Laboratory for the EPA Region V Laboratories.

It is hoped that this symposium will stimulate future technical sessions since there is a great deal of work yet to be accomplished in the field of computerization of laboratory instruments. Anyone new to the field should find the entire publication to be helpful in getting an automation project started.

Special thanks go to S. Perone, H. Hoffman, J. Smith, and T. Brubaker for their critical review of manuscripts submitted for presentation.

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