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Preface

We are pleased you have chosen to enjoy the 1978 National Computer Conference (NCC). Frequently the NCC is judged to be "too large" to have a theme. This year we bring you two themes: the primary theme is the national energy problem and how computers can contribute to its alleviation; the secondary theme is the growth of the computer industry, especially its fastest growing segment, personal computing.

The energy and computation theme is highlighted in the keynote address and in a powerful panel for the Tuesday evening's Symposium on Developing Energy and Computing Technology. It is continued by the luncheon speakers and by more than 10 percent of the Technical and Professional Program.

On coping with growth in the computer industry, a portion of the Technical and Professional Program deals with personal computing and with developing education curricula. The principal highlight is the Personal Computing Festival, with exhibits, sessions, and contests all its own. This is the first time the National Computer Conference has had separate registration with no age limit on attendance for a portion of its program.

This document forms the principal permanent record of the Technical and Professional Program of this conference. As such, it is a vital part of the documentation and information-dissemination system in our community. The explosive growth of literature in the last decade makes it imperative that this dissemination system be examined carefully. One such examination has been conducted by Thomas J. Allan, in his interesting NSF-funded, ten-year study of this information-dissemination system and reported in The Management of Technology Flow (MIT 1977). Most such studies lump scientific and engineering literature; however, he draws a careful distinction between them. One part of that distinction is that a given topic generally appears earlier in time in scientific literature than in engineering literature. During this time delay three very important things occur: diffusion of the information through the community; translation into the language of current technical practice; and evaluation of the concepts. This evaluation tends to be related to enterprise objectives and, hence, of strong interest to technical management.

Despite the explosive growth in the number of conferences, symposia, seminars, and workshops dealing with the
computer industry, the National Computer Conference has remained the premier conference to enhance this diffusion, speed this translation, and sharpen this evaluation. NCC is supported by 15 individual technical societies which provide it with the multidisciplinary support that makes it the focal point of excellence in the literature for technology and management.

To this end, in 1978 we have not equated originality with quality. Rather, we have brought the best judgment of a very strong technical and professional program committee together to ensure that the topics of importance to the community at large are represented. The best of these topics are presented in either paper or panel form. You will note there are two papers in this proceedings that have been presented earlier for a smaller audience. "The art of artificial intelligence—Themes and case studies of knowledge engineering," by Dr. Edward A. Feigenbaum and "The ubiquity of discovery," by Dr. Douglas B. Lenat. Within the AI community these have been judged "best papers" and hence are repeated here to speed the translation process and to enhance the diffusion throughout the larger information processing community.

Likewise, we have attempted to present both sides of controversial issues so that society itself can participate in the evaluation. Only in a large multidisciplinary forum of this type can we begin to provide approaches to solutions of the very pervasive problems, such as the national energy problem, the facets of a public information policy, the problems of federal regulation, etc., that face us today.

My undying thanks go to the literally hundreds of people whose efforts have gone into bringing you this fine conference, but especially to those who have dedicated their time, talent, and effort to serve on its many committees. The names of most of them are acknowledged in the back of this proceedings.
Introduction

SHAPING THE PROGRAM

Of the many criteria that were followed in creating the technical program committee of 1978, the one that played the dominant role was "excellence." We believed that attracting top people to participate in the technical program committee would result in an excellent technical program. We were indeed fortunate in attracting top technical and professional people from industry, government, universities, and other parts of society which are associated with the computer industry. We also included in our committee top professionals from our sponsoring societies; IEEE Computer Society, ACM, SCS, and DPMA. Cooperation from each of the non-sponsoring constituent societies of AFIPS was requested through their Presidents by our conference vice-chairman.

The program committee in its first meeting in December 1976 established the following philosophy and aims: (i) The number and reactions of attendees are the major criteria for measuring the success of the conference; (ii) Seek broad base appeal—do not concentrate on applications for industrial usage and ignore the system questions. Do not concentrate on the systems architecture problems and ignore the general public; (iii) Orient the program toward industrial and commercial audiences. With this charter in hand, the technical program committee began identifying appropriate technical areas for the program and created a broadly structured program with built-in adaptability to accommodate unsolicited high quality papers.

PROGRAM STRUCTURE

The program is structured into four major areas: Applications, Methodology, Systems and People and Society. Each major area is subdivided into multiple basic areas. Each member of the program committee was responsible for at least one basic area. Each basic area was headed by an area director; some area directors were also a member of the program committee. The area directors were selected for both their professional reputation and motivation. The basic areas cover most of the traditional important aspects of computer knowledge. We have tried to capture some emerging important areas such as Computer Models in Solving World's Energy Problem, Electronic Fund Transfers, Special Purpose Terminals, Office Automation, Home and
Hobbying Computing, Evolution of New Hardware Technology, and Legislation and Its Impact. For the first time in NCC's history, we have asked a sister nation, namely Japan, to organize an area in our conference.

One of the primary responsibilities of the area directors was to solicit high quality papers. The rule "every paper will be refereed" was applied universally to all solicited and unsolicited papers with the exception of two invited papers. The program contains many panel sessions. Each panelist was asked to prepare a position paper and have it approved by the session chairperson. In some cases the position papers of panelists participating in a session were combined into a panel paper and are included in these proceedings. Most of the area directors have included an overview of their area.

We hope you will find these proceedings of the program valuable and rewarding for many years to come.
PART I—APPLICATIONS