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THE FUTURE OF THE ACTUARIAL PROFESSION AS VIEWED IN A.D. 1974

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> Time present and time past
> Are both perhaps present in time future,
> And time future contained in time past.
>
> T. S. ELIOT, *Burnt Norton*

I. INTRODUCTION

THE approach of the year 2000 creates a millennial fascination which causes man to ponder his past, to assess his present, and to peer into his future. Futurism is a current fashion—a new fad seen in books and media and daily conversation. The future will come half by chance and half by design.[1] If fully half is to come by design, then futurism, which can seek to steer that design, is a worthy science. This study of the actuarial profession looks upon those design-steering aspects which can lead to a greater future.

Although this work adopts the standpoint of a life company actuary, it views the entirety of the profession. The actuarial profession cannot be divided and placed in compartments—life versus casualty, company versus consulting—or classified by country of residence. All actuaries are bound up in essentially the same future. Indeed, all are bound up in the future of the insurance and pension industries on this continent. So the framework of inquiry is wide.

The work may have special interest to a young person contemplating the actuarial profession as a career. Consequently, an effort is made to consider the subject over the projected career of such a person—roughly to the year 2020. This lengthy future is seen "through a glass, darkly." But would an effort made in 1930 have been effective in predicting the highlights to 1974? The answer is yes, provided that the predictor could have seen beyond the gathering clouds of depression and war. And so it may be possible to see beyond present clouds of gloom.

II. CHARACTERISTICS OF PRESENT-DAY LIFE

Any study of the future should start with the present; so an effort is made here to describe life in 1974. It is said that this is an age of

[1] Machiavelli, *The Prince*, chap. 25.

meaninglessness. Institutions to lean on, such as church and nation, are in decline. In the fashion of the existentialist philosophers, meaninglessness is declared in many forms on television and in the press, by consumerists, critics, and inquisitors. Such declarations may be well meaning, but their primary object is to give subconscious strength to the declarers. Dealing with criticism must be accepted as a way of life; one must stand up to it and do what is right, not necessarily that which is demanded by the inquisitors.

Evil makes all the news. There is a succession of "unmanageable" crises: heavy inflation; the unexpected shortage of petroleum and other energy sources; threats of anarchy currently manifested in a rash of kidnappings, some of them politically motivated; the danger that the environment will become polluted; human breakdowns resulting from the use of drugs and alcohol; and the governmental crisis in the United States denoted by the name "Watergate." In his outstanding address at the One Hundred and Twenty-fifth Anniversary of the Institute of Actuaries, "The Professional Man—Will He Survive?" Lord Boyd-Carpenter referred to still another evil: ruthless commercial ambition. There are too many examples to require enumeration in this paper.

III. VIEWS OF THE "FUTURISTS"

Actuaries are believed to be capable of predicting the future! The general public believes so; nonactuaries in the insurance industry believe so. Of course the actuarial profession would deny that it is true in any mystic sense. But it is clear to this author that actuaries *should* become futurists in a more formal manner than in the past, or at any rate actuaries should become familiar with the serious thinking that has taken place in many quarters concerning the future. As introductory material for this paper, then, a survey is included of the views of the following: the macrohistorians, the creators of modern literature, the professional futurists, and futurists in the insurance industry.

Examination of the views of futurists (of all types) is an essential prerequisite for anyone wishing to make serious inquiry into the future. This, of course, should not imply a willingness to swallow any particular set of views. Opinions of the futurists should be taken seriously but with a determination not to swallow them hook, line, and sinker. A comparison of all views, from diverse sources, is valuable. A procedure known as the "Delphi method" can then be used in comparing such views; this places much greater credence on an observation if it is believed by more than one observer.

IV. THE MACROHISTORIANS

Several famous philosophers of history have lived and written in the twentieth century. These macrohistorians not only have studied the process of history but have used their findings to peer into the future. Three such persons will be discussed here: Oswald Spengler (1880–1936); Pitirim A. Sorokin (1889–); and Arnold J. Toynbee (1889–). Spengler's famous work *The Decline of the West* was written in a Germany which was suffering from the effects of World War I. It is a work of monumental erudition and precise detail; using speculation rather than rigid historical method, it concludes that Western civilization is in a period of decay. Sorokin believes that civilizations move through three major stages: ideational, integrated, and sensate. The first, or ideational, stage can be described by words such as "transcendental" and "religious"; the integrated stage, by the words "noble," "sublime," and "moralistic"; and the sensate stage, by terms such as "materialistic," "sensation seeking," and "depraved." Sorokin seems to believe that the West is in a late sensate stage, which will be followed by crisis, ordeal, catharsis, charisma, and then a new religiosity. Sorokin is like most macrohistorians in holding that present civilization will go through a period of chaos, anarchy, and irrationality and will then experience some kind of rebirth. Toynbee is the most famous of the twentieth-century philosophers of history, and his views will be discussed at greater length below.

Toynbee's great work *A Study of History* was published in twelve volumes over the period 1934–61. The work is not a recitation of events in the fashion of most histories; it is a study of the philosophy of history; its rigorous mathematical approach should appeal to members of the actuarial profession. Toynbee regards a civilization as a logical unit of historical study; he identifies twenty-three civilizations which have come to life in recorded time. Most of these are long dead. Only one (our own Western civilization) is still in vigorous life; a few others (Islam, Orthodox Christendom, the Far Eastern civilization, and Hinduism) are alive but in very advanced states of disintegration. Western civilization—"the West," the great civilization—not only is alive but extends across the entire surface of the globe and even beyond into the depths of space.

According to Toynbee, the story of a civilization is encompassed in the following steps: genesis, growth, breakdown, time of troubles, universal state, and disintegration. The institutions of a civilization include a universal church, a dominant minority, an external proletariat, and an internal proletariat. Toynbee places stress on the func-

tion of the internal proletariat; this group is small and persecuted during the final stages of the history of a civilization, yet it has the power to live through those convulsive final stages and to bring about the eventual birth of a new civilization out of the ashes of the old. An example of such an internal proletariat is the small Christian community of Rome, which succeeded in surviving the decay and disintegration of the universal state of the Hellenic civilization (i.e., the Roman Empire) and, about the year 700, in bringing about the birth of a new civilization (the West).

Toynbee maintains that Western civilization has reached an advanced stage of its history. It has had its breakdown and is in its time of troubles. Various points of time are suggested as having marked the beginning of the time of troubles, including the Napoleonic wars and the great war of 1914–18. (Because these events are too close to the present, the matter is uncertain.) The West has not achieved its universal state, although several attempts have been made to impose such a condition. One such attempt was made by Napoleonic France and two by Germany (in this century). Toynbee hopes with some fervor that the West's present leading nation-state (i.e., the United States) will succeed in maintaining a condition of order. He speculates that the West can no longer achieve a universal state by the classic method (the knockout blow) because invention of nuclear arms would seem to make this impossible without unacceptable destruction. Consequently, he believes that a universal state can come only by negotiation. This is not to say that he favors the creation of a universal state; it heralds and only postpones the final death of a civilization.

In short, Toynbee believes that Western civilization is deep into its time of troubles and, by the precedents of other civilizations, nothing lies ahead but eventual doom; nevertheless, he points out that the great civilization could have the capacity to enter upon a new period of vitality achieved through a revitalization of the Christian spirit. But even if destruction comes, an internal proletariat could cause an ultimate rebirth.

V. THE CREATORS OF MODERN LITERATURE

Serious students of twentieth-century literature believe that it contains a most significant theme recurring over and over. In many respects the theme is subconscious or mythical, but it nevertheless represents a clear statement about the condition of the modern world and its prospects for the future. The theme holds that the twentieth century is a spiritual wasteland in which mankind is being despoiled by industrial, mechanical, and monetary obsessions which will lead to ever

greater chaos and destruction; in the midst of all this, however, a small number of "questers" are searching for the means to a better existence. The quest will result, before the year 2100, in a new rebirth of vigor, spirituality, and progress—a development described as "the coming of the new man."[2]

The German novelist Thomas Mann presents his greatest quester in *The Magic Mountain;* Hans Castorp, confined to a tuberculosis sanitarium, succeeds in preventing his physical decay by glimpsing a vision of the creative elements in life. The British author D. H. Lawrence is especially skillful in portraying the pollution, misery, and squalor which arise from excessive industrialization; this he does in the novel *Women in Love*. The story concerns an industrialist, Gerald Crich, who is obsessed by the need to possess all people with whom he is related in any way. However, the novel also concerns Lawrence's great quester, Birkin, who resists Crich and believes he must discover a world in which love in all its aspects is possible. Ernest Hemingway's most famous questers occur in his early novels—especially in *The Sun Also Rises*. Jake Barnes, physically mutilated by war, is surrounded by self-centered pleasure seekers; but in spite of, or because of, an innocence like that of Huck Finn, he ultimately learns to rejoice, to believe, and to give thanks.

To put the matter in a nutshell: the creators of modern literature, like the macrohistorians, believe that after a period of chaos a rebirth will occur.

VI. THE PROFESSIONAL FUTURISTS

Since World War II the new science of futurism has developed. This new science uses methods of thought and analysis which are pseudo-mathematical and rigorous in nature. Indeed, the practitioners of the science, who have been called professional futurists, appear to be mathematicians by basic training; actuaries (who more and more are involved with models and projections) should be interested in this science of professional futurism, and it could become a new research project for the profession.

Work done by the professional futurists is well illustrated in the book *The Year 2000,* published in 1967 by Herman Kahn and Anthony J. Wiener. These authors describe a Standard World which represents the future to the year 2000 (and possibly 2020). This Standard World is described as "relatively apolitical and surprise free." The authors then discuss eight Canonical Variations, which again are quite surprise-free

[2]Ted R. Spivey, *The Coming of the New Man*. (New York: Vantage Press, 1970).

but describe conditions with greater or less stability than that of the Standard World. The authors freely admit that surprises will occur, as they always have, but do not expect them at nearly the same rate as in the first two-thirds of the twentieth century. The Standard World appears more likely than any other, and the authors settle into some glow of satisfaction with it.

The Standard World is determined by projecting a basic long-term "multifold trend"; most of the elements in this trend have been under way for centuries. The elements in the trend are as follows:

1. Increasingly sensate (this-worldly, hedonistic) cultures.
2. Growth of bourgeois, bureaucratic, and democratic elites.
3. Accumulation of technological knowledge.
4. Institutionalization of change, especially in research and development.
5. Worldwide industrialization and modernization.
6. Increasing affluence and leisure.
7. Population growth.
8. Urbanization and growth of megalopolises.
9. Increasing importance of secondary, tertiary, and quaternary occupations.
10. Literacy and education.
11. Increasing capability for mass destruction.
12. Increasing tempo for change.
13. Increasing universality of the multifold trend.

When discussing item 3, "accumulation of technological knowledge," the authors list one hundred developments which they consider very likely before the year 2000. The following small selection is given here:

Human hibernation for short or relatively long periods (months to years)
New "educational" and propaganda techniques for affecting behavior
New techniques for very cheap, convenient, and reliable birth control
New drugs for control of personality
Genetic control over the basic constitution of an individual
General and substantial increase in life expectancy, postponement of aging, and limited rejuvenation
More extensive use of transplantation of human organs
Improved chemical control of mental illness and senility
New techniques for keeping physically fit
Widespread use of computers for intellectual and professional assistance
Stimulated and planned, and perhaps programmed, dreams

All this, be it recalled, is in the "surprise-free" Standard World!

Item 6 in the multifold trend is "increasing affluence and leisure." According to the Standard World of Kahn and Wiener, Canada (population, 35 million) and the United States (population, 320 million) will be in a "postindustrial" stage in the year 2000. Some of the characteristics of postindustrialization are:

Per capita income of about $25,000 measured in terms of 1974 dollars
Most economic activities tertiary or quaternary (service-oriented)
Business firms no longer the major source of innovation
Effective floor on income and welfare
Efficiency no longer primary
Erosion of work-oriented, achievement-oriented values
Sensate self-indulgent criteria become central

It appears to this author that many of the "favorable" elements in the Standard World—for example, high per capita income—could hardly come to pass in company with such "unfavorable" elements as erosion of the work ethic and sensate cultures. However, this mixed bag might develop if a professional elite succeeded in controlling the counterproductive elements of postindustrialism, or, to put the matter in the jargon of the futurists, if a counterreformation succeeded in controlling the counterculture.

Item 8 is "urbanization and growth of megalopolises." It is expected that three gargantuan megalopolises will have developed by 2000: Boswash (80 million people), stretching from Boston to Washington; Chipitts (perhaps 50 million), on the shores of Lakes Michigan, Erie, and Ontario and embracing both Canadian and United States territory; and Sansan (20 million), extending from San Diego to San Francisco. The entire state of Florida might have become a fourth, but somewhat suburbanized, megalopolis.

When discussing item 9, Kahn and Wiener point out the vast increase which will occur in tertiary and quaternary occupations. Tertiary occupations render service to primary (e.g., agricultural) workers and to secondary (processing) workers; the insurance agent could properly be called a tertiary worker. Quaternary occupations render service to tertiary workers or to each other; the actuary can be called a quaternary worker. Kahn and Wiener do expect a large relative increase in quaternary occupations but seem to believe this will occur more at professional levels, in agencies of government, and in nonprofit private groups than in private business enterprises.

All these predictions are in the so-called surprise-free Standard World of Kahn and Wiener; having discussed this Standard World and

its eight Canonical Variations, these authors discuss possible surprises or nightmares which might disrupt the normal trends. These include the possibilities of nuclear war (which will be discussed later in this work) and major depression. Major depression can come only through a series of coincidences or political mistakes, but Kahn and Wiener in 1967 wrote an elaborate scenario of how such a development might occur. The main ingredient is uncontrolled disorder in the international economic system, resulting in a great reduction in trade; depression lasts until 2000, followed by a resumption of the multifold trend. To this author, writing in 1974, it seems that many of the beginning elements in the major depression scenario have occurred.

VII. FUTURISTS IN THE INSURANCE INDUSTRY

Up to this point the work has reviewed conditions of life in 1974 and views of those futurists who have given serious thought to the prospects of Western civilization generally; this background seems essential before an inquiry into the prospects of the insurance industry and then of the actuarial profession. The background has been explored; now, chauvinistically, the work can narrow into the field of the insurance industry and the domain of the actuarial profession itself.

The first question might be this: If there are any futurists in the insurance industry, what are their views? When posing this question, one should recall that futurists are persons who make serious predictions about the future. They are to be distinguished from persons who merely say what *should* be done in the future. The world is full of the latter people! The insurance world is full of them, and the actuarial world is full of them! In some cases their views are important, and this work will devote space to them later. But for the present the inquiry will restrict itself to the futurists of the insurance industry.

The Institute of Life Insurance has published a series of *Trend Reports* which forecast future life styles, including attitudes toward education, employment stability, family formation, leisure, and retirement. These are all matters of vital interest for the insurance and retirement plan industries and for the practitioners of actuarial science themselves. Because it is both instructive and amusing, a scenario from *Trend Report No. 8* (February, 1974) appears as Exhibit I of this work.

In March, 1974, a subsidiary of the Chase Manhattan Bank published a report entitled "The Long-Term Outlook for the Insurance Industry." In the opinion of this author the outlook described is *short-term,* since it extends only to 1982! The report is based on a mac-

EXHIBIT I

SCENARIO: ONE OF MANY ALTERNATIVE LIFE CYCLES THE FUTURE MIGHT OFFER

The Life of John Smith: 1985–2070

(Birthplace: Chicago; Status of Mother: Single, Age 27)

Age (Years)	
1–8	Attended elementary school
8	Traveled with a class of fifteen students; visited a number of countries around the world; learned several languages and cultures
10	Returned to the United States and resumed formal studies
15	Entered a rotating work-study program, electing to serve as an apprentice in three fields: architecture, social research, and communications science
18	Went back to formal studies in the liberal arts; also took advanced courses in architecture
19	Spent three years abroad, studying comparative architecture
22	Returned to United States and was employed as a draftsman; lived for two years in an urban commune with nine other young professionals
24	Moved into an apartment with three friends—two female and one male; they were all "married" to each other, and all income and properties were pooled
27	Divorced himself from his living arrangements and married a woman who was also divorced (she had one child, aged 6); took and passed his architectural exams
35	He and his wife took two-year leaves from their jobs and took their 14-year-old son and went to live on Nantucket; there the three of them jointly developed their interests in the arts: painting, sketching, and sculpture
38	Divorced his wife and lived by himself
50	Set up house with two career women in their mid-forties; the relationship was economic and sexual but not exclusive—he dated other women and they dated other men
60	Left his job and residence and went to teach communications science to students in a developing country
65	Returned to the United States and resumed work part time; also went back to school part time to update his formal education
67	Remarried; his new wife had two children, both grown, with children of their own
72	Took a two-year leave, and he, his wife, and one of their grandchildren traveled around the world; the 16-year-old grandchild remained with a family in London, and he and his wife returned home
74	Resumed work and school; became interested in photography; developed it as a full-time hobby and part-time income
80	Took on a teaching position at a nearby university; his students ranged in age from 12 to 87; his topic was comparative architecture
85	Died of sudden lung failure

roeconomic model which follows the now familiar pattern—calm following storm. In the short run there will be recession and high inflation (over 7 per cent), but by 1982 there will be relatively full employment, a balanced budget, and inflation of only 4 per cent. Life insurance will continue to prosper during this period, securing a 7.5 per cent compound annual growth rate in premium revenues; medium-sized companies will be especially favored. Property and casualty insurance will experience a 7.6 per cent compound growth rate, with large companies being favored.

It is now appropriate to turn to the work of R. Morton Darrow (vice-president, planning and analysis, Prudential Insurance Company), who is one of the true futurists of the insurance industry. His article "The Futures and Life Insurance" appeared in the January, 1974, issue of the Life/Health edition of *Best's Review*. Using the methods of professional futurists such as Kahn and Wiener, he starts with a long-term trend which, although stated differently, is essentially the same as the thirteen-point "multifold trend" discussed in Section VI above. Concentrating on the business world, and specifically the insurance world, he then proceeds to project three futures, described by the following scenarios:

The politicized society.—Because of the menaces of uncontrolled technology and the breakdown of authority, the state has emerged as the one institution with the power to handle problems. Institutionalized consumerism abounds. Although there is probusiness macroplanning on the Japanese model, there is a myriad of antibusiness micróregulation. Corporations survive only by participating in the framing of state policies and regulations. There is decreased product innovation. There is increased violence and conflict; it has become an accepted way of life that business must be done in a climate of distrust and fear.

The postindustrial society.—Knowledge industries dominated by intellectuals have replaced corporations as the primary institutions of society. An elite of experts and technocrats is housed in universities and think tanks. Such corporations as survive are much influenced by "scientific" management techniques. The home communications core has led to the demise of advertising. A much smaller proportion of manpower is allocated to marketing, including the sale of insurance. The work ethic has eroded. Corporations are "persecuted" by government social indicators, leading in many cases to "social" bankruptcy.

The corporate society.—Corporations dominate society. They have a high sense of social responsibility. They have eliminated their failure sectors. Since the state is democratic, they are willingly subject to social audit. The consumer is no longer viewed as a target and is integrated into the total system. The orientation is toward service. New markets and new technologies abound.

Darrow then throws a probability distribution across these three possible worlds: 60 per cent for the politicized society, 25 per cent for the postindustrial society, and 15 per cent for the corporate society. On the basis of this, he proceeds to make personal forecasts of specific developments affecting the insurance industry. These forecasts, which he believes have at least a 50 per cent chance of occurring, include the following:

Tensions of modern society will continue to promote markets for security products.
There will be decreased consumer interest in individual life insurance for death protection, reliance being placed on employers and governments.
There will be increased interest in savings-investment mechanisms.
The life-cycle client account will become a major sales vehicle.
Marketing practices leading to negative public reactions may be eliminated.
Most agencies will market a wide range of financial security products.

If this author were to comment about the work of Darrow, it would be along the following lines. Darrow feels that the politicized society is most likely because it represents the most normal flow or least break from current conditions. He does not seem to define his time frame and does not discuss the possibility that the politicized society at a later stage might turn into the postindustrial society or the corporate society (or some other society). Primarily, his thinking concerns the short-term future. The postindustrial society is that which most professional futurists expect as most likely, but Darrow dissents from this view, in favor of the politicized society. Both the postindustrial society and the politicized society are gloomy prospects; they both reflect the "period of chaos" of the creators of modern literature, or Toynbee's "time of troubles." On the other hand, the corporate society (the key to which is social responsibility) might be reflective of the "coming of the new man" or of Toynbee's hoped-for "new period of vitality achieved through a revitalization of the Christian spirit." It is the hope and the forecast of this author that, after a gloomy period of the politicized society extending perhaps until A.D. 2000, a bright period of the corporate society will emerge, characterized by social responsibility.

VIII. WHAT IS AN ACTUARY?

The purpose of this work is to inquire about the future of the actuarial profession. Therefore, it is desirable to define the term "actuary." This section is devoted to that purpose.

All members of the profession have been plagued by the question,

What is an actuary? A clear answer understood by the public is lacking. The profession should try to amend this deplorable situation! Below are given two standard definitions, both of the traditional type and both relatively obscure to the public:

Oxford English Dictionary:

Actuary. . . . An official in an insurance office, whose duty is to compile statistical tables of mortality, and estimate therefrom the necessary rates of premium, etc.; or one whose profession it is to solve for Insurance Companies or the public, all monetary questions that involve a consideration of the separate or combined effect of Interest and Probability, in connection with the duration of human life, the average proportion of losses due to fire or other accidents, etc.

American College Dictionary:

Actuary. . . . Insurance. An officer who computes risks, rates, and the like according to probabilities indicated by recorded facts.

The *Encyclopaedia Britannica,* as would be expected, goes well beyond these stilted definitions in describing the work of an actuary. It points out, for example, that the work embraces life and accident and health insurance; annuities; pensions; and social as well as fire, casualty, and marine insurance. It also makes this clear statement: "The actuary is, in a way, the engineer of the insurance company."

The present author would like to enter a definition which hopefully is clear and is based on his long-time observations of the actual job itself:

Actuary. A professional who is expert at the design, financing, and operation of insurance plans of all kinds, and of annuity and welfare plans.

IX. HISTORICALLY, WHAT HAS STIMULATED (OR DEPRESSED) THE DEMAND FOR ACTUARIES?

The actuarial profession has grown rapidly because of certain stimuli which have caused a demand for the services of actuaries. This study of the future of the profession should examine some of these historical stimuli (and also the few negative influences which have depressed the demand for actuaries). The following points may be noted:

1. In the period 1860–1900, individual cash-value life insurance, virtually invented on this continent, became widespread; this caused a substantial need for actuarial services (and was indirectly responsible for the formation of the Actuarial Society of America in 1889).

2. A large growth in the number of companies prior to World War I, par-

ticularly in the South and Midwest, stimulated further demand (and was responsible for the formation of the American Institute of Actuaries in 1909).

3. During the 1920's there was widespread acceptance of individual cash-value life insurance as *the* social security system in Canada and the United States. This was particularly true with respect to combination companies operating on the debit system; this condition stimulated the need for actuarial services in insurance companies.

4. The depression of the thirties was a negative influence.

5. World War II was a further negative; although actuarial services of all kinds were maintained, they were not increased; comparatively few actuarial examinations were written.

6. Between 1945 and the present time there has been a vast growth in group coverages of all kinds, including life insurance, health insurance, and pensions. All these group coverages have grown vastly in complexity as well as in numbers of persons covered, leading to a very heavy demand for actuarial services.

7. More recent developments stimulating the need for actuaries (1967 to date) would include activity in the financial reporting area (adjusted earnings) and in the development of such new coverages as variable life insurance and price index–related life insurance.

8. Although it has not caused an easily traceable slowdown in the need for actuaries, a recent negative development (1965 to date) is the rash of mergers and acquisitions, which typically destroy smaller independent companies and with them their distinctive modes of operation and their actuarial staffs.

9. Actuaries have accepted ever increasing management duties. This is a factor which has gradually stimulated the over-all need for actuaries. This has been a result of the increasing complexities of the business and the increasing professionalism of actuaries themselves.

This list raises an inevitable question: What specific developments can be expected which might stimulate further need for actuarial services? The question will be considered later in this work.

X. A CURRENT LOOK AT THE ACTUARIAL PROFESSION IN CANADA AND THE UNITED STATES

One of the characteristics of the actuarial profession (like the Reformed church!) is a tendency to fractionate into sects which claim independence from each other. More than the sects of the church, actuarial organizations exhibit much overlapping and interdependence. Periodic ecumenical efforts are usually paralleled by additional sectarianism. The following is a list of independent actuarial organizations in Canada and/or the United States in 1974:

1. *Society of Actuaries.*—The Society of Actuaries, which is the successor to the Actuarial Society of America (1889) and the American Institute of Ac-

tuaries (1909), is the pre-eminent actuarial body in Canada and the United States for life actuaries. Its historical achievements in the fields of literature, research, education, and examination have advanced the knowledge of actuarial science and promoted the maintenance of high standards of competence and conduct within the actuarial profession. Exhibit II gives a breakdown of the membership of the Society of Actuaries by country and type of employment.

2. *Casualty Actuarial Society.*—The Casualty Actuarial Society (1914) performs the same functions as the Society of Actuaries but in fields other than life insurance. Exhibit III gives a breakdown of its membership.

3. *Conference of Actuaries in Public Practice.*—As its name indicates, this body consists primarily of consulting actuaries. It holds meetings and publishes papers but does not engage in examination activities. Membership, according to the 1972–73 *Proceedings*, was as follows:

Fellows:	
United States	248
Canada	10
Associates:	
United States	184
Canada	2
Members:	
United States	84
Canada	0
Grand total	528

4. *Fraternal Actuarial Association.*—The Fraternal Actuarial Association consists of actuaries who specialize in the needs of fraternal life insurance organizations on this continent. Membership as of May 1, 1974, was as follows:

	Canada	U.S.	Total
Fellows:			
Employed by fraternal societies	2	15	17
Consulting actuaries	.....	22	22
Others	.....	28	28
Associates:			
Employed by fraternal societies	1	10	11
Consulting actuaries	1	25	26
Others	1	12	13
Grand total	5	112	117

The consulting actuaries who are members of the FAA have fraternal organizations as their principal clients.

5. *Canadian Institute of Actuaries.*—The Canadian Institute of Actuaries

(1965) was formed to promote actuarial science in Canada specifically. Its membership as of October 17, 1973, was as follows:

	In Canada	Out of Canada	Total
Fellows	581	200	781
Other members	44	12	56
Total members	625	212	837
Students	213	4	217
Correspondents	1	54	55

6. *American Academy of Actuaries.*—The American Academy of Actuaries (1965) was formed to promote actuarial science in the United States specifically. It contains both life and casualty actuaries. There is only one class of membership. As of December 31, 1973, there were 3,269 members.

7. *International Actuarial Association.*—The International Actuarial Association (1895) is headquartered in Brussels, Belgium. Its Canadian section (1973) contained 360 members, and its United States section 616 members. It is safe to say that each of these actuaries is a member of at least one of the bodies already mentioned. The International Actuarial Association has a special subgroup (ASTIN) for nonlife actuaries.

8. *International Association of Consulting Actuaries.*—The organization, whose purpose is indicated by its name, includes 53 members from Canada and 92 from the United States.

9. *Actuarial clubs.*—There are 37 local and regional actuarial clubs listed in the *1974 Year Book* of the American Academy of Actuaries. They have no official connection with other actuarial bodies but supplement their activities. Exhibit IV provides some statistical information about these clubs. Most members belong to one or more of the actuarial organizations mentioned above.

With all this proliferation, is it possible to determine how many professionals there are on this continent who can be called actuaries? Elimination of all duplicates is almost impossible, but it is the estimate of this author that there were, at the end of 1973, approximately 825 persons in Canada and 4,300 persons in the United States who were members of at least one of the first six organizations listed above.

XI. RECENT HARMFUL PREOCCUPATIONS OF THE PROFESSION

It seems to this author that there has been a trend in recent years toward activities which are not designed to provide service to the public and are not in the long-term interests of the profession. These activities are inward-looking at best and could in the long run be

EXHIBIT II

SOCIETY OF ACTUARIES

Distribution of Membership as of July 1, 1973

TYPE OF EMPLOYMENT	CANADA		UNITED STATES		OTHER	
	Fellow	Associate	Fellow	Associate	Fellow	Associate
I. Insurance companies*	265	250	1,184	858	14	121
II. Consulting actuaries and insurance brokers	63	73	407	339	4	49
III. Insurance departments (Canada and United States)	12	8	9	12	.....	.....
IV. Other governmental employment	8	13	17	26	1	5
V. Organizations serving insurance business	0	1	6	2	0	1
VI. Universities and colleges	5	10	14	19	0	2
VII. Miscellaneous employment	2	10	27	25	1	7
VIII. Retired or no indicated business connection	50	34	183	91	8	25
Total	405	399	1,847	1,372	28	210
Total by country	804		3,219		238	
Grand total	4,261					

* Including fraternal benefit societies, health insurance carriers, and holding corporations with insurance subsidiaries.

EXHIBIT III

CASUALTY ACTUARIAL SOCIETY

November, 1973

TYPE OF EMPLOYMENT	FELLOWS				ASSOCIATES			
	U.S.	Canada	Other	Total	U.S.	Canada	Other	Total
Insurance companies:								
Property-liability	149	1	2	152	140	3	.....	143
Life and accident and health	8	2	.....	10	26	1	2	29
Bureaus and associations	19	1	.....	20	16	1	.....	17
Consultants	25	.....	1	26	17	1	.....	18
Government	8	.....	.....	8	13	3	.....	16
Academic	6	.....	.....	6	3	.....	.....	3
Other	5	.....	.....	5	8	1	1	10
Retired	40	2	1	43	38	1	.....	39
Total	260	6	4	270	261	11	3	275
Grand total	545							

EXHIBIT IV

MEMBERSHIP OF LOCAL AND REGIONAL ACTUARIAL CLUBS*

	F.S.A.	A.S.A.	Other	Total
Arizona Actuarial Club				
Atlanta Actuarial Club	34	37	61	132
Baltimore Actuaries Club	17	26	11	54
Actuarial Club of Boston	184	109	42	335
Central Illinois Actuarial Club	14	14	82	110
Chicago Actuarial Club				376
Columbus Actuarial Club	20	15	16	51
Denver Actuarial Club	8	3	22	33
Actuaries Club of Des Moines	42	22	41	105
Actuaries Club of Hartford	252	179	99	530
Actuaries Club of Indiana, Kentucky, and Ohio	119	65	74	258
Actuarial Club of Indianapolis	32	13	43	88
Kansas City Actuaries Club	17	16	38	71
Little Rock Actuarial Club	1	2	14	17
Los Angeles Actuarial Club	75	72	93	240
Michigan Actuarial Society			38	92
Middle Atlantic Actuarial Club	102	69	56	227
Actuaries Club of Montreal	81†	69	0	150
Nashville Actuarial Club	15	8	9	32
Nebraska Actuaries Club	17	32	43	92
Actuaries Club of New York				669
Casualty Actuaries of New York	49‡	63§		112
Actuarial Club of the Pacific States				271
Actuaries Club of Philadelphia	99	57	19	175
Pittsburgh Actuarial Club	3	9	12	24
Portland Actuarial Club	11	4	15	30
Le Club Actuariel de Quebec	28	33	13	74
St. Louis Actuaries Club	25	15	27	67
San Francisco Actuarial Club	31	21	38	90
Seattle Actuarial Club	18	17	38	73
Southeastern Actuaries Club	132	90	77	299
Actuaries Club of the Southwest	84	52	140	276
Twin Cities Actuarial Club	42	38	9	89
Western Pennsylvania Actuaries Club				
Actuaries Club of Winnipeg	35	19	1	55
Winston-Salem Actuarial Club	8	5	5	18
Wisconsin Actuaries' Club	48	32	54	134

* As reported to the author in the spring of 1974; blank indicates that information is unavailable or unreported.

† F.S.A., F.C.I.A., F.F.A., F.I.A.

‡ F.C.A.S.

§ A.C.A.S.

harmful to the actuarial profession. The following short list is provided:

1. In some stock companies there has been excessive preoccupation with profits. The phrases have been: "The bottom line is all that counts"; "The stockholders are entitled to an annual return of 14 per cent on their investment"; and so on.

2. Many thousands of hours of actuarial time have been spent on the subject of adjusted earnings. It can be argued that this effort, which is directed not to solvency but to earnings, gives a better picture of the performance of a company and in some general way should benefit the insurance-buying public in the long run; at this writing, however, it is admitted that GAAP statements have not succeeded in bringing about uniformity and have not clarified the position of life stocks for investors. To this author it seems that the amount of money, and of actuarial effort, which has been spent on adjusted earnings has not been justified if service to the public is the criterion.

3. During recent years (essentially since 1968) there has been a rash of mergers and acquisitions of stock companies and the formation of insurance holding companies, in which individual component companies lose their actuarial independence. Admittedly such actions may have been dictated by economic considerations; to the extent that they have destroyed strong local companies, however, they may have harmed both service to the public (which is based at least partly on a variety of independent approaches) and the future of the actuarial profession itself.

4. Recently, a number of actuaries have been accused publicly of wrongful acts in connection with falsifying insurance data or financial information. Fortunately this number has been extremely small, but the very fact that these accusations have been made is disquieting and is a historical "first" for the profession.

XII. FURTHER NEGATIVES THAT COULD AFFECT THE PROFESSION

In the interests of thoroughness and objectivity it is desirable to catalogue all negatives as well as positives that could affect the future of the profession. This section of the work will discuss five specific negative areas. In some of these areas the actuarial profession on its own initiative might be able to palliate, contain, or eliminate the negatives or even turn them into positives; such possibilities will be mentioned below. The five areas are as follows:

1. There has been a recent negative turn in the attitude of the public toward life insurance. This is brought out in a publication of the Institute of Life Insurance: *MAP 1973*. The usually strong belief in life insurance has weakened somewhat: very few people think of the life insurance industry as responsive to consumer needs; three out of four question the agent's motives; there is a major increase in the public's dissatisfaction with the job the industry is doing in balancing profits and service to the public; and there has been a significant decline in the proportion of the public who feel that the individual should have the basic responsibility for life insurance and retirement income. All these findings are disquieting, but they are all within the power of the actuarial profession to influence and even reverse; measures along these lines will be discussed later in this work.

2. The problems mentioned above are already upon us. The next one is not,

but it is a possibility that must always be kept in mind: prolonged economic depression. The Kahn-Wiener scenario for depression extending until 2000 has been described above. In addition, there are economists of the Khondrati school who believe on the basis of long-term cyclical studies that a major depression will occur before 1980. Furthermore, it must be recorded that at the time of writing this work the United States is in a recession as measured by usual statistical methods. It has been predicted in this year 1974 (by Arnold Toynbee, now aged 85) that because of the depletion of physical resources the West will return to a condition of austerity like that of the world war periods.

3. Among the nightmare possibilities is nationalization of the insurance industry. This has happened on a wholesale basis in some countries of the world, notably India. As an insidious variation, there is the gradual socialization of certain fields; examples would include the medical care insurance field (for Medicare recipients in the United States and for the entire population in Canada) and the automobile insurance field in certain provinces of Canada. More picking away of this sort can be expected; however, there seems no real threat of out-and-out nationalization of the insurance industry on this continent. Not even the most pessimistic of the scenarios of Kahn, Wiener, and Darrow predict the actual demise of the corporation. Finally, this author should point out that the actuarial profession through its own efforts can bring to bear influences which can make nationalization unnecessary and undesirable.

4. War is on any list of possible nightmares. War in any form tends to be disastrous for the insurance business and for the actuarial profession. Therefore its possibility will here be considered. For this purpose an extremely fine article will be mentioned which appeared in the October, 1973, issue of *Foreign Affairs*. The article is by Louis J. Halle, professor at the Graduate Institute of International Studies in Geneva, and is entitled "Does War Have a Future?" Professor Halle concludes that the day of general war involving great powers on both sides may be past; however, he foresees a continued use of military force in violence, manifested in prolonged guerrilla war or in "incidents" falling short of outright war; he foresees widespread and continual disorder, inhumanity, and barbarism. With the passage of time he imagines that certain "rules of the game" might emerge as in the early Middle Ages to bring the chronic disorder under control; here again is the familiar theme of rebirth following a period of chaos. It is hardly within the power of the actuarial profession to alter the likelihood or consequences of war. Nevertheless, actuaries are professionally interested in most aspects of human behavior; this author suggests that a segment of the profession should become interested in the science of conflict control as a new research project.

5. The final negative considered here may be the worst of all: inflation. As this is being written, inflation in the United States is at its highest rate in twenty-three years (in excess of 10 per cent per annum). The erosion of the purchasing power of life insurance is obvious, as is the potentially destructive effect on all forms of fixed-dollar saving, including cash-value life insurance. Continued inflation of this magnitude could have incalculable effects on the

life insurance business on this continent. It is possible, of course, that the industry could attempt to bring about governmental policy which would control inflation (although such attempts in the past have had very little success). At a more practical level, however, it is possible for the industry and the profession to develop price index–related products which give some needed protection to the public; it is a matter of regret to this author that such a small segment of the industry has been making efforts along these lines.

Earlier in this work a case was made that Western civilization is in, or is about to enter upon, a difficult era variously described as a "time of troubles," a "period of chaos," and "the politicized society." Perhaps, in its own way, the actuarial profession is in that difficult era.

XIII. A PAUSE FOR BREATH

It is now time to pause for breath in this exposition. After painting the general background and summarizing the view of futurists, this work has delineated negatives in the present position of the insurance industry and the actuarial profession, and reasons for believing that a time of troubles is at hand. From this point forward, we will consider positives in the position of the insurance industry and the actuarial profession, and reasons for believing that "a new period of vitality," a "rebirth," or "the corporate society" can be achieved in due course of time. The key is return to service of the public.

XIV. SPECIFIC FUTURE DEVELOPMENTS THAT COULD INCREASE THE NEED FOR ACTUARIES

As has been mentioned, the insurance world is full of institutions and persons who say *what should be done* to set things straight. Frequently these prescriptions differ from one another or are confined to limited fields. Many are well meant and probably correct. Some will be discussed in the next section. First, however, it seems well to list some specific future developments which could increase the need for actuarial services. The list is by no means complete.

1. For the individual as well as group (or mass) markets it seems inevitable that most companies will adopt a "supermarket" approach with a large variety of products, including not only the traditional life and health coverages but also property and casualty products, savings plans of various kinds, and more exotic services such as prepaid legal assistance, estate management and executor services, and others. This development, which will be a gradual one over the next thirty to forty years, will increase the need for actuarial personnel.

2. There will be a vast increase in the number of pension plans and in the

responsibilities of actuaries for adequate design and solvency. This will increase the need for actuaries both in companies and at the consulting level.

3. There will be a vast proliferation of regulation at the federal, provincial or state, and local levels. This regulation will be important and meaningful in some cases, particularly where consumerist concerns are involved, but much of it will be of the type described as "antibusiness microregulation." To shape, prevent, or cope with all of this, many actuaries and other professionals will be needed—not only in companies and at the consulting level but in the regulatory bodies themselves. Future income tax problems constitute a similar area.

4. There will be significant changes in marketing methods for insurance products. There will be increased need for those actuarial services concerned with the design of marketing methods.

5. There will be a considerable increase in the internal problems of companies, calling for increasing attention from actuaries. Such problems will include investment research and allocation, expense analysis and allocation, and electronic operations.

6. More and more, in the future, actuaries will be called on to render voluntary, "unpaid" service, usually on specific projects or problems, to governments, regulatory bodies, planning agencies, social agencies, educational or charitable bodies, and the like. In most cases these services will be rendered by insurance company actuaries; an increased demand for actuaries will be the (somewhat indirect) result.

7. Actuaries have special ability to perform new services which will be badly needed in the upcoming years of a "politicized society" or a "postindustrial society." Such services will include the following:

a) Construction of social indicators to reveal the factors which impinge on mortality, morbidity, and therefore the quality of life.
b) Determination of future manpower needs in various professional and employment sectors.
c) Study of the effects on society of genetic engineering.
d) Sophisticated population projections, including, for example, the effects of adverse selective breeding in advanced countries.
e) Study of job-related mortality and morbidity under the new considerations of postindustrialism.
f) Revision of actuarial assumptions of all kinds, as a result of such aspects of modern society as new moral standards, new sexual "technology," serial marriages and divorces, and children born out of wedlock.
g) Study of the effects on mortality and morbidity of various scientific advancements and of negative factors such as pollution.
h) Study, hopefully before its inevitable legalization, of euthanasia and its effects—financial, medical, emotional, and social.
i) Determination of the differing food needs of individuals in the light of impending world food shortages.

Many of these tasks are of interest to, and can be financed by, the private sector. Many, however, are government-related and call for a much more

satisfactory mechanism under which the actuarial profession can provide needed services to government bodies of all kinds.

8. Overseas expansion in both the developed and the developing countries seems a distinct possibility over the next thirty or forty years, especially for United States companies, which, unlike their Canadian counterparts and other United States corporations, have not generally expanded to other parts of the world; such a development on any large scale would certainly stimulate demand for actuaries here at home. It should be mentioned here that professional futurists feel that transnational corporations (despite some present elements of disgrace) have bright futures.

9. Last, a general point: The condition of the world, be it called time of troubles, chaos, postindustrialism, sensate culturalism, wasteland, or whatever, creates a vast need and desire for security. This cannot fail to help the prospects of the insurance industry on this continent and those of the actuarial profession.

XV. PRESCRIPTIONS

As has been mentioned, the insurance world at large is full of persons and organizations who say what should be done to set things right. They do not produce predictions of the future but, rather, prescriptions for the future. The present author has collected some of these which seemed worthy of inclusion in this work because they could have a strong bearing on the future of the actuarial profession on this continent. In all these matters, "the key is return to service of the public."

In January, 1974, the Institute of Life Insurance issued the first memorandum report concerning Project II of its Future Outlook Study, directed by E. J. Moorhead, F.S.A. The memorandum deals largely with ordinary life insurance; it lists various "needs" which are summarized below:

Issues calling for current management attention:

Review of on-campus sales activities
Public education in equity products area
Uniformity of practice on policy dividends
Increased use of settlement options
Service more readily available to policyholders
Qualified manpower
Further utilization of the talents of women
Progress in improving public understanding
More effective regulatory system

Issues calling for additional research and study:

Objective measure of family insurance needs
Further development of life-cycle concept
Measures of managerial success based on efficiency as well as growth

Better knowledge of markets
Examination of field manpower needs
Better efforts at forcasting
Better statistical exploration
Better knowledge of the effects of competition
Better knowledge of trends in life insurance prices

Issues calling for reflective thinking:

Philosophy on surrender values
Better benefits for persisting policyholders
Corporate social responsibilities and involvements
Better response to critics
Cooperative efforts to improve service to the public

Efforts of another life insurance trade association will now be discussed: The Life Insurers Conference. This organization consists primarily of stock companies operating under the combination (debit) approach and servicing primarily the middle and lower socioeconomic markets. Incidentally, the author believes that inability to serve the lower socioeconomic market for individual products is a "failure sector" for most ordinary insurance companies. The Life Insurers Conference, as might be expected, has an entirely different list of prescriptions for the future, including the following:

1. Discounts must be given to present weekly premium policyholders who are actually paying premiums monthly.
2. "Participation limits" must be adopted by all companies to prevent the purchase by low-income families of insurance beyond their ability to pay.
3. Plans such as twenty-year endowment which exhibit low persistency on a debit basis must not be sold.
4. Socioeconomic underwriting must not be used if it is a disguise for racial underwriting.

The "prescription list" is most prominent in the case of health insurance. This is because the list is embedded in a bill before the United States Congress: the National Healthcare Act of 1973, sponsored by Senator Thomas J. McIntyre and Congressman Omar Burleson. This bill was created under the aegis of the Health Insurance Association of America and is quite largely the work of the actuarial profession. In the eye of the public, the health insurance industry is considered to have the largest "failure sector" of all: failure to cover all segments of the population with adequate health insurance coverage and failure to control the rapidly escalating cost of health care itself. In the past the health insurance industry has shied away from responsibility for these failures, but it now accepts it, as the initiatives of the bill clearly show. The prescriptions of the bill are as follows:

1. The supply, productivity, and distribution of health manpower must be improved.
2. To reduce costly hospital use, ambulatory and preventive programs must be improved and included in all health insurance plans.
3. Distribution of health resources must be improved through use of regional health planning agencies, which, among other things, would have some power to prevent unnecessary hospital construction.
4. Health care costs must be controlled through adequate use of peer review and "health services review organization" mechanisms.
5. National goals for the improvement of health care must be established through the mechanism of a council of health policy advisers.
6. Health insurance benefits according to federal standards must be made available to all segments of the population through a combination of state pools and private insurance.

The National Healthcare Act of 1973 leaves the provision of health insurance largely in private hands, and its adoption would be very favorable for the actuarial profession. However, it would call upon the health insurance companies to display a very large measure of corporate social responsibility and to merit the public trust which would be accorded to companies generally under the ideal corporate society which was discussed earlier in this work.

Turning now to the field of the pension actuary, a still different "prescription list" is seen. A discussion of the future of the actuarial profession (*TSA*, Vol. XXIV) is a good source for this.

1. A primary goal is to advise employers on plans designed to maximize the security of the employee while keeping short- and long-range costs at a minimum.
2. Thorough knowledge must be acquired of tax laws relating to benefit plans.
3. Knowledge of investment alternatives and long-range performance must be acquired.
4. The profession has the unique obligation to be the source of credible information on the cost and incidence of alternative benefit and financing plans for transfer payment programs of all types.
5. The profession must study the problems of, and formulate recommendations regarding, government proposals in the field of economic security programs.
6. Attention must be directed to the design and funding of pension and profit-sharing programs for the small-employer market.

XVI. PRESCRIPTIONS FOR THE ACTUARIAL PROFESSION

Prescriptions have been listed for the insurance and pension industries. Now it is time to turn inward and list prescriptions concerning the conduct of the actuarial profession itself.

1. Basic and continuing education must be modified to put more stress on economics, the effects of inflation, government programs, expense-handling in a dynamic economy, political aspects of the insurance business, and the needs of consumers.
2. Means must be found to improve the flow of practical research and literature. As part of this effort, an education and research foundation should be created by the actuarial profession.
3. The profession must learn to speak out appropriately on important topics.
4. Ways must be found, including the provision of any necessary subsidies, to put fully qualified professionals into key government posts.
5. A spirit of professionalism must prevail. The characteristics of professionalism are integrity, judgment, ingenuity, competence, and humility.

XVII. THE FUTURE OF THE LIFE INSURANCE COMPANIES

The brightness of the future for the actuarial profession depends on the future for insurance companies. Accordingly, this section of the work will inquire specifically about the companies themselves. To put the matter in a nutshell, the author expects that in the year 2020 fewer companies will exist (especially in the United States) than in this year 1974, and their nature will be modified greatly. The modification, which will be gradual, will come as the result of a time of troubles, followed by a new period of vitality characterized by corporate social responsibility. The time of troubles, which may last until 1995, will be the result of general problems in Western civilization and of such negatives as are discussed in Sections XI and XII of this work. The new period of vitality will result from a successful response to challenges such as those discussed in Sections XV and XVI, and a recognition in Western civilization that independent corporations within a nation, if characterized by social responsibility, are preferable to government monopolies; this recognition will be parallel to the rediscovery for the civilization as a whole that a system of independent nations, if characterized by political and economic responsibility, is preferable to a universal state.

During the years between 1974 and 2020, companies will gradually become more complex in terms of product. A typical company might develop a product mix including the following:

Personal life insurance in much variety
A vast array of business insurance
Health insurance, with heavy concentration on long-term disability coverage
Property and casualty coverage
Savings plans of many kinds
Financial counseling and budgeting services

Estate management services, including the counseling of survivors
Legal services on a prepaid basis
Administration of health maintenance organizations
Pension plans of many kinds
Protection against inflation for all products
Much correlation with governmental benefits

Thinking not of product but of complexity of operation, the following may be discerned:

Great relative increase of group and mass-marketing techniques
Investment side of the business subjected to much greater research and scrutiny
Agency forces compensated by salaries, sales-attempt fees, and bonuses
Decline of the independent broker
Overseas expansion; increased participation of overseas companies in the Canadian and United States markets
Merging of the "combination" and "ordinary" concepts
"Consulting" branches of companies, prepared to give free services to worthy agencies

Historical growth in the number of United States life insurance companies is shown in the accompanying tabulation. Formation of new

End of Year	Number of Companies	Average Number per Annum of Additional Companies since Preceding Entry
1930	438	.....
1935	373	−13
1940	444	14
1945	473	6
1950	649	35
1955	1,107	92
1960	1,441	67
1965	1,701	52
1970	1,804	21
1971	1,818	14
1972	1,835	17
1973	1,854	19

companies occurred at the greatest rate in the five-year period 1950–55. Growth in the number of companies has been much slower in more recent years. One may get the impression that the number is still increasing at a modest rate, but this inference is misleading because of the "Arizona phenomenon." Arizona requires only $37,500 to form a life insurance company ($25,000 capital and $12,500 surplus), and this has

led to a phenomenal rash of formations for tax or other special reasons. At the end of 1973 Arizona accounted for more than 22 per cent of all life companies in the United States! When Arizona companies are removed, the picture is as follows:

End of Year	Total Number of Companies	Arizona Companies	Net
1955....	1,107	25	1,082
1960....	1,441	116	1,325
1965....	1,701	172	1,529
1970....	1,804	346	1,458
1971....	1,818	352	1,466
1972....	1,835	398	1,437
1973....	1,854	410	1,444

From this it is clear that the effective number of companies has tended to decline since 1965. The decline is likely to continue; it will be the result of (*a*) mergers and acquisitions, (*b*) the difficulty of raising capital under present conditions, and (*c*) other economic conditions affecting the future of life insurance.

The principal changes affecting companies will, however, be in the areas of complexity, as has been mentioned, and of size. Because of complexities of operation, there will be few "small" companies in the year 2020.

One major point affecting the future of companies: the day of the policyholder's losing out because his company has become insolvent is over. Insolvency fund legislation will see to this, and, where it does not, solvent companies will see to it voluntarily. Incidentally, the Canadian life insurance industry is rightly proud of the fact that no policyholder in Canada has ever lost anything through his company's becoming insolvent; that result has been achieved by voluntary cooperation of Canadian companies.

How many life insurance companies employ at least one member of the Society of Actuaries? The answer is provided by the tabulation on page 362. The fact that the vast majority of United States companies do not employ even one member of the Society of Actuaries is quite astonishing, even when allowance is made for the small size of many companies. Nevertheless, the gradual increase in the percentage of companies employing members is encouraging. One gets the impression that plenty of new actuarial jobs are in the offing if this trend continues! This table shows that the number of members per employing company is also gradually increasing in both countries. It indicates

End of Year	Total Number of Life Insurance Companies* (1)	Number Employing at Least One Member of Society of Actuaries (2)	Percentage [(2) ÷ (1)] (3)	Average Number of Members per Employing Company (4)
Canada:				
1963	59	48	81.4%	6.6
1972	81	64	79.0	7.7
1973	82	65	79.3	7.9
United States:				
1963	1,352	195	14.4	6.1
1972	1,438	283	19.7	6.8
1973	1,445	294	20.3	6.8

* The number of companies in the United States is adjusted to exclude all Arizona companies except the one company which in 1972 and 1973 employed members.

the much more satisfactory percentage of Canadian companies employing members (a fact which may be accounted for by the conservative attitude in Canada toward formation of new companies), and it tends to corroborate the well-known belief that, size for size, Canadian companies employ more actuaries than United States companies. If conditions in the United States approach those in Canada, there may be a bonanza in the actuarial employment world!

XVIII. HOW MANY ACTUARIES WILL BE NEEDED?

This section will be devoted to a question of ultimate importance: How many actuaries will be needed? But first it is well to point out that this question has been asked before in Society history, and answers have been attempted. Those answers will be discussed first.

In 1958 the Society's Committee to Review Membership Requirements surveyed 180 companies employing members and 236 companies not employing members, plus consultants and other employers. The tabulation at the top of page 363 compares the forecast and actual results. Even as late as December, 1973, Society membership (4,664) had not reached that 1968 forecast. Either the profession was vastly understaffed in 1963 and 1968, or, what is more likely, the responders to the survey "missed it by a country mile"!

In 1967 the Committee on the Future Course of the Society prepared a somewhat similar forecast. However, it was in the nature of a forecast more of size of membership than of needs. Perhaps mindful of the difficulties, the committee saw fit to express the forecast in terms of a range. Results are shown in the second tabulation on page 363. Precariously, the number of Fellows has continued just above the "low."

	Forecast Needs			Actual Members		
	F.S.A.'s	A.S.A.'s	Total	F.S.A.'s	A.S.A.'s	Total
1958:						
Life companies				753	482	1,235
All others				225	283	508
Total				978	765	1,743
1963:						
Life companies	1,242	1,068	2,310	946	643	1,589
All others	446	649	1,095	309	293	602
Total	1,688	1,717	3,405	1,255	936	2,191
1968:						
Life companies	1,683	1,586	3,269	1,136	1,013	2,149
All others	609	917	1,526	512	531	1,043
Total	2,292	2,503	4,795	1,648	1,544	3,192

	Forecast		Actual
	High	Low	
1966:			
F.S.A.'s			1,555
A.S.A.'s			1,438
Total			2,993
1971:			
F.S.A.'s	2,329	2,155	2,162
A.S.A.'s	2,129	1,780	1,827
Total	4,458	3,935	3,989
1973:			
F.S.A.'s	2,758	2,429	2,444
A.S.A.'s	2,378	1,905	2,220
Total	5,136	4,334	4,664

After a somewhat weak start, Associates are now occupying a more comfortable position in mid-range.

So much for previous forecasts. Another item of interest is the recent trend in employment of F.S.A.'s and A.S.A.'s. Exhibit V deals with this point. There has been continued growth in both fields of employ-

EXHIBIT V

TREND IN EMPLOYMENT OF F.S.A.'S AND A.S.A.'S

Date	F.S.A.'s	A.S.A.'s	Total
Insurance companies —Canada:			
June 1, 1963	184	135	319
July 1, 1972	256	235	491
July 1, 1973	265	250	515
Consultants— Canada:			
June 1, 1963	18	17	35
July 1, 1972	59	55	114
July 1, 1973	63	73	136
Insurance companies —United States:			
June 1, 1963	759	443	1,202
July 1, 1972	1,143	822	1,965
July 1, 1973	1,184	858	2,042
Consultants— United States:			
June 1, 1963	152	123	275
July 1, 1972	364	300	664
July 1, 1973	407	339	746

ment, in both countries, and in both classes of membership. Company employment grew at about the same incremental rate in the most recent year as it had in a ten-year period. The growth has been quite spectacular in the consulting field; in the most recent year, 104 members were added to the consulting field. This compares with 101 additional members in the company field. All things considered, recent trends would seem to indicate a bright future for actuarial employment in all sectors.

The new forecast is now reached. Very fortunately for the readers of this work, the Society's Committee to Encourage Interest in Actuarial Careers (Wilbur H. Odell, F.S.A., Chairman) has been conducting a survey dealing with future needs. The work has been under the direct supervision of Russell H. Smith, Jr., F.S.A., to whom this author is much indebted. The survey questionnaire was answered by the following numbers of organizations:

Insurance companies:	
Canada	32
United States	181
Consultants:	
Canada	8
United States	46

Other employers:	
Canada	4
United States	9

The survey results contain very interesting and valuable material dealing with present and future needs for actuaries, specific job assignments, time required to achieve membership, and other matters. It is hoped that the committee will publish its findings in suitable form. For purposes of the present work, only certain data are being shown. Exhibit VI is a forecast of the need for F.S.A.'s and A.S.A.'s in Canada and the United States. Exhibit VII, which should be of immediate interest to young people considering an actuarial career, is a forecast of the need for actuarial students. In the case of Exhibit VII, the raw data from the survey are shown, since there was no practical way to prorate upward so that a total population would be represented. In the case of Exhibit VI, however, a proration was made as described below.

The survey represented about 78 per cent of employed F.S.A.'s and 62 per cent of employed A.S.A.'s. Responses were more complete for companies than for consultants and other employers. What addition should be made so that the forecast represents the total population? A proportionate adjustment would take the (somewhat dubious) view that nonrepliers would have the same attitudes as repliers. One might guess that a proportionate adjustment would be too high. On the other hand, the survey did not include any organizations not now employing actuaries which might employ them in the future. Another problem concerned the fact that the survey data were as of January 1, whereas Society membership statistics by employment organization are as of July 1. In the end, a proration was made by multiplying the raw forecast data from the survey by the ratio of the number actually employed July 1, 1973 (from Society records), to the number actually employed January 1, 1973 (from the survey raw data). This was done separately for each of the twelve distinct segments in Exhibit VI. Retired members and foreign members are not included in Exhibit VI; it is intended to deal only with employment needs in the two countries. Comparison with actual membership in future years can be made by consulting the table in the Society's publication *List of Members of Society of Actuaries by Business Connection;* that table provides the necessary breakdown by country, type of employment, and class of membership.

Exhibit VI shows that as of July 1, 1973, there were shortages in all segments; although 3,665 members were employed, 4,157 were actu-

EXHIBIT VI

FORECAST OF NEED FOR F.S.A.'S AND A.S.A.'S

(As of July 1 in Each Year Stated)

	CANADA			UNITED STATES			BOTH COUNTRIES		
	F.S.A.	A.S.A.	Total	F.S.A.	A.S.A.	Total	F.S.A.	A.S.A.	Total
	Insurance Companies								
Employed: 1973	265	250	515	1,184	858	2,042	1,449	1,108	2,557
Needed:									
1973	282	269	551	1,342	1,017	2,359	1,624	1,286	2,910
1978	368	408	776	1,828	1,393	3,221	2,196	1,801	3,997
1983	423	464	887	2,082	1,631	3,713	2,505	2,095	4,600
1988	475	528	1,003	2,317	1,813	4,130	2,792	2,341	5,133
1993	515	594	1,109	2,549	2,023	4,572	3,064	2,617	5,681
	Consultants								
Employed: 1973	63	73	136	407	339	746	470	412	882
Needed:									
1973	65	77	142	448	381	829	513	458	971
1978	120	177	297	696	636	1,332	816	813	1,629
1983	134	188	322	829	753	1,582	963	941	1,904
1988	150	207	357	950	845	1,795	1,100	1,052	2,152
1993	164	223	387	1,016	920	1,936	1,180	1,143	2,323
	Other Employers								
Employed: 1973	27	42	69	73	84	157	100	126	226
Needed:									
1973	29	46	75	83	118	201	112	164	276
1978	35	57	92	115	174	289	150	231	381
1983	37	61	98	139	235	374	176	296	472
1988	37	61	98	153	269	422	190	330	520
1993	40	65	105	160	297	457	200	362	562
	Grand Total								
Employed: 1973	355	365	720	1,664	1,281	2,945	2,019	1,646	3,665
Needed:									
1973	376	392	768	1,873	1,516	3,389	2,249	1,908	4,157
1978	523	642	1,165	2,639	2,203	4,842	3,162	2,845	6,007
1983	594	713	1,307	3,050	2,619	5,669	3,644	3,332	6,976
1988	662	796	1,458	3,420	2,927	6,347	4,082	3,723	7,805
1993	719	882	1,601	3,725	3,240	6,965	4,444	4,122	8,566

EXHIBIT VII

FORECAST OF NEED FOR ACTUARIAL STUDENTS

	Canada	United States	Total
	Insurance Companies		
Employed: Jan. 1, 1973	138	804	942
Needed:			
Jan. 1, 1973	157	918	1,075
Jan. 1, 1978	197	1,273	1,470
Jan. 1, 1983	240	1,475	1,715
Jan. 1, 1988	277	1,665	1,942
Jan. 1, 1993	316	1,869	2,185
	Consultants		
Employed: Jan. 1, 1973	11	115	126
Needed:			
Jan. 1, 1973	12	126	138
Jan. 1, 1978	25	228	253
Jan. 1, 1983	30	262	292
Jan. 1, 1988	32	293	325
Jan. 1, 1993	33	326	359
	Other Employers		
Employed: Jan. 1, 1973	6	24	30
Needed:			
Jan. 1, 1973	5	34	39
Jan. 1, 1978	7	44	51
Jan. 1, 1983	7	67	74
Jan. 1, 1988	7	78	85
Jan. 1, 1993	7	88	95
	Total		
Employed: Jan. 1, 1973	155	943	1,098
Needed:			
Jan. 1, 1973	174	1,078	1,252
Jan. 1, 1978	229	1,545	1,774
Jan. 1, 1983	277	1,804	2,081
Jan. 1, 1988	316	2,036	2,352
Jan. 1, 1993	356	2,283	2,639

NOTE.—These figures represent the total number employed below A.S.A. rank.

ally needed. Furthermore, 6,007 members will be needed as of July 1, 1978, requiring a 64 per cent increase in membership in just five years! Such a growth rate would seem to be impossible! If it can be achieved, however, Exhibit VI shows that much more modest five-year growth rates will be needed thereafter—16, 12, and then 10 per cent.[3] Perhaps there is a human tendency to overstate immediate needs and understate more distant needs; something of this tendency was found in the 1958 survey.

The results are not likely to coincide with actual Society growth or the actual growth in needs. No matter how they are watered down or discounted, however, the results show a bright future for the actuarial profession on this continent.

XIX. WHAT WILL AN ACTUARIAL CAREER BE LIKE?

An actuarial career spanning the years 1980–2020 will, it is safe to say, be vastly different from that which the present author has experienced or seen to date. The following, apparently, are among the developments which will be important:

1. Authoritarian patterns of the past will be modified. There will be many "independent" task forces. Job rotation, even among senior personnel, will become common. As retirement approaches, personnel will expect to be rotated into less strenuous roles. Flexible hours and lengthy sabbaticals, sometimes to perform outside tasks, will become common. Many people will have second fields of interest or careers, whether a second compensation is involved or not.

2. The "historical shortage" of actuaries will end. Most members of the profession, including the author, are thoroughly accustomed to a situation in which there is a shortage of qualified actuaries and of prospective students. Massive efforts have been made to overcome this, through campus promotion and recruiting, work-study programs, and the like. These efforts have been successful. The career will continue to be a rewarding one, financially and intellectually, but a long-held belief will become even more important: A successful actuarial career requires a massive dose of determination and dedication.

3. "Professionalism" will be an absolute requirement for any actuary. By this is meant not merely consummate technical skill but also communications skill and, most important of all, humility.

What will an actuarial career be like? Following the methods of the professional futurists, a scenario has been created (Exhibit VIII). Readers of this work will not resent its lighthearted vein.

[3]In a few responses no predictions beyond 1978 were made; such cases have been included at zero growth rates.

EXHIBIT VIII

SCENARIO CONCERNING THE LIFE AND CAREER OF RICHARD MCKEE, ACTUARY

Year	Attained Age	
1960	0	Born to former keypunch clerk, aged 23; father is Bible salesman, aged 28
1963	3	Mother returns to work leaving Richard and his older sister in day-care facility
1966	6	Parents divorced; lives six days per week with mother, one day with father
1968	8	Stays home with sister after school and during summer; has much freedom
1972	12	Is disciplined for minor experiment with marijuana
1973	13	Enters high school; takes accelerated mathematics, English, and Spanish courses
1976	16	First hears of actuarial career from mathematics teacher who has helped develop mathematical aptitude
1977	17	Owns small electric automobile; commutes to college to take basic courses while finishing high-school credits
1978	18	Enters large state university; major is quantitative methods; minors are history and urban life enhancement
1981	21	Transfers to university offering actuarial courses; shares efficiency apartment with female student who is also studying for actuarial exams
1982	22	Passes Part 1 (Basic Mathematics, Statistics and Probability); receives degree of Master of Actuarial Science
1983	23	Passes Part 2; on own initiative and at own expense, visits seven insurance-related companies; receives two offers; accepts job with Security Unlimited Insurance Company; company is multiline and requires studies toward F.S.A. and F.C.A.S.
1985	25	Spends one year in Human Service Corps (semicompulsory government program for young men and women, to combat massive problems that have emerged in society; some foods are rationed in the United States); spends the year on famine relief work in India, then returns to Security Unlimited
1988	28	Completes exams and becomes Fellow of Society of Actuaries (one of 217 new Fellows that year, 69 of whom are women and 18 black); work projects have included: *a*) Revision of life-cycle product, which provides protection against inflation *b*) Merger with African company; companies are

		hooked to central computer in United States via video terminals *c*) Salary compensation plan for financial and budgeting advisers operating at shopping-center locations *d*) Review of property and casualty rates to incorporate protection against inflation and riot
1989	29	Is loaned for one year to industry task group devising model legislation to untangle overburdensome regulation by various national, provincial, state, and local governments
1990	30	Completes night-school work and receives his degree in history; marries well-educated Hindu woman, aged 28, with whom he has been living for fourteen months
1991	31	Becomes F.C.A.S.
1992	32	Daughter born; he becomes regional representative on Board of Governors of Society of Actuaries
1995	35	Becomes leading actuary at Security Unlimited upon sudden transfer of chief actuary to long-term disabled status; advises management to reduce 38 per cent profit level on business written on African continent; advice refused
1998	38	Because of lengthy declining trend in sales of individual insurance and in interest rates (now down to 5 per cent on AA bonds), Security Unlimited's life insurance operation is in severe financial straits; some segments of board (average age 62) suggest weakening of reserves by unobtrusive electronic means and institution of rate increases for unsophisticated segments of market; Actuary Richard McKee refuses and is forced out
1999	39	Society of Actuaries Career Consultation Staff (three Fellows and one Associate employed full time) obtains new position for him as consultant to United States Council of Health Policy Advisers; American Academy of Actuaries Committee on Screening of Irregularities routinely exposes 1998 incidents at Security Unlimited
2004	44	Returns to Security Unlimited as chief actuary; as result of recent law sponsored by industry trade associations, 50 per cent of board are now policyholders' directors elected by mail ballot from large slate; top management is entirely new

2006	46	Especially in voluntary market for insurance and pension products, company has achieved fine reputation in light of clumsy and inadequate government programs
2009	49	In connection with the Diamond Anniversary celebration of the Society of Actuaries, writes a paper about the future of the actuarial profession
2010	50	Social audit by United States government (conducted by ten-person team including three actuaries) reveals superior performance by Security Unlimited; prize of $1,500,000 paid to officers of company by industry trade organizations; Richard McKee becomes president of company; new chief actuary is black female with actuarial and political background
2011	51	Richard McKee becomes President-Elect of Society of Actuaries
2012	52	Takes leave of absence to fulfill duties as President of the Society of Actuaries
2015	55	Takes two-year sabbatical to study oriental history and mores; lives in China much of this time; his wife and three grown children assist in study; team of young career actuaries replace him at Security Unlimited for this period
2016	56	His 24-year-old daughter marries young actuary in Hong Kong
2017	57	Returns as chairman of board of Security Unlimited
2020	60	Retires from Security Unlimited; joins Conflict Control Commission of United Nations and is appointed arbitration research commissioner, achieving one of his long-term goals
2025	65	Is instrumental in arbitrating dispute about Mediterranean sea-bed minerals
2035	70	Teaches courses in History of Western Civilization, Actuarial Science, and Mathematical Theory of Games, rotationally, in three universities—one in Canada and two in the United States
2058	98	Dies from injuries received in train collision near Carlisle in the north of England

XX. CONCLUSION

This work has been wide-ranging in scope. It has described the characteristics of present-day life. It has described the work of futurists who consider the prospects for Western civilization and its compo-

nents, including the insurance industry. It has defined the word "actuary" and determined the historical reasons for the growth of the profession. It has described the profession in Canada and the United States, in this year 1974. It has described negatives that could affect the future of the profession. Then it has described specific future developments that could increase the need for actuaries. It has dealt with prescriptions which address themselves to actuaries, in the quest for a brighter future. It has considered the future of the life insurance companies. Finally, it has attempted to answer the questions, "How many actuaries will be needed?" and "What will an actuarial career be like?"

Having considered it all, this author reaches a conclusion that is clear: The future of the actuarial profession is bright.

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DISCUSSION OF PRECEDING PAPER

CHARLES F. B. RICHARDSON:

This scholarly, far-ranging, and imaginative paper is indeed worthy of the occasion of our Society's twenty-fifth anniversary, and John Bragg deserves our gratitude and congratulations for a splendid and unique piece of work.

The future of our profession, the demands that will be made upon it, and the course it must follow to make its proper contributions to the needs of our society are indeed bound up in what happens to our civilization in the years ahead. The varying opinions of the futurists so well summarized by the author are, therefore, the heart of the matter.

The problems we face today are undoubtedly so serious that they seem amply to justify Spengler's conclusion that Western civilization is in a period of decay. Some of these are the following:

1. The specter of inflation which engulfs the entire Western world and which we do not have the means to control, or perhaps the will to make the sacrifices needed to bring it under control. We are, perhaps, the victims of politics and excessive prosperity.
2. The energy crisis, foreseen years ago but conveniently ignored by an over-indulgent society, is now being exploited ruthlessly by a tiny minority of mankind and is producing intolerable strains on the delicate financial structure of the Western world.
3. The many evidences of moral decay, exemplified by frightening abuses of power in our political system, increase in crime, drug addiction, permissiveness and lack of discipline, abandonment or de-emphasis of what used to be regarded as sacred principles of conduct, general deterioration of moral standards, and undue emphasis on material things. In many ways one is reminded of the symptoms that appeared during the decline of the Roman Empire.
4. The obstinate refusal of many ethnic groups to forget the ugly past and make sincere efforts to reach peaceful accommodations with each other, exemplified in Israel, Ireland, Korea, Vietnam, Cyprus, Nigeria, and other problem spots in the world.
5. The senseless expenditure of vast resources on arms.
6. Environmental problems.
7. Depletion of natural resources.

On the other hand, if one looks back fifty, one hundred, or two hundred years, were not the problems as great or greater, if entirely different in nature, and has not the lot of mankind improved immensely even though

still leaving much to be desired? One has only to read the history of Europe just one hundred years ago to realize the enormity of the progress that has been made, not only in material things but in the general lot of the common man and in respect for his human rights.

The vast material progress made in the Western world, with varying degrees of socialism or government control in different countries, cannot be denied. Nor can we ignore the fact that the incentives inherent in a free capitalistic economy, which brought about immense improvements in our standard of living, themselves need more effective controls in the public interest to prevent abuses which inevitably arise from the frailties of human nature and man's insatiable greed for material wealth. Along with this massive material progress, there have been immense strides in our legal, political, and educational systems which also have resulted in vast improvements in the lot of the common man.

The free enterprise system, through the profit motive, undoubtedly has proved to be the best system yet devised by man to encourage all phases of economic development and has resulted in the general betterment of man's lot on this earth. However, the free enterprise system and the old laissez faire approach of the last century resulted in gross excesses on the part of the entrepreneurs and in the exploitation of the masses. The history of this century has shown that in our modern society these excesses cannot be tolerated politically. As a result, there has been a certain degree of compromise which has involved steadily increasing control of the pure free enterprise system in order to prevent flagrant abuse. We are still experiencing the development of various types of control and have not yet learned what is the happy compromise between the stimulus of financial incentive and social fairness and responsibility. I foresee no alternative to a further great increase in controls or, if you will, bureaucracy in the interest of protecting the masses of people against various forms of exploitation and unfairness which still exist in our system.

If one looks at the other extreme, which is communism, one cannot fail to recognize that, in spite of the evils which still exist, much has been accomplished. Russia has progressed in a short span of years from the primitive and cruel environment of the czars to vastly improved conditions of life, so far as the mass of its people is concerned. This is not to say that there are not many evils and intolerable oppressions still present in the system and a lack of the incentives of the profit system which encourage greater efficiency and speed up progress. However, there is evidence that in the Communist countries there is a growing realization that some compromises with the purer forms of communism as taught

by Marx and Lenin are essential if the various forms of enterprise are to be run with greater efficiency. This is notably true of the agricultural sector. These developments involving incentive are more advanced in Yugoslavia than they are in Russia.

The conclusion, which represents my own view, is that in time each of the systems will take on some of the better characteristics of the other and that improvement of both systems will result. In the case of the free enterprise system I am convinced that there will be less free enterprise and more and more government control, which probably will develop over a long period of years. During this time many mistakes will be made, and the system will continue to endure serious problems until the best approaches are found to produce the most effective compromises between untrammeled free enterprise and pure theoretical socialism.

If these developments occur, as I am sure they will, there will arise the professional aristocracy referred to in the postindustrial society as it is described in the work of Darrow. The actuarial profession undoubtedly will be one of the important segments of this professional aristocracy as our civilization develops along these lines, and a much greater proportion of our profession will be engaged in various forms of governmental activities aimed at controlling the excesses of free enterprise and protecting the interest of the masses—in modern parlance, the consumer. This second phase of the free enterprise system may very well develop into the responsible corporate and somewhat idealistic society envisioned by the author as emerging in the next century.

GEOFFREY N. CALVERT:

Once in a long time, there comes before the actuarial profession a landmark paper reflecting a grasp of fundamentals, a breadth of vision, and a depth of erudition that go well outside the normal scope of actuarial training. Basic policy of far-reaching importance, affecting both our profession and the fields in which we work, is best formulated in the light of studies of this kind. Such a paper has been placed before us by Mr. Bragg, and we are deeply indebted to him for his research and reflection and all of the stimulating and mind-provoking thoughts he has expressed so well.

Mr. Bragg urges us as a profession to become more deeply involved in the field of futurology and challenges our thinking with some examples of conditions that have been forecast to exist by the end of this century. How strongly I agree with his main thesis!

I would like to supplement his illustrations with some hard-core facts and projections taken from the fields of economics and demography

which seem to me to bear directly on our present work, whether in benefit or product design, in selection of long-term investment policies, or in formulation of suggested government or similar policies. Perhaps these will help to give us glimpses of the future, and perhaps they will stimulate our interest in having more research directed into this supremely important field. Only through this type of research can we see more clearly as a profession where we are going, sense dangers before we are overwhelmed, formulate corrective policies, sense opportunities, make plans for improvements, and play our part in society as a profession with a sense of things to come.

1. *Demographic Changes*

One-quarter of the persons who ever lived on this planet are alive today. Life expectancies in the Western world have increased from 18 years in the days of the pharaohs to 22 years at the beginning of the Christian Era, 33 years in the year 1200, 41 years in 1850, 49 years in 1900, 67 years in 1946, and 71 years now. There were 1.6 billion people in the world in 1900, 3.6 billion in 1970, 4 billion now, and present indications point to 7 billion by the year 2000—a doubling time at present of about 30 years. Unless overwhelming forces limit and prevent a continuation of this exponential growth, we face the prospect of a world with 12 billion or more people in it in about 50 years, which is well within the lifetime of many millions of the workers covered by our present pension and welfare plans and insurance policies.

As the world population grows from 4 to 12 billion, will the available supplies of food, energy, and basic resources enable living standards to keep rising at rates such as we have seen in the past or even to remain intact at today's levels?

Without waiting for this projected tripling of the world population to occur, the birth rate in the United States and in Canada has already fallen below the level necessary to maintain the North American population at zero growth. A vast shifting of the pressures and balances in the world is surely indicated by this momentous contrast in growth rates as between countries. Even within our own borders, the recent sudden plunge in the birth rate foreshadows a great shifting in the burden of the dependent population from the younger to the older groups, away from educational needs and to the support of those in old age.

The recent 135-nation world population conference at Bucharest did not seem able to do much about the awesome global problem with which the world is faced, placing national sovereignty ahead of world problems and looking to hoped-for rising living standards in the less-developed

countries (which are breeding the fastest) ultimately to curb their population growth rates in a "socioeconomic transformation." Wrapped in their protective cloaks of sovereignty, the overconsumers and the overbreeders alike continued their paths of irresponsible nationhood, reported one observer, while another (the French demographer René Dumont) voiced this epitaph for the conference as a whole: "It will be said that this conference met on the eve of the greatest famine in the world and did not recognize it. It will be judged for this by future generations."

2. *Food Resources*

Human beings are not the only claimants on world food supplies. Domestic animals consume far more food than people. Food scientist Georg Borgstrom concluded in 1967 that the world's livestock at that time consumed food equal to that of 14.6 billion people. Cattle alone (which also provide motive power) consumed a diet sufficient to feed 8.8 billion people. Yet red meat derived from cattle provides only a very small portion of world human food needs. A pound of feed grain produces only one-eighth of a pound of beef. Looked at in economic terms, a steer is a highly inefficient converter, as are all animals.

Perhaps there are grounds, therefore, to expect some radical changes in diet as the coming world struggle for food intensifies. Consider, for example, the accompanying tabulation. The average person in a poorer

YIELD OF EDIBLE PROTEIN PER ACRE PER YEAR

Planting Method, Use	Human Food	Pounds of Protein
Grain, forage for steers	Beef	43
Forage, silage for cows	Milk	77
Soybeans	Soybeans	450
Alfalfa	Extracted protein	600

country consumes less than 400 pounds of cereal grain each year. At the other extreme, the average American, by his emphasis on meats and animal products, indirectly consumes grain to the extent of 2000 pounds, placing five times as much pressure on basic agricultural resources. As famine pressures become stronger in future years, will contrasts like this continue unchanged and unchallenged?

Paradoxically, as productivity and living standards rise in the developing nations, there is a tendency for the animal protein content in the diet to be increased, placing a double pressure on world food resources and

prices. In the United States red meat consumption per capita rose from 145 pounds in 1950 to 192 pounds in 1971 but has fallen recently to 175 pounds as other foods have been substituted. Even so, Americans, an overweight people, consume protein daily at the average rate of 100 grams, although the recommended amount for an average man is 70 grams and for an average woman 60 grams. While 3000 calories is generally regarded as too much, per capita calorie intake in the United States was 3300 in 1970 and has never gone below 3000. Will other developing nations seek to emulate these patterns of consumption as their growing industrial capacity or affluence enables them to put increasing pressure on available supplies? Can the miracle of the green revolution continue indefinitely to provide ever increasing yields per acre of key crops? Will the vast increase in fertilizers required for this be available? (Nitrogen fertilizers depend on the availability of natural gas supplies. Will these exist?) As a rule of thumb, one ton of fertilizer will produce five tons of extra grain. Will water, not land, turn out to be the ultimate constraint on world food production? These are key questions for the futurologist.

3. *Energy: Other Basic Resources*

Implicit in the concept of maintaining standards of living in the long years of retirement is the continued availability, at a price within reach, of such necessities as energy and manufactured goods, as well as food. These, in turn, depend on such basic resources as coal, oil, metals, forest products, and water. Looking into the distant future, what do we see ahead?

Taking into account the exponential growth of population and present trends in consumption, the Council on Environmental Quality in Washington, D.C., estimated recently that the world's known resources of seven key nonrenewable metals will have been exhausted in the numbers of years shown below.

	Number of Years Based on Presently Known Global Reserves	Number of Years Based on 5 Times Known Reserves
Copper	21	48
Lead	21	64
Mercury	13	41
Silver	13	42
Tin	15	61
Tungsten	28	72
Zinc	18	50

Shortages obviously lie ahead within a single generation, and even with all the advances of technology, substitution, recycling, new discoveries, waste elimination, use of lower-grade and hence higher-cost ore, and creation of totally new materials, it would seem inevitable that the outlook within our two-generation time horizon can only be for continuing shortages, higher prices, and the acceptance of less.

Of special interest at the present time are the following figures relating to nonrenewable energy sources on a world basis: for natural gas and petroleum it is estimated, on the basis of presently known reserves, that resources will be exhausted in 22 and 20 years, respectively; on the basis of five times known reserves, in 49 and 50 years, respectively.

In their 1972 book *The Energy Crisis*,[1] published *before* the Arabs placed their embargo on oil shipments, Professors Rocks and Runyon stated that "the most profound issue we face today is an impending power shortage." Other environmental problems can be largely abated, but energy cannot be recycled, and, as the world's energy resources are depleted in future decades, "the deepening stresses of a gathering power shortage will clearly reveal the great role that power plays in our lives. During the next two decades, severe oil and gas shortages are inevitable. We shall be powerless to infuse energy sources on a sufficiently massive scale to meet the demands of our industrial life-support systems."

The authors go on to say that "the earth is incapable of sustaining the enormous increases that would be necessary to bring the rest of humanity up to our standards of power consumption"; that we are already using up fossil fuels about one million times faster than nature makes them; that present technologies cannot utilize alternative sources on anything like the scale required in the time available; and that restrictions on future rates of energy consumption are therefore inescapable. After looking at shale, organic, solar, wind, hydro, tidal, geothermal, and nuclear energy potentials, the authors reluctantly pin their hopes, for the next few decades at least, on coal, our dirtiest fuel. "To obtain it, we are forced to rape the landscape. Yet coal appears to be our only hope of averting an economic, political and social catastrophe," they state. In the field of energy, as in others, the problem of sovereignty is preventing global solutions to world problems; this we must expect both now and in the future.

In a world faced with severe problems of resource depletion, mass starvation, pollution, and higher costs, there are nevertheless some geographic areas that will at least for some time, because of their reserves

[1] Lawrence E. Rock and Richard Runyon, *The Energy Crisis* (New York: Crown Publishing Co., 1972).

of land, water, forest, and other resources, be the beneficiaries rather than the victims of some of these growing scarcities. Global monetary problems will intensify.

4. *Conclusion*

It is against this type of background, thoroughly researched and rounded out as it should be, and not merely sketched and hinted at as I have done, that we as a profession should be looking at such basic questions as long-term investment policy, the design of benefits reaching on into the next century, the role of the insurance industry, sociological changes, the value of fixed-dollar benefits, the question of whether to fund the social security program (recently seriously suggested in a learned technical paper), the need for capital formation, and the part we, as actuaries, can play in identifying and resolving the many, many future problems of mankind.

What of the period beyond the next fifty years? Working under the distinguished aegis of the Club of Rome, a Massachusetts Institute of Technology team under the direction of Donnella H. Meadows recently made many computer projections of the interaction of present trends of population growth, food and industrial output per capita, resource consumption, and pollution. Sweeping aside the sticky problem of national sovereignty and looking only at the world as a whole, they projected the condition of mankind as far forward as to the end of the next century, first taking population and similar trends and resource limits as they are now and then assuming basic changes such as the discovery of unlimited resources, effective pollution controls, universally adopted "perfect" birth control, and greatly increased food productivity. Every combination seemed to point one way or another to overshoot and collapse, but eventually they developed a set of conditions that would lead to a "stabilized world model."

Examining the policies or conditions that would make this possible, they then tested the effect of delaying the introduction of these policies until the year 2000. "If all the policies . . . are delayed until the year 2000, the equilibrium state is no longer sustainable," they concluded. Their report, contained in the widely available book *Limits to Growth*[2] and described as "one of the most important documents of our age," should be read by every actuary and student and by all of us who are concerned about the world of our children and grandchildren. Can we, as a profession, fail to concern ourselves directly with the immense implications of studies and trends such as these?

[2] Donnella H. Meadows *et al.*, *Limits to Growth: Report for the Club of Rome's Project on the Predicament of Mankind* (New York: Universe Books, 1972).

CHARLES BARRY H. WATSON:

I find it difficult to express my gratitude and pleasure to Mr. Bragg for having presented the actuarial profession with this paper. It is extremely rare to read a paper which illuminates the nature of the actuarial profession, although we are honored with several on the occasion of this twenty-fifth anniversary of the Society. Still rarer is it for a paper to do so with style, wisdom, and wit, and rarest of all for a paper to go beyond the confines of our profession, rooting it and its prospects within the landscape of humanity. Yet all of this Mr. Bragg has done, and for it we are in his debt.

In such a wide-ranging, evocative paper, each person undoubtedly will find a particular insight that is most meaningful to him. For my own part, I was most taken by the "new services" that Mr. Bragg suggested actuaries would be called upon to perform in a future "politicized society" or "postindustrial society." I have long believed that the unique nature of the advice that the actuarial profession renders—how to make wise financial decisions in the face of future uncertainty—qualifies the actuary to ply his profession in a far wider spectrum of problems than is currently the case. In this regard, I vividly remember reading the life story of a distinguished English actuary, a past president of the Institute, who spent almost his entire career applying actuarial science to the operations of the London Passenger Transport Board. When one steps back and looks at the problems of society, it seems clear that many of the most perplexing—involving the projection and matching of resources and needs, both human and otherwise—are susceptible to analysis (and, may one hope, to solution) by the skills of an actuary. On the most local level, I cannot see why an actuary should not be as essential a member of a school board or town council as is now an accountant or a lawyer. In all areas of our society we are bedeviled by the uncertainties of tomorrow; surely the actuary can, and should, be called upon to help in their exorcism.

There are, of course, tasks of public service, and they are tasks that actuaries, as responsible citizens, can and should take on. However, Mr. Bragg in his paper appears to link the actuary to public service in another, more intensive manner. For example, he criticizes the actuarial profession for "a trend in recent years toward activities which are not designed to provide service to the public." And again, he states that the key for the future health of the profession is "return to service of the public." To the extent that the actuary is a citizen, we can all, I am sure, agree with Mr. Bragg. However, to the extent that the actuary is to be linked more tightly to public service, I have some concerns. These

concerns undoubtedly are more theoretical than practical. Still, they should be attended to, since theory can affect practice, especially in a changing world.

My concerns are rooted in the threefold nature of each member of our profession. He is a citizen, a professional, and an actuary. As a citizen, he benefits from the existence of society and hence owes certain debts to that society: to obey the laws, to live morally (not always the same thing)—in short, to cooperate in at least the preservation of that society. As a professional, he benefits from the rights granted him by society to practice as a professional. In effect, he benefits from the honor and respect that society grants him merely as a member of a profession. In return, he must adhere to a code of professional ethics. The professional gives advice to his clients, and his code of ethics is their guarantee that his advice can be relied on as unbiased and aimed at the resolution of their problems. As an actuary, he benefits, more specifically, from the right that society has granted him to practice as an actuary. In return for this right, the actuary must not only adhere to a code of ethics, but he must also follow sound actuarial practices. Otherwise, his clients may rely on his ethics but cannot trust his advice.

Hence the three requirements are placed on each member of our profession: as a citizen, moral; as a professional, ethical; as an actuary, a sound practitioner. The difficulty that I have with Mr. Bragg's formulation of the actuary's relation to the public is that only the first of these represents uniquely responsibility to the public at large. The latter two—those that distinguish us as professionals—really involve responsibility to our clients. They are the ones who are taking our advice and who therefore must be able to rely on our ethics and our advice. In the case of a consulting actuary, the client is the one who pays our fee. In the case of an insurance company actuary, the client is the one who pays our salary—the insurance company.

Obviously this is an overly simplistic analysis. There cannot ever be a clean dichotomy separating clients from the public. Advice given to a client/employer in many instances will enter the public sphere—a life insurance company annual statement, for example, as a statement of pension costs and liabilities. To this extent, the actuary owes high ethics and sound practice to any public who will rely ultimately upon his advice, just as he owes it in the first instance to the client/employer who asked him for that advice. Beyond this, the actuary owes moral conduct to the public at large. His advice should never be contrary to public policy.

Still, the distinction is, I believe, important. As professional actuaries, our first loyalty is to our client/employer. It may be very tempting to

say we always should put the public interest first, but then our client always would be the public—which patently is not the case.

This may appear to be a rather hard-nosed argument in favor of serving those who pay our bills and letting the public be damned. However, our morality as citizens always must inform our professional advice. Moreover, the conflicts between public morals and private advice that apparently arise on occasion are often susceptible to resolution on a professional level. For example, the long lamentation over the twenty-year net cost comparison method might have been stilled if the profession had paid closer attention to the question of whether that comparison method was actuarially sound.

It is for these reasons that I am certain my quibble with Mr. Bragg over the linkage between the actuary and service to the public is more theoretical than practical. In any event, I do believe that service to the public is the rationale for the insurance industry, and hence the actuary's advice to an insurer should be tailored to fit.

I agree with Mr. Bragg that a reaffirmation of this dedication to public service is a requirement of the future growth of the insurance industry. With such growth and with the continuing need for actuaries in other spheres, the picture of the actuarial profession should indeed be bright.

At any rate, one hopes so. Mr. Bragg points to a number of the creators of modern literature who believe that "after a period of chaos a rebirth will occur." There are other writers, however. We would certainly wish to avoid the metamorphosis of which Franz Kafka wrote.

In order that our profession will indeed emerge into the sun of the bright future that Mr. Bragg foresees, I believe that we must always keep in mind exactly what we are—citizens, professionals, actuaries—and act accordingly.

JOHN C. ANGLE:

"Those uncertain actuaries," as we were characterized by *Fortune* magazine in 1965, still are not certain of their identity or professional standards. The words "identity crisis" leap out from Past President Morton D. Miller's program introduction for this meeting, and John Bragg's paper reminds us of our forlorn search for an acceptable definition of our profession's brand name, actuary. Mr. Bragg tries again by saying that we are experts. I give him credit for a good try, but suspect that "What do you do?" will continue to rank among the most difficult questions faced by an actuary.

Our persistent failure to cast a suitable definition of "actuary" can be accounted for, I suspect, by the varied roles of today's actuaries. We are, in fact, as fragmented as the French assembly. Our common bonds are

those of a scientific discipline which seems to be breaking into several subspecialties. Our cultural ties are those which unite the graduates of a single institute, but we took our studies by correspondence and wrote examinations in centers stretching from the Philippines to South Africa. But can the unity of education produce a unity of vocation? I will suggest that it cannot. While the president of a mutual life company and a consulting actuary can unite in scientific matters, to suggest that they share identical vocational obligations is to fall into the trap of those who consider alike all insurance men or all Texans or all New Yorkers.

Our changing identity has crept up on us over the last quarter-century. If one says "cashier," the response is "bank"; "conductor" elicits "railroad"; and for two hundred years "actuary" brought forth either a puzzled look or "life insurance company." After all, an "actuary" was selected in 1762 as the first chief executive officer of the first modern life insurance company, the Equitable Society of England. The reasons for this move lie in the history of the hundreds of unsound, speculative annuity schemes that prospered only to fail in the early eighteenth century. One observer called them "schemes of dishonesty on one hand and of unhappy credulity on the other." All this changed with the arrival of Dr. Richard Price's theories and demonstrations. Then actuarial leadership became almost a hallmark of insurer soundness.

For a more recent example of our long-held practice of describing actuaries as officers of life insurance companies, I turn back to 1949. In that year Horace Bassford, the last president of the Actuarial Society of America, wove into his presidential address a recital of the actuaries' contribution to the sound growth of life insurance in North America. Interestingly enough, Mr. Bassford took it for granted that actuaries were professionals. Actuaries, he said, were talented men who had mastered the subject of life contingencies while receiving valuable practical training through apprenticeship. As a result most actuaries developed into well-rounded businessmen, and many were selected for executive positions with life insurance companies.

Robert J. Myers struck much the same note in his 1972 presidential address to the Society of Actuaries. "In North America," he said, "one important element in the definition of an actuary is the general characteristic of being a businessman—that is, a policy maker and administrator."

Time, however, has altered the accuracy of this monochromatic picture of the actuary as one identified with life insurance. During the twenty-five-year life of the Society of Actuaries, which is being observed at this meeting, extraordinary changes have taken place in the work of the actuary and in the institutions he serves. Let me mention a few of these

changes which make it so difficult to define precisely the subject matter and work of an actuary.

1. *The rapid rise of consulting practice.*—As noted in the paper by Milliman and Eckler which appears in this volume of the *Transactions*, consulting actuaries and brokers represented 24 per cent of our 1973 membership. In 1950 the comparable figure was 7 per cent. Between 1963 and 1973 the population of consulting actuaries grew by 11.4 per cent a year, while the number of insurance company actuaries grew by 4.9 per cent a year and the Society's membership by 7.3 per cent a year. Obviously we are becoming less homogeneous, and I, for one, doubt that we can ignore the differences in company and consulting practice.

2. *The changing face of the life insurance company.*—Forty years ago most life insurance companies issued only individual life insurance. Today life insurance companies are major underwriters of group life and health insurance, pension benefits, disability insurance, variable annuities, mutual funds, and so forth. And that is not all. *Forbes* (September 1, 1974) reports that the Prudential, Metropolitan Life, Equitable, New York Life, and John Hancock will collectively commit $600 million over the next ten years to break into the fire and casualty insurance field.

3. *The increasing specialization of the actuary.*—We are becoming more specialized, often in fields such as health insurance and in areas where mathematics and traditional actuarial methods offer only rough guidelines to the problems at hand. Some fields of practice, including company management, are explicitly soft-data fields more closely akin to the social sciences than to the more exact sciences. I note in passing that North American actuaries readily agree upon the foundation skills of the profession but are terribly unsure about the advanced topics. We have been through the Fitzhugh examination revision of a decade ago which saw five Fellowship examinations with further subdivision between I and E branches replace three Fellowship examinations. Now we are embarked on another change, to four Fellowship examinations, with I and E all the way, as well as a Canadian Part 9.

4. *The problems of size.*—In 1940 most actuaries worked for companies that would seem of moderate size by today's standards in a remarkably compact geographic area bounded by Toronto, Montreal, Boston, Hartford, New York, and Philadelphia. Today the companies are larger, split into many semi-autonomous divisions, and actuaries are found across a large continent. Furthermore, our professional societies are ten times their 1940 size, while our members seem to prefer face-to-face discussions to written exchanges. This has led to the rise of the actuarial organizations, such as the Canadian Institute of Actuaries, the Pacific Coast Actuaries Club, and the Actuaries Club of the Southwest.

Because of these influences, the Society of Actuaries has come to resemble a map of the Balkans. The facts are that there exist pronounced differences in the interests and problems of actuaries in different employ-

ment situations, in different specialties, and in different cities and countries. We also have seen the rise of the actuarial accrediting bodies, the Academy and the Canadian Institute of Actuaries. Their rise has stimulated the officers of all actuarial bodies to a remarkable amount of political activity. One senses also a pervasive drive by our presidents for actuarial unity. This, it seems to me, sometimes obscures our need for more dissent and public disagreement.

Having pointed out that no single definition of the actuary can tell us what the man or woman in question does, I would like to turn to an even fuzzier abstraction, "professional." Now the term "professional," at least as used by Horace Bassford twenty-five years ago, denotes our ties to the discipline of actuarial science. From those scientific ties came a spirit of scholarship, a duty to the cause of learning, and a sense of duty to our employers, to the public, and to our colleagues. These, of course, are characteristics of an intellectual discipline and not merely the features of a guild or vocation that decided one day to proclaim itself a profession.

To expand upon this special sense of the term "profession" more fully, I shall argue from Professor Thomas S. Kuhn's studies of the development and flowering of science. Professor Kuhn suggests that every science or intellectual discipline consists in its infancy of descriptions of what can be seen, felt, or tasted together with a number of conflicting, often metaphysical explanations of the phenomena in question. Sooner or later a strong, all-encompassing theory appears from the pen of a Newton, a Galileo, a Copernicus, a Kepler, or a Pasteur which sweeps away rival theories. At that point the amateur sport becomes a profession, one complete with specialist societies and learned journals. Thereafter the practitioners no longer concern themselves with the philosophy of first principles but concentrate on advanced problems within the narrow boundaries of their particular science or intellectual discipline.

For the names of the philosophers who brought about this watershed for actuarial science, I turn to William Morgan's introduction to the seventh edition of *Observations on Reversionary Payments* (London, 1812): "[While] to Dr. Halley, Mr. DeMoivre and Mr. Thomas Simpson, and particularly the latter, we owe the first rudiments and improvements of this science, we must remember that for the more accurate knowledge of it we are indebted to Dr. Price."

While Morgan was scarcely impartial, being Price's nephew, I agree with his judgment. It is notable that Dr. Richard Price is remembered more for his writings on moral philosophy than for his role as the first man to put insurance on a sound mathematical foundation. Dr. Price was an English Presbyterian or dissenting clergyman with mathematical

ability. In 1761 Price, in going through the manuscripts of the deceased Reverend Thomas Bayes, F.R.S., found a problem in probability that Bayes had solved imperfectly. Price's solution, a contribution to the "Doctrine of Chances," won him election to the Royal Society in 1765. A few years later he wrote Benjamin Franklin offering "Observations on the Expectations of Lives"; his letter appears in the 1769 *Transactions* of the Royal Society. It was followed in 1770 by a paper on how to calculate "Reversions Depending on Survivorship," then by the book *Observations on Reversionary Payments* and Price's advisorship to the Equitable Society of London. Price supported both the American and French revolutions and engaged in furious debate on the latter subject with Burke. The Americans so treasured his support and advice on public finance that Congress, after the American Revolution, invited Price to become an American citizen. In 1782 Yale awarded honorary Doctor of Laws degrees to two men: Richard Price and George Washington.

Scientific education, after the appearance of a Richard Price, gains its power through intense concentration within a clearly defined, narrow field. While this technique is powerful, Professor Kuhn calls scientific education narrower and more rigid than that of any other course of instruction save that of seminarians in orthodox theology. Furthermore, scientific education proceeds from textbooks (*read* study notes) to concentrate the student's attention on the development of highly refined, particular skills. Little time is spent giving the novice any insight into the premises of the field. Textbooks and even scientific papers are prepared according to the advice attributed to Louis Pasteur: "Make it seem inevitable." This may explain why scientists, actuaries included, find it more difficult to explain their work or relate it to other fields than to apply it to a problem.

I advance, then, a definition of "professional" which denotes the practitioner of a scientific or intellectual discipline. The standards of a scientific profession are concerned with how each member uses his mind, not with how he earns his living. Under one rule of science, scientific questions are not to be appealed to heads of state or to the populace for decisions. Under another, a scientific society is held by its members to be the sole arbiter of scientific achievement.

In questions debated at this meeting, the use of the term "professional" seems to be concerned with a practitioner's work relations with clients and undoubtedly is stimulated by the ethical problems of consulting actuaries. The analogue for this sort of "professional" seems to be not the scientist but the public accountant. The public accountant, it seems to me, is a sort of financial referee who can give investors, lending institu-

tions, and governments an independent, unbiased opinion about the accuracy of a firm's financial statements. As financial referees, public accountants abide by rules of statement presentation established through a quasi-judicial process within the accounting profession. Conformity to these rules rather than creativity seems the byword in accountancy.

Somehow I find such rule-making the antithesis of the scientific ethic, which encourages all members to untrammeled debate over the quality and objectivity of any scientific work presented by a fellow scientist. At the heart of the scientific ethic, according to Jacob Bronowski, lies an almost religious worship of the value of truth. From this ethic, according to Bronowski, flow such other values characteristic of scientists as independence, originality, dissent, tolerance, freedom, justice, honor, and respect.

Not only are professional-vocational rules of conduct likely to stifle the iconoclastic spirit needed by a good actuary, but they are apt to curtail his venturesomeness. After all, our science is not explicit enough to cover all situations in which an actuary gives advice. Often we must reason by analogy from the simple models of life contingencies to the complexities of a large insurance company. In creating new coverages or new financing provisions, our experience and mathematical skills may be all that we can bring to bear upon the problem.

I am also impatient with suggestions that actuaries are compromised by accepting company employment or by consenting to serve as officers or directors. The best antidote to the pressure to conform is an intellectual toughness, the practice of challenging and testing new ideas. Pressure to conform is found throughout society, and one must learn to suffer unpopularity as the price for owning one's own soul. One must even learn to differ with professional colleagues who espouse such dubious enterprises as the "alternate route" or "professionalism."

From the standpoint of effectiveness, there are a number of reasons why an actuary can make a greater contribution as a company actuary than he can as an outside consultant.

1. Only as a full-time member of the official staff can an actuary have a hand in the formulation of corporate policy, as recommended by R. J. Myers, and know, in Peter Drucker's words, the objectives, needs, and problems of his company.
2. The actuary's work is most useful if other people understand his work and become capable of using it. He is, in fact, a lifelong teacher of those around him.
3. The actuary should help frame the questions put to him. Otherwise, he becomes a technician working on projects and priorities about which he has had no say.

4. The actuary is often uniquely qualified to sense an unfavorable impact of an insurance decision and to work for an altered decision. This is especially true in matters of pricing, treatment of policyholders, and dividend distribution. Among all company officers the actuary seems uniquely insulated against the ultimate manifestation of unpopularity, the pink slip, by the apparently unquenchable thirst of the marketplace for more actuaries. E. J. Moorhead suggested several years ago that actuaries cultivate a readiness to sacrifice. He recalled the words of George King, who said, when accepting the Gold Medal of the Institute of Actuaries: "Four times in my life I was out of a job, without knowing where I could earn the next sixpence, just because I would not accept conditions that seemed to me to be dishonorable or perhaps worse. I wish every person to know, the younger men especially, that I was never a penny the worse, and those whom I left were those who suffered most. . . . My advice would be that a man should be sure that his position is right, and then go forward boldly with no fear of what might happen to him."

Finally, let me say a few words about accountability. It can be agreed that intellectual standards, goals, and visions are determined by one's professional society. But what about conduct on the job? Can professional societies be expected to exercise sole jurisdiction over an offending professional somewhat in the manner of ecclesiastical courts or military tribunals? The evidence is that they cannot. Consider the following:

1. The antitrust division of the United States Department of Justice has brought price-fixing charges against the Oregon State Bar Association. Similar suits are pending against professional associations of architects and engineers. Assistant Attorney General Thomas Kouper is quoted by *Forbes* (October 1, 1974) as speculating that learned professions must rid themselves of the idea that they are somehow exempt from antitrust laws.
2. Six months ago the American Bar Association approved a new ethical standard intended to curb or eliminate closed-panel practice by attorneys in a mode of practice resembling that of health maintenance organizations. Congress reacted swiftly. A rider attached to the Pension Reform Act prohibits the bar association from limiting lawyers' participation in prepaid legal insurance plans.
3. In the June, 1974, issue of *Scientific American* the chief judge of the United States Court of Appeals for the District of Columbia Circuit makes it clear that the courts intend to monitor the performance of professionals. Judge David L. Bazelon's article bristles with signs of his impatience at psychiatrists who hide behind conclusory labels and who assert that medical opinion can be the only guide in court cases involving medical problems. Not so, thunders Judge Bazelon: "Today every profession is being challenged by those who believe that trust should rest not on mystique but rather on what the public knows about the exercise of its expertise. Challenging the expert and digging into the facts behind his opinion is the lifeblood of our

legal system, whether it is a psychiatrist characterizing a mental disturbance, a physicist testifying on the environmental impact of a nuclear power plant or a Detroit engineer insisting on the impossibility of meeting legislated automobile exhaust-emission standards by 1975. It is the only way a judge or a jury—or the public—can decide whom to trust."

All these opinions suggest that a profession which becomes a guild will find itself increasingly called to account by the courts and lawmakers. They also suggest that persuasion and openness will carry us much further than rule-making.

Thus actuaries are a part of society, whether we choose to be or not. While isolation may be comfortable, I note that there are thoughtful observers who decry the scientist's isolation from the rest of society. C. P. Snow's novels and articles spring to mind. Lord Snow denigrated the gulf between scientists and those learned in arts and letters in a series of essays with such titles as "The Two Cultures and The Scientific Revolution," "Science and Government," and "The Moral Un-neutrality of Science." In one of these essays Lord Snow refers to the book *Government and Science* by Don K. Price as "the most interesting and experienced book on the subject I have read."

Don K. Price is a political scientist who has served as president of the American Association for the Advancement of Science and whose writings offer great insight into the problems of relating science to decision-making. Price, like Snow, encourages scientists to overcome their traditional fear of bureaucratic interference. The real and greater risk, he says, is that politicians and decision makers will act without appropriate guidance or, almost as bad, will ask science for answers to questions that are inherently unscientific (*Daedalus*, Summer, 1974).

In yet another comment about the harmful effects of too great a gulf between scholars and governments, Secretary of State Henry Kissinger in 1974 told James Reston of the *New York Times* that the members of the intellectual community participate less in government today than they did twenty years ago and that little of their work is relevant to foreign policy questions. This is because many scholars work on pure, abstract intellectual models while others reject government service altogether. Mr. Kissinger found this a pity because he saw two important roles for the country's learned men. They should, he said, ask important questions and provide a middle- and long-range perspective for policy-makers caught up in the pressures of short-range, tactical decisions.

Obviously I think that actuaries should worry about where life insurance companies are headed and take a firm resolve to work for whatever change they deem necessary to sustain them as sound, viable

institutions. This is not apt to occur if actuaries prefer isolation or a worship of the past.

Let me close with one or two conclusions about this terribly subjective, complex subject of professionalism. The heritage of actuaries is the maverick-like freedom of thought characteristic of Dr. Richard Price rather than the catechisms of some orthodoxy of practice. Attempts to put actuarial practice in a mold will be as doomed to failure as are business plans which take no note of changing times and consumer wants.

Furthermore, attempts to specify modes of practice are made more difficult by the balkanization of the actuarial profession in North America. Rather than creating a need for some new generalization, such as professionalism, I believe that the situation cries for enough organizational fragmentation to stimulate new scientific theories, new debate, and new extensions of our science to meet the needs of the actuaries of today.

In 1830 a tablet was placed in Stoke Newington Chapel to commemorate the twenty-six years of Dr. Richard Price's ministry at that chapel. I know of no better advice to the actuary as a professional than the words which end the inscription on this tablet:

> Richard Price, D.D., F.R.S., twenty-six years
> Minister of this Chapel: Born at Tynton, Glamorganshire
> February 23, 1723
> Died at Hackney, Middlesex, April 19, 1791
>
> Theologian, philosopher, mathematician; friend to freedom; as to virtue: brother of man; lover of truth as of God; his eminent talents were matched by his integrity, simplicity and goodness of heart; his moral dignity by his profound humility. Few have been more useful in their generation or more valued by the wise and good; none more pure and disinterested. Honoured be his name! Imitate his example!

Bibliographical note.—The details of the life of Richard Price, including the quotation attributed to William Morgan, are from Roland Thomas, *Richard Price* (London: Oxford University Press, 1924). The theory of the development of science is found in Thomas S. Kuhn, *The Structure of Scientific Revolutions* (2d ed.; Chicago: University of Chicago Press, 1970).

NATHAN H. EPSTEIN:

I too was astonished at reading Mr. Bragg's statistics on the number of companies employing no actuaries. Any company that says it is too small to need an actuary will not become large enough to need one, and any company that says it cannot afford an actuary eventually will not be able to afford anyone. Show me a company without a strong actuary in a top position of authority and I will show you a company that will

not be around in twenty years. The richest man in America who made his money in the insurance business is John MacArthur. The only man he ever offered a piece of the action (10 per cent) was his actuary. The story is quite well told in the book *The Stockholder*.

Peter Drucker, in his most seminal work, *The Practice of Management*, states that management means managing the business, knowing what to do and how to do it. By Drucker's definition of management, the actuary is the life company manager. I am optimistic that actuaries will more and more take over the management of life companies. Capital and surplus requirements have risen considerably in recent years. As a result, new companies are being formed by corporations rather than individuals. Casualty companies are forming life companies. Manufacturing companies are forming life companies. Brokerage houses are forming life companies. Furthermore, more and more life companies are being taken over by nonlife corporations. These corporations are professionally managed and will demand in their life companies the professional management that actuaries can provide. Many of these corporations are international in scope. They will expect their life company management to be capable of managing an international life insurance operation.

Dick McKee, Mr. Bragg's scenario sensation, is a strong actuary. He quits when he disagrees with policy. He manages an international operation. He does become president of the company. In my opinion, the scenario depicts the most probable Standard Actuarial World.

While I, using Drucker, define the actuary as a life company manager, and Mr. Bragg defines him as "a professional who is expert at the design, financing, and operation of insurance plans of all kinds, and of annuity and welfare plans," it is impossible to fit an actuary into the Procrustean bed of a one-sentence definition. An actuary is too big; both his head and his feet stick out of the bed. Human nature being what it is, however, the existential need for definition of self has always existed and will always exist. I add the following to the discussion.

What is an actuary? In 1884 Dr. T. B. Sprague said, "An Actuary is a Fellow of the Institute of Actuaries or a Fellow of the Faculty of Actuaries in Scotland, and no other person can properly take to himself the title."

What is an actuary? In 1928 Abraham Levine said, "I think it is generally assumed, however, and I am prepared to accept the assumption, that it is frequently the duty of the actuary to make estimates as to the future, based on his theoretical knowledge and on his experience of the past. Someone, I believe, has described such estimates as 'educated guesses.' What I wish to stress is the supreme importance of the qualifying

word 'educated'; the necessity of securing that our estimates when we make them, shall be inferences based, as far as possible, on accurate knowledge."

What is an actuary? In 1970 Gordon Shelley said, "I think of myself as something of a cross between an engineer and a financial officer. We develop and price a product, but we also have to keep an eye out for the financial impact on the organization."

What is an actuary? A person of great personal humility and great professional pride. A person of compassion and integrity in his dealings with others and strictness in his dealings with himself. A person who learns from his reading and a person who learns from his people. A person who has absorbed Herman Kahn and a person who has absorbed Paul Kahn.

What is an actuary? John M. Bragg is an actuary.

ROBERT J. MYERS:

Mr. Bragg has presented a truly monumental paper that should be read very carefully by all actuaries in this twenty-fifth anniversary year of the Society. It should be read again at least in A.D. 1999 by those fortunate enough to survive to the Society's fiftieth anniversary.

The projection of what may possibly happen in the future is always fascinating, although it is apt to be dangerous for those futurists who claim too much precision for their clairvoyance. I believe that too often professional futurists adhere rigidly to a projection of past trends, even though there may be factors arising that will introduce an entirely different direction in these trends. In other words, although it is elegant mathematical pleasure and sport to project past trends in what appears to be a very scientific mathematical manner, new developments can cause the results to be quite wide of the mark.

This situation certainly is evident with regard to the trend of birth rates and to the quotation from Kahn and Wiener of a United States population of 320 million in the year 2000, which now seems significantly too high. This estimate was made in the days when birth trends seemed to show the likelihood of a population explosion. Now, just a few years after that prediction was made, it seems most likely that the level will be only about 250–260 million.

Similarly, there seems to be a sharp discontinuity currently occurring in the relationship between wages and prices. Formerly, the annual increase in wages averaged about 2–2½ per cent more than the annual increase in prices. Now, however, it seems to me that the outlook for the future is for a much lower differential. In fact, currently we are having a negative differential. This change in trend can have a very serious effect

on many elements of our social and economic lives, including the social security program.

Mr. Bragg presents a very interesting brief definition of an actuary, but I believe that it is somewhat lacking in that it does not refer to the mathematical ability needed by the actuary in carrying out the fundamental job described in the definition. I think that there is a grave danger in ever describing our profession without bringing in, to some extent, our mathematical foundation.

It may be of interest to point out that a futurist approach to the insurance business was developed several years ago by a professor at Indiana University. This study was made through the use of the Delphi method, whereby the opinions (or perhaps, one might say, impressions or wild guesses) of a large number of participants are pooled, hopefully so as to yield a meaningful projection. As one of the participants in this project, I must say that I was completely disenchanted with it and cannot really see how very much validity or credence can be placed in the results.

Mr. Bragg brings out what he considers to be several recent harmful preoccupations of the profession. I should like to add a pet one of my own—the growing trend for consulting actuarial firms to be owned by other organizations, such as accounting firms, management firms, and even conglomerates. This, it seems to me, can have a very weakening effect on the related matters of actuarial professionalism and service to the public. This will be especially true if major attention is devoted to the making of profits rather than to professionalism and service.

Mr. Bragg mentions among the "nightmare" possibilities the nationalization of the insurance business, and here he cites the example of India. Although this is a long story in itself, it should be pointed out that the Indian experience has, in my opinion, been quite disastrous. The premium rates which are charged by the Life Insurance Corporation of India are quite unfavorable, because of high administrative expenses and artificially low interest rates on its investments. As a result, the sales of insurance in India are stifled, and this does not seem to be in the best interest of the nation or its citizens.

Mr. Bragg also gives a number of prescriptions in the field of the pension actuary. It seems to me that this list should also include a very strong obligation to the members of the plan, even though the actuary may be hired by the employer. My belief parallels my corresponding belief in connection with insurance companies—namely, that the actuary, whether he is with a stock or a mutual company, has a very significant responsibility to the policyholders.

Mr. Bragg gives a number of prescriptions as to the conduct of the actuarial profession itself. I must say that I was rather stunned at the one which suggests that fully qualified professionals should be brought into key government positions by subsidies if necessary. I am deeply concerned about the necessity of having adequate actuarial services in all branches of the government. However, it seems completely unwise that any outside organization should subsidize particular individuals in government positions. Such a procedure would undoubtedly be illegal, since it would have the appearance of bribery.

There would probably be nothing wrong if business encouraged its employees to enter government service for a moderately long period, with at least the tacit understanding that they would be rehired later and that their careers would not have suffered thereby. Of course, a more straightforward procedure would be a strong advocacy of higher governmental salaries, particularly in some state insurance departments where salaries are unduly low.

Mr. Bragg's rather whimsical development of the scenario of the life and career of an actuary born in 1960 is extremely fascinating reading. One would regret, however, that Mr. McKee apparently did not participate in any activities of the American Academy of Actuaries or the Canadian Institute of Actuaries.

SPENCER KOPPEL:

Mr. Bragg is to be congratulated on his creative and imaginative paper forecasting the future of the actuarial profession. Such crystal-ball gazing is always hazardous; I imagine that persons reviewing his paper some fifty years from now will (1) marvel at the accuracy of many of his predictions and (2) enjoy a good laugh at the erroneousness of others.

In the section entitled "Recent Harmful Preoccupations of the Profession," Mr. Bragg has taken the position that too much time has been spent by actuaries on the subject of adjusting earnings. Interestingly enough, he includes this in the same category as the activity of wrongfully falsifying insurance data which, if it exists, would indeed be a harmful preoccupation.

Perhaps because I am one of those who have spent much time on adjusted earnings, I feel compelled to rise up in protest of the criticism of such activity. The American Institute of Certified Public Accountants put the actuaries against the wall. The need for stating earnings of life insurance companies on a basis similar to that of other types of companies was evident, but the actuarial profession was reluctant to take a position or to work out the required means to develop such earnings. As a result,

the actuarial profession did not respond adequately to at least one of the interests which it serves, namely, the shareholders of the company, or perhaps to the company's management. We found out that we could not simply say "you can't get there from here" and expect the accountants to take our word for it. They were willing to go ahead with or without us. The inordinate amount of time spent recently by actuaries on the subject of adjusted earnings was necessary to ensure that the job was done correctly. Further, it was necessary to ensure that the statutory balance sheet was recognized as an important element of information for appropriate users and to protect it from total obscurity.

In place of adjusted earnings on the list I would propose that the actuarial profession's preoccupation with itself be included. It is evident that if things are needed and not done because of us, they will be done in spite of us. Unless we modify our attitude, generally accepted accounting principles will not be the last change that we will be catching up on after it is a fait accompli. As actuaries we are entrusted with many duties, and many people might feel that some of them are incompatible. We serve current policyholders, potential consumers, shareholders, management, and governments. The actuary or actuaries of any given work group, be it a corporation or a governmental body, must continually evaluate whether they are serving all interests adequately. The future of the profession will depend heavily upon the ability of its members to do this.

FERGUS J. MC DIARMID:

Mr. Bragg has written a very scholarly and comprehensive paper on the future of the actuarial profession. On two of his expressions of opinion I find myself in hearty agreement. These concern the adoption of GAAP statements and adjusted earnings and the formation of insurance holding companies.

As for the former, it appears to me a giant step into an accounting swamp which has done the industry no good. It was promoted largely by outsiders whose primary motive was to heighten the market appreciation of life insurance stocks. In that it has failed signally to date. What it has done is to lessen the credibility of life insurance financial statements of earnings. An accounting change that overnight doubles the stated earnings of some companies, and increases that of practically all of them, must appear suspicious to investors. As has been amply proven, stated earnings are the creation of accountants, and the only proof of their long-term validity is the ability to pay dividends, which are real.

The new GAAP statements carry an asset item—which may be quite large in relation to capital and surplus—called "unamortized acquisition

costs." This represents money already spent. Its validity as an asset depends on the future earning power of the new business put on the books, which is subject to very wide possible variation.

On the liability side, life insurance reserves are restated to take into account future interest rates, lapse rates, and the like. There is no uniformity in such assumptions among companies. After the experience of the last ten years, anyone who thinks he can estimate interest rates over the next twenty-five years and come within a mile of being right must be living in an ivory tower. Past lapse rates may give little clue to future lapse rates if the present rate of inflation keeps up.

In short, in many important areas these GAAP statements are so riddled with assumptions which differ from company to company, and which may prove to be far off base, that the investing public probably has been right in taking a dim view of them. Life insurance stocks have suffered accordingly. The old statutory method may or may not have tended to understate life insurance earnings, but what was particularly bad about that?

I also share fully Mr. Bragg's skepticism about the holding company movement into which many in the industry plunged toward the end of the soaring sixties. This was a phase of the conglomerate syndrome—eat or be eaten. Motives varied. Some companies had accumulated more capital funds than they felt were needed to back their insurance business. They had arrived at this position by a niggardly dividend policy over the years. They sought the higher return that an equity investment might be hoped to give over and above that obtainable from traditional life insurance portfolio investments. The risk in seeking such higher return was not always fully weighed. In this area considerable naiveté was shown. Just because a management was skilled in the operation of a life insurance company, it did not follow that they had the know-how to operate or control the operation of widely differing businesses, even if the management happened to be actuaries. The combination of a large available pool of capital and inexperience in its employment outside traditional areas has sometimes proved to be costly.

Having formed holding companies, managements were under pressure from investment bankers, and even their own stockholders, to find something to hold—and this with as little delay as possible. Payment could be made either in company shares, common or convertible preferred, or in cash, which made that part easy. However, some of the things dug up to hold had best been left buried. In other cases so high a price was paid, in cash or stock, that the earnings of the old stockholders were diluted. Out of this process some real financial wreckage has resulted,

and in less extreme cases earnings per share have suffered. The expression "department store of finance" had an impressive ring, but in general the old life insurance stockholders have not been the gainers, and in some cases they have suffered very badly.

One cannot dismiss entirely the possibility that part of the stimulus for the formation of holding companies has come from a desire to improve the status of management. It seemed appropriate that the remuneration of the top management of a "department store of finance" should be at least a notch or two higher than that of the management of a mere life insurance company. To drive home this point, it was necessary only to acqure a subsidiary the salaries of whose top people were already higher than those of the company making the acquisition. This was an untenable situation, and there was only one practical way to rectify it. This approach worked very well in at least one case, where everyone benefited but the stockholders of the acquiring company.

RUSSELL H. SMITH, JR.:

John Bragg's excellent paper has provided a welcome opportunity for me to present additional data on the number of actuaries that will be needed in the future. In his paper (Section XVIII: "How Many Actuaries Will Be Needed?") John referred to the manpower survey sponsored by the Society and conducted by its Committee to Encourage Interest in Actuarial Careers. As a member of that committee, I am able to provide some information gathered in the course of the study.[1]

Background

In the not-too-distant past, new candidates for Society membership were relatively scarce and the bona fide student had many opportunities for employment in the actuarial field. More recently, for various reasons, the number of applicants for beginning actuarial positions has increased substantially. This has raised questions as to whether employment opportunities for new entrants still exist and whether the future employment outlook is favorable for those considering an actuarial career. One of the objectives of the manpower study was to shed light on this matter.

Actuarial Manpower Study

Using the *List of Members of the Society of Actuaries by Business Connection,* 559 questionnaires were sent out in August, 1973, to employers of members of the Society in the United States and Canada asking them to provide certain information. This mailing covered approximately

[1] A detailed report of the study has been filed with the Board of Governors.

75 per cent of the Society's membership. Since about 5 per cent of the membership is employed outside the United States and Canada and another 10 per cent is listed as "retired or not known," only 10 per cent of the membership was not covered by the requests for information.

Eventually, a 50 per cent response was obtained. This represented 64 per cent of the Society's total employed membership (United States, Canada, and other countries). Coverage of Fellows (73 per cent) was better than that for Associates (54 per cent). The better coverage of Fellows may have been due in part to the extra efforts which were made to obtain replies from large employers, while the poorer showing for Associates may be due in part to the large proportion of members in this category who are employed abroad and qualify as Associates of the Society other than by examination.

Inevitably, problems arise when employers are asked to project future employment needs: optimistic and pessimistic biases are introduced in varying degrees not easily assessable; some reporters are not willing or able to project future manpower needs; and instructions are sometimes misread. Despite these deficiencies, and with some reservations regarding the proportionate upward adjustments which were made on the raw data to represent total Society membership, it was felt that the final figures would have significance in broadly evaluating the need for new recruits.

Study Results

Summaries of reported data on employment history, estimated future needs, and future retirements, as well as adjusted data on required increases in manpower, appear in Table 1. Analysis of the data reveals that the number of actuaries employed will continue to increase. The magnitude of the required increases in manpower is shown in the third tier of the table.

For a number of reasons the lower rate of increase apparent in the later five-year periods beginning with 1978 is somewhat artificial. A zero growth rate was introduced as needed into the statistics for employers who did not project complete manpower figures. In addition, replacements required on account of attrition due to death, disability, and retirement have been ignored, and no provision has been made for possible increases in the number of employers of actuaries. Therefore, barring unforeseen dire business conditions, the projected manpower increases are probably understated from 1978 on. It was assumed that the expected growth of manpower needs for nonreporting employers would match that of those who submitted data.

The increase in total employed between January 1, 1968, and January

TABLE 1

SOCIETY OF ACTUARIES MANPOWER SURVEY—SUMMARY

	Total	Fellows	Associates	Students
	Employment History			
Employed at January 1, 1968	2,504	1,120	728	656
Movement, 1968–72:				
Became students	745	.....	.....	745
Joined company	1,825	253	335	1,237
Became Associates	747	.....	747	747
Became Fellows	522	522	522	.....
Gave up exams	257	.....	.....	257
Resigned	1,125	283	309	533
Retired	150	121	26	3
Employed at January 1, 1973	3,542	1,491	953	1,098
	Estimated Future Needs			
January 1, 1973	4,021	1,662	1,107	1,252
January 1, 1978	5,671	2,299	1,598	1,774
January 1, 1983	6,582	2,635	1,866	2,081
January 1, 1988	7,379	2,944	2,083	2,352
January 1, 1993	8,171	3,217	2,315	2,639
	Required Increases in Manpower*			
January 1, 1973	759	234	285	240
1973–78	2,595	873	908	814
1978–83	1,435	460	496	479
1983–88	1,247	423	401	423
1988–93	1,251	374	429	448
	Estimated Future Retirements			
1973–77	216	127	48	40
1978–82	177	114	34	29
1983–87	175	121	28	26
1988–92	280	200	49	31

* After application of adjustment factors to increase survey returns to 100 per cent of membership: Fellows, 1.37; Associates, 1.85; students, 1.56.

1, 1973, was 1,038. It appears that 1,449 (745 + 1,237 − 533) new students supported this growth. This would indicate that a 40 per cent excess of actuarial students is required to sustain a desired rate of manpower growth. On this basis, the total need for new actuarial students through January 1, 1978, including present and projected needs, amounts to 4,696, that is, [(759 + 2,595 = 3,354) × 1.4]. This is an average of 939 new entrants each year. During the period January 1, 1968, to January 1, 1973, new students averaged about 452 per year, or less than one-half the required number. (The 452 was developed by multiplying the reported number of students mentioned above [1,449] by 1.56, the factor shown in the footnote to Table 1, and dividing by 5.)

To whatever degree manpower needs prior to January 1, 1978, are not met, there will be a corresponding increase in the projected needs of the succeeding years. The present deficit, 759, will probably continue to grow for a number of years. Hopefully, supply and demand may then begin to come into balance. In any event, a periodic review of the situation is indicated.

In spite of whatever deficiencies may exist in the above figures, they strongly support the conclusion that opportunity for employment in actuarial positions exists today and will continue to exist for the near future.

Areas of Work

The reported information which is summarized in the tables in Appendix I should prove helpful in identifying the work areas where actuarial needs may be greatest. It was hoped that these tables would reveal anticipated changes in the assignment of actuaries to various areas of work. The returns for insurance companies did point up several areas in which above-average growth in the number of actuaries is expected to develop, The leader in this growth is the combined individual and group equity products area, where the expected rate of growth is almost double the average. This and other significant growth areas are as follows:

Company Area of Work	Rate of Growth Compared with Average, 1973-78
Equity products	183%
Research	134
Product development	120
Corporate planning	112

Table 2 shows some further summarization of the data contained in the Appendix.

Actuarial Recruiting

A supplemental questionnaire requested information about actuarial recruiting. As shown in Appendix II, the responses, in general, reflect satisfaction with the present procedures for recruiting and selecting actuarial students.

There has been little change in the sources from which actuarial students are recruited, and no great change is expected in the future. The

TABLE 2

PERCENTAGE DISTRIBUTION OF ACTUARIAL MANPOWER EMPLOYED JANUARY 1, 1973 BY TYPE OF EMPLOYER AND AREA OF WORK

(Summarized from Tables A, B, and C of Appendix I)

Area of Work	Fellows	Associates	Students
	Insurance Companies		
Individual actuarial	29%	41%	42%
Group actuarial	24	29	33
Other	47*	30†	25‡
Total	100%	100%	100%
	Consulting Actuaries		
Employee benefits	70%	70%	69%
Insurance companies	18	17	25
Other	12	13	6
Total	100%	100%	100%
	Other Employers§		
Government	58%	65%	87%
Universities	39	15	10
Other	3	20	3
Total	100%	100%	100%

* Includes general executive category, 17 per cent. All other categories were less than 5 per cent each.

† Data processing, at 6 per cent, is the only category over 5 per cent.

‡ Data processing category is 7 per cent, and all other categories are less than 4 per cent each.

§ Shown principally for completeness, since only 38 Fellows, 26 Associates, and 30 students were reported employed in this category.

main source of new actuarial students is still the college, with or without an actuarial program.

About 70–80 per cent of the responses indicated that the present supply of recruits is adequate. The increased number of applicants in recent years has allowed employers to become more selective, and this undoubtedly has contributed to an improvement in the quality of recruits.

No consensus appears to exist as to the length of time actuarial students will remain with their employers. More vigorous selection, such as a requirement of credit for two actuarial examinations, may improve the chances that a student will successfully complete all examinations. However, improvement in the supply of actuarial students may cause employers to be less satisfied with the student who is making slow examination progress. The general mobility of younger people today is reflected in the job switching of actuarial students, although enlightened managements are offsetting this to some extent by increased attempts to meet more fully the needs and desires of these developing actuaries.

If, as reported in item 4(*a*) of the supplemental questionnaire, only 60 per cent of new actuarial students will become Fellows, then, mathematically, it would appear that recruitment programs would have to exceed Fellowship goals by about two-thirds. In addition, item 4(*b*), the average length of time (about $6\frac{1}{2}$ years) required to attain Fellowship after two examinations have been passed, indicates that we may have to wait as long as ten years for today's recruiting efforts to reach fruition.

APPENDIX I

MANPOWER SURVEY—SUMMARY OF RETURNS FROM QUESTIONNAIRE (NUMBER EMPLOYED JANUARY 1, 1973; NUMBER REQUIRED JANUARY 1, 1978)

TABLE A

INSURANCE COMPANIES

COMPANY AREA OF WORK	FELLOWS		ASSOCIATES		STUDENTS	
	Employed January 1, 1973	Required January 1, 1978	Employed January 1, 1973	Required January 1, 1978	Employed January 1, 1973	Required January 1, 1978
Actuarial:						
Individual:						
Life	225.4	303.1	210.3	263.8	254.9	332.0
Health	55.4	85.1	49.0	78.3	67.3	99.0
Pension	33.0	62.5	34.7	57.6	45.4	70.7
Equity products	32.6	79.7	17.9	58.5	11.5	49.8
Group:						
Life	70.7	118.0	50.0	92.7	82.6	126.8
Health	93.6	148.2	67.9	112.4	105.8	142.8
Pension	116.5	173.9	94.9	136.7	99.1	158.8
Equity products	14.0	33.4	7.1	18.6	7.6	21.0
Accounting	32.0	46.2	33.1	41.9	30.3	32.5
Agency	37.6	51.0	13.2	19.2	8.8	12.3
Corporate planning	38.1	69.4	14.5	21.5	10.0	19.2
Data processing	52.6	66.5	48.3	77.5	66.7	96.9
General executive	205.7	233.9	14.8	11.3	0.4	.....
Investment	10.2	20.1	4.9	10.2	6.1	5.1
Policy service	13.8	18.2	12.9	14.5	14.2	21.6
Product development	49.3	88.0	32.7	55.2	28.8	66.0
Reinsurance (assumed)	24.6	30.6	10.0	18.3	12.3	19.8
Research	21.4	44.6	17.8	39.0	19.7	40.1
Taxation	25.4	37.5	9.8	22.4	6.2	12.3
Underwriting	40.5	45.5	13.9	20.6	12.9	16.3
Other	19.6	26.6	10.3	18.8	11.4	12.0
Nonallocated	42.0	114.0	18.0	88.0	40.0	115.0
Total	1,254.0	1,896.0	786.0	1,277.0	942.0	1,470.0

TABLE B

CONSULTING ACTUARIES

TYPE OF WORK	FELLOWS		ASSOCIATES		STUDENTS	
	Employed January 1, 1973	Required January 1, 1978	Employed January 1, 1973	Required January 1, 1978	Employed January 1, 1973	Required January 1, 1978
Employee benefits:						
Pension	129.5	212.2	91.2	159.6	82.1	147.6
Other	9.5	24.6	7.0	17.5	4.4	17.2
Insurance companies	35.4	66.4	24.3	61.0	31.3	61.9
Governmental and quasi-governmental organizations	1.5	1.5	.....	1.5	.....	.....
Collective bargaining	1.5	3.3	1.0	3.0	.....	.....
Taxation	0.7	1.1	1.3	0.4	0.2	0.3
Administration	12.8	21.4	5.5	7.4	0.5	1.9
Data processing	3.6	6.0	9.5	18.3	7.5	21.9
Other	4.5	4.5	1.2	2.3	.....	0.2
Nonallocated	.....	7.0	.....	4.0	.....	2.0
Total	199.0	348.0	141.0	275.0	126.0	253.0

TABLE C

OTHER EMPLOYERS

TYPE OF WORK	FELLOWS		ASSOCIATES		STUDENTS	
	Employed January 1, 1973	Required January 1, 1978	Employed January 1, 1973	Required January 1, 1978	Employed January 1, 1973	Required January 1, 1978
Government:						
Supervision and regulation	9.0	10.0	6.0	5.0	5.0	5.0
Public service pensions	2.0	4.0	2.0	3.0	3.0	8.0
Social security	2.5	4.0	3.5	6.0	12.0	16.0
Actuarial advice to government	5.5	8.0	1.5	9.0	1.0	8.0
Administration	2.0	4.0	2.0	3.0	3.0	2.0
Other	1.0	3.0	2.0	5.0	2.0	10.0
Universities:						
Teaching:						
Full-time staff	8.8	10.6	2.8	4.8	1.5	.....
Part-time staff	3.0	3.4	.....	.....	0.7	.....
Actuarial research	1.5	2.1	0.6	1.0	0.4	.....
Actuarial advice to university	0.2	0.3	.....	.....	.....	.....
Administration	0.8	0.7	0.2	0.1	0.3	.....
Other	0.7	0.9	0.4	0.1	0.1	.....
Other:						
Employee benefits	.....	.....	1.0	1.0	.....	.....
Technical actuarial	1.0	2.0	3.0	5.0	1.0	2.0
Management	.....	.....	1.0	1.0	.....	.....
Other	.....	.....	.....	.....	.....	.....
Nonallocated	.....	2.0	.....	2.0	.....	.....
Total	38.0	55.0	26.0	46.0	30.0	51.0

APPENDIX II

SOCIETY OF ACTUARIES SUPPLEMENTAL QUESTIONNAIRE (SUMMARY OF 254 RETURNS)

1. (*a*) *What are your present main sources of new actuarial staff?*

   Colleges (117), employment agencies (60), insurance companies (53), college actuarial programs (44), and unsolicited (38)

   (*b*) *How have these sources changed in recent years?*

   Previously were colleges (105), insurance companies (57), employment agencies (51), college actuarial programs (39), and unsolicited (27)

   (*c*) *How do you expect these sources to change in the future?*

   Expected to be colleges (130), college actuarial programs (50), insurance companies (46), employment agencies (45), and unsolicited (31)

2. (*a*) *What standards do you set when looking for actuarial staff?*

   College record or native intelligence (126), personality, communication, or management traits (121), and actuarial exams (107)

   (*b*) *To what extent do you recruit staff who exceed or fail to meet these standards?*

   Meet qualifications (142), accept underqualified (126), or flexible depending on supply (25)

   Why?

   (*c*) *Are the numbers of suitable recruits adequate?*

   Yes (177), No (45)

   If not, to what extent do they fall short?

   (*d*) *How have the quality and quantity of recruits changed in recent years?*

   Better quality (105), larger quantity (141), no change in quality (5) or quantity (34)

   (*e*) *How do you expect them to change in the future?*

   Better quality (60), larger quantity (78), no change in quality (76) or quantity (61)

3. (*a*) *How many actuarial students have been lost since January 1, 1968, due to*

   i) *failure to pass exams?*

   346

   ii) *transfer to other employers?*

   456

   iii) *other causes?*

   165

   (*b*) *In what ways do you expect that your experience will change in the future?*

   Lose more by transfer (38), lose more by general loss (30), lose less due examinations (17), lose more due to examinations (16), lose less in general (15), lose less by transfer (9)

4. (*a*) *What proportion of your new actuarial students do you expect will qualify as Fellows?*

   Averaged 60 per cent

   (*b*) *What do you expect will be the average number of years required to achieve Fellowship after having completed the first two exams for those who do qualify?*

   Averaged 6.57 years

5. (*a*) *Are you satisfied with your present procedures for selecting new actuarial students?*

   Yes (188), No (33)

   (*b*) *In what ways might the Society of Actuaries further assist in improving the quality and quantity of recruits?*

   Promote profession (69), no change generally (41), update syllabus (14) establish clearing house (9), and alternate route (8)

6. (*a*) Name of Employer _____

   _____

   (*b*) Date sent to Society of Actuaries' Office _____

(AUTHOR'S REVIEW OF DISCUSSION)

JOHN M. BRAGG:

The nine discussions supplement the paper in a marvelous way and magnify its chief precepts. They represent an outpouring of the soul, for which the author is most grateful.

Mr. Richardson corroborates the views of the paper concerning the gloomy immediate prospects of Western civilization but subscribes also to the bright future which may emerge in the twenty-first century as a result of the responsible corporate society.

Mr. Calvert stresses the need for the profession to become deeply involved in the field of futurology. His many examples of the work of the professional futurists supplement those of the paper. He paints a picture of gloom but makes clear that this is the background against which actuaries must face certain basic questions.

When discussing the future health of the profession, Mr. Watson singles out one of the principal points in the paper: "The key is return to service of the public." He then comes to grips with an old question: How does an actuary reconcile his responsibility to the general public with his responsibility to his employer (client or insurance company)? Mr. Watson's is a fine discussion of this apparent conflict. Perhaps, however, the two sets of interests are not irreconcilable; in the long run the client cannot prosper unless the general public is well served. Or, if this author

were allowed to reverse an old dictum: "What's good for America is good for General Motors"!

Mr. Angle's scholarly remarks deserve separate status as a paper dealing with "The Actuary as a Professional." But they are greatly welcomed by this author as a discussion; they supplement the paper in dealing with the definition of "actuary" or as Mr. Angle puts it, in coping with the "identity crisis." Mr. Epstein also deals with the question "What is an actuary?"

The most wide-ranging of the discussions is that of Mr. Myers. He suggests the desirability of referring to mathematical ability in the definition. Perhaps this could be done by expanding the definition in the paper to the following:

> **Actuary**. A professional, skilled in mathematics, who is expert at the design, financing, and operation of insurance plans of all kinds, and of annuity and welfare plans.

Mr. Myers suggests that the prescription list for pension actuaries should include a very strong obligation to the members of the plan. This author agrees heartily. When referring to specific future developments that could increase the need for actuaries, the paper includes the following: "a vast increase . . . in the responsibilities of actuaries for adequate design and solvency" of pension plans. During the nine months which have elapsed between the writing of the paper and these remarks, the Employee Retirement Income Security Act of 1974 has become law; the act bears out Mr. Myers' point and that of the paper also.

On the adjusted earnings question, Messrs. Koppel and McDiarmid take opposite sides; Mr. McDiarmid also agrees with the author on the subject of holding companies.

Mr. Smith's discussion provides additional information from the manpower survey sponsored by the Committee to Encourage Interest in Actuarial Careers. This is valuable. The author particularly likes the way in which Mr. Smith clearly describes the present recruiting climate.

Mr. Koppel speculates about the reactions of persons who will read the paper in A.D. 2024. This author believes that these, our professional successors, who are not removed by a gulf of time which is all so wide, will still possess, as we do, the human ability to marvel and laugh. They may again find that they are in a time of troubles and that, if a new period of vitality is to be entered, the key is return to service of the public.