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DEVELOPING AN ACTUARIAL PROGRAMMING LANGUAGE

by Russell J. Mueller

Editor's Note: This is a summary of a much more extensive paper on the question of a programming language. A limited number of copies of the complete paper are available from Mr. Mueller whose address is Hewitt Associates, Libertyville, Ill. 60048. A bibliography is also available on request. Mr. Mueller compiled the TM2 System Users Manual for the Tablemaker language developed at the National Institute of Health.

Since the beginning of the use of large scale digital computers to solve actuarial problems, there has been distinct evidence of the so-called "communication gap." This communication problem manifests itself in several ways.

A communication gap may occur between the actuary requiring the solution to a problem and the professional programmer or individual enlisted to code the program for a digital computer. This general problem arises from the specialization of each within his own profession and it has been encountered by scientists and businessmen in their attempt to utilize the efficiencies of large scale computing machinery.

Another gap occurs between the actuary coding his own solution and the computer system executing the program. This is generally due to the lack of time for the actuary to completely familiarize himself with the intricacies of computer languages and systems.

It has been stated that "the greatest single obstacle to more widespread use of the computer has been the insufficiency in variety and power of the higher level languages needed, especially by non-professional programmers." The trend has now been set for the develop-

(Continued on page 8)

ABOUT ACTUARIES IN THE PHILIPPINES

by Robert L. Bergstresser

Editor's Note: The author, former Actuary of the United States Life Insurance Company, has been a missionary in the Philippines for the past 15 years, during which time he has actively participated in the Actuarial Society of the Philippines, serving on the Board of Governors, and as President for one term.

In the examination results published in January by the Society of Actuaries, no less than six of the new Associates were from the Philippines. This underscores the close relationship between Philippine actuaries and their American counterparts and warrants a brief report.

From the American regime in the Philippines, we have inherited the "Convention Blank" form of annual statement, and reserve bases like the American Experience, and CSO—CRVM. Probably because of this close parallel between American and Philippine practice, more than half of the Philippine actuaries have taken actuarial courses at the University of Michigan, on the undergraduate or graduate level, and have personal and business contacts with American actuaries.

Organized in 1953 with eight members, the Actuarial Society of the Philippines now has 41 full members (Fellows), plus four non-resident members (Special Members) and 31 Affiliates. Until 1969, the Society did not set its own examinations, but recognized membership in actuarial societies of other countries. In the absence of such membership, the Society prescribed minimum requirements in the areas of college actuarial studies and responsible practical experience, for full member-

(Continued on page 6)

STATISTICS ON 20 YEARS OF THE "ESTABLISHMENT"

by Thomas P. Bowles, Jr.

In this age of protest groups, various words have come swimming to the fore. Notable among these words is the "establishment"—and in most cases, this dignified old cliché has taken more punishment than the second toughest kid in the third grade. In fact, you may have attended a recent conference and listened to a Protestant minister analyze the forces at work in the "movement" on college campuses. There is, he contended, among those who are a part of the movement a vigorous opposition to the "establishment." We bring up this point because from time to time there have been members of the Society who have identified themselves with a movement and have also identified the "establishment."

An actuary has often been described as "a person who can reach any conclusion you give him." This article is not intended to give you conclusions or to make recommendations. Rather, it is to let you form your own opinion: Is an "establishment" good or bad? More importantly, do we have an "establishment" within the Society of Actuaries?

For purposes of discussion (and dissension) let's define the "establishment" as "a group of people who have been in a position of 'running things' or making decisions for an organization for a number of years." If we accept this definition, the "establishment" within the Society of Actuaries is the Board of Governors.

"Change, change, change", we hear. "Younger men. Fresh blood."

Or, you may demand, "What's wrong with experience?" Or . . . "Who says the Board of Governors consists of men

(Continued on page 7)

Programming Language

(Continued from page 1)

ment of computer languages for the subject-matter specialist instead of for the professional programmer or computing machinery.

Other professions have placed emphasis on development and implementation of problem-oriented and/or user-oriented languages. "The availability of such special languages is highly desirable since it will reduce to a minimum the time which the subject-matter specialist has to spend in order to translate his problem, even a complex one, into execution on an electronic computer."

The successful adoption of an operative system by social scientists and the continual search by civil engineers and statisticians, raises the question: should an actuarial programming language be developed?

Such a language is needed to close the communication gap. The actuary would not only realize a savings in total time spent on problem definition, coding, and solution but also would derive benefits simply from the availability of an actuarial language. Such a language would provide a common basis for presentation and discussion of various computing problems and solutions for actuaries and programmers, for publication to the profession, and possibly for use in the Society's examination syllabus. Even a slight possibility of attaining such highly desirable goals should provide the actuarial profession with the incentive to study the feasibility of developing a specialized actuarial programming language.

Detailed Study Needed

It is not the purpose of this paper to give a specific proposal. Such a proposal could be composed only after completion of a detailed study. The study should include a careful analysis of the computing needs and applications required of an actuarial programming language. Then the general scope of an actuarial programming language would have to be delineated, and technologies available to implement the language reviewed.

Other user groups, such as social scientists, have developed a specialized programming language. Evidence of the trend towards a special computer lan-

guage for every specialist is exemplified by IBM's support of APL—a computer language for statisticians. Recognizing this trend and remembering John H. Miller's charge regarding the computer, "spelled with a capital C," in the April 1968 issue of *The Actuary*, it seems appropriate for all actuaries to attempt to answer the question posed in the title. This paper endeavors to set forth the framework for further discussion.

First, a study should be undertaken to determine the feasibility of developing an actuarial programming language to accomplish the goals stated previously. The study should be the means of ascertaining all of the specific needs and application areas that a utopian language might serve. The computing applications for actuaries in all environments—insurance companies, consulting, government, universities and other academic institutions, etc.—should be considered. The list of applications may range from the pricing and valuation of various insurance and annuity products to operations type modeling requiring various statistical and tabular reports. It is just as important to project and estimate future applications and to distinguish trends, as it is to determine present day needs.

Scope of Language

After having all possible application areas itemized, it must be decided to what degree the language is to be user-oriented and/or problem-oriented. A user-oriented language is one in which the notation is so clearly intelligible that a scientist with little or no computer training can read a program in the notation and easily understand the problem being executed. A problem-oriented language is one in which the notation allows a convenient and efficient coding of well-defined problem area. They are not exclusive traits.

After deciding on the scope of the language, the application areas must be broken down into their basic components to aid in selection of a notation. At this point if the programming language is to be intended for presentation and discussion purposes, only the design can be finalized and the language used and refined until the computing language state-of-the-art advances to the point

where implementation is desirable and feasible.

If on the other hand immediate implementation is desired, then the present day technologies and hardware capabilities will dictate to some extent the possible scope of the language. A liaison must be set up between the computer experts and the actuarial designers so that the final language includes as much of the utopian design as possible. Compromises will be necessary, but with the study preceding and the utopian design already conceived, knowledgeable choices can be made.

Mention has been made of various specialized user-oriented and problem-oriented programming languages which have proved to be effective communication devices and computing tools. The trend toward the multiplicity of these computing languages and the major efforts under way for developing more powerful implementation schemes should provide the actuarial profession with increasing evidence of the case for deciding that an actuarial programming language is not only feasible but appropriate and suitable to their professional needs.

If a developmental effort commences as the result of a preliminary study, there is a distinct possibility that the following quotation could well apply to the actuary:

"The instructions or commands to the computer, which the engineer uses to express the solution of a problem, are at approximately the same technical language level as instructions which one engineer would use in describing his solution to another engineer." □

Letters

(Continued from page 3)

which suggests that the only thing this formula adds to the current average net cost formula is the interest on the average initial cash value. In practice most participating companies now publish ${}_{20}NC$ in their rate books. Little more work would be required to produce ${}_{20}INC$. Also, the average initial cash value could be approximated by using the cash value at the end of 10 years. The dividend distribution rate is usually available from Schedule M.

Miguel A. Ramirez