RECORD, Volume 26, No. 2*

San Diego Spring Meeting
June 22–23, 2000

Session 3PD
Actuarial Education and Certification Around the World

Track: International/Education and Research

Moderator: ANGELICA B. MICHAIL
Panel: CURTIS E. HUNTINGTON
HUBERT B. MUELLER
JOHN O. NIGH
Recorder: ANGELICA B. MICHAIL

Summary: With the exception of North America, the United Kingdom, and a few other predominantly English-speaking countries, (which we'll loosely refer to as the "Exams-Plus" community), actuarial education and certification programs around the world are generally university-based. They often have few or no mandatory supplemental educational or on-the-job training requirements for an individual to practice as a "certified" actuary. (We refer to this model as the "University-Plus" model).

Ms. Angelica B. Michail: We are going on a virtual world tour of actuarial education and certification. Several years ago, when I was a member of an actuarial delegation that visited Russia, Poland, and Hungary, I never thought I would be moderating this session. But on that trip, I realized:

1. how great the need is for trained actuaries in many parts of the world,
2. how great the need is for countries to find ways to develop local actuarial expertise, and
3. although the SOA is a well-established actuarial training program, there are other alternatives to obtaining actuarial training.

Global economies dictate that actuaries of today should know more of how other actuaries in the world develop and practice the profession.

Perhaps you are already familiar with some of those alternatives that exist outside the US. Perhaps you are familiar only with the U.S. system. Whatever your level of knowledge is, your presence at this session shows your interest in how actuaries are trained around the world. Your interest might be driven by your desire to work in the international arena or you might have a desire to find a way to get foreign credentials recognized by North American companies. You might want to learn about this subject from a theoretical standpoint.

Curtis Huntington has a long list of involvement in many actuarial organizations, including the SOA. The ones I want to highlight are his involvement in actuarial

Note: The charts referred to in the text can be found at the end of the manuscript.

education. Curtis is a professor of mathematics and director of the actuarial program at the University of Michigan in Ann Arbor. He joined the faculty in 1993 after retiring from New England Mutual Life Insurance Company in Boston where he worked for more than 28 years. He is executive director of the Actuarial Education and Research Fund and is the former chairperson of the SOA's Education and Examination Committee. He currently serves as a member of the American Society of Pension Actuaries's (ASPA) Education and Examination Committee. He is ASPA's delegate to the International Actuarial Association (IAA) where he serves in the Education Committee. As more proof that he is an international actuarial citizen, he is also a member of the New Zealand Society of Actuaries.

Not only has Curtis experienced the rigors of actuarial education when he trained to become an actuary, but he is also training future actuaries at a time when we would understand if he just took it easy after many years of working. He continues to devote hours of volunteer work to continue to help shape the actuarial education of tomorrow. We are privileged to have him on our panel.

I only recently met Hubert Mueller when he came on board as a member of the International Section Council. Already I could see his passion for international work and actuarial education. Hubert was born and educated in Germany. He is a qualified German actuary and a member of the German Actuarial Association. Hubert is a principal of Tillinghast-Towers Perrin and is a leader of the North American risk management practice located in Hartford. He has worked on various projects assisting clients in Europe, the U.S. and the Far East.

He joined Tillinghast-Towers Perrin in 1986 and worked in the New York office. From 1993 to 1999, he worked in the Cologne office in Germany. He speaks German, English, and French. Because of his background, he is an excellent resource for this topic. Furthermore, one of his responsibilities on the International Section Council is as coordinator for the SOA ambassador program in Europe. The ambassadors are encouraged to give a turnkey PowerPoint presentation on the SOA's new educational system to the actuarial organizations and institutions in the countries where they are residing and working. By the way, if you are not familiar with the SOA's ambassador program, please check our new and improved SOA International Web site.

We were supposed to have a third speaker, John Nigh. Unfortunately for us, he was called to be in Argentina and cannot be here. John is a principal of Tillinghast-Towers Perrin in Atlanta. On a day-to–day basis, he is responsible for the firms' operations in Mexico, Brazil and Argentina. However, you will still hear about actuarial education in Latin America. He made prior arrangements with Hubert. John prepared the material and Hubert will deliver it.

Mr. Curtis E. Huntington: I'm going to use the IAA guidelines as a starting point of the presentation. A little history of the IAA might be helpful. Until 1995, the IAA was an organization of individual actuaries from around the world. We celebrated our centennial in the Brussels congress in 1995 and transformed ourselves from an organization of individuals into an organization of organizations. We made

significant strides in trying to present an organization that will encompass all of the actuarial bodies in the world. At this point, 95–98% of the actuaries that are in the world today are members, and we are desperately trying to find those last few holdouts. We know where they are and we are in the process of contacting them and suggesting that they join us.

To become a member of the IAA, the organizations are required to submit preliminary information about their standards of practice, codes of conduct, disciplinary processes, and an indication that they are in place and they work.

How does one become an actuary? There are currently two models in place in the world—the Exam Plus system and the University Plus system. The IAA is attempting to rationalize those two different educational vehicles to see if there can be a common foundation for an educational base that would be recognizable for actuarial education around the world. The IAA education committee has put together a preliminary set of guidelines that would be suggested to the national organization as a requirement. The guidelines consist of the guidelines being in place in the year 2005 and the guidelines being applicable to newly matriculating students in each national organization in that year. If guidelines are met, the IAA will recertify membership in the IAA. There are interesting dilemmas, particularly in the U.S., where we have five actuarial organizations that are recognized. Below are the guidelines with some comments included.

IAA Educational Guidelines and Syllabus
(Note: You can download from www.actuaries.org the Educational Guidelines and Syllabus for an Internationally Recognized Actuarial Qualification that was used as the basis for this presentation.)

Variation in Education and Qualifications
We need to be cognizant of variations when we are evaluating different types of programs such as the following:

1. Training basis—give credibility to both the Exam Plus and University Plus systems and to bring them together in a rational way
2. Training source—use our own or another organization's materials
3. Control of educational content and qualification standards—actuarial organization, university or government
4. Qualification basis—professional exams or university degree
5. Mathematics/Business Orientation—in Europe, the degree of mathematical education tends to decrease the further south you go. In Finland and Scandinavian countries, there is a very high content. In Portugal and Greece, there is more business content.
6. Specialization—broad based actuary or narrower training in a specific field
7. Qualification standards
8. National actuarial structures—one organization per country (in most parts of the world) or several (U.S. has five organizations). In 1998, I prepared a document for the Birmingham Congress that attempted to show why it is reasonable and in fact desirable to have the five U.S. organizations.

9. Diversity of markets for actuaries—In a country with government-mandated health insurance and prices set by the government, there is no real actuarial aspect; hence, there is no health actuarial industry in place. In a total free market economy, there would be a significant difference and need for actuarial talent.
10. Geographic scope—In New Zealand, there are 76 actuaries, most of whom are trained in Australia and have a limited and narrow focus. In the U.S., the SOA has about 10–20% of actuaries educated outside North America.

Purpose of Education Guidelines and Syllabus

Though there are ten variations in education and qualification on the international basis, the IAA education committee believes that there is a high degree of commonality. We've developed some guidelines and syllabi on the assumption that those are true. There are several reasons why we think it would be desirable to have an international educational syllabus in place.

1. A new actuarial organization—A number of developing countries are establishing actuarial organizations for the first time. It would be useless for them to develop a new syllabus when there is a syllabus available to them as a model. I am running a system in Lebanon, and we were in Jordan talking to the Jordanian government. They are interested in establishing a program in Jordan. There is someone in attendance who just came back from Egypt where there is a program at the University of Cairo. Many of these newly developing countries would like to have a decent educational system, and they would like to know what they can put in place and how they would be measured.
2. An existing actuarial organization—Many actuarial organizations review their syllabus on a periodic basis. Norm Crowder, current SOA president, indicated that the SOA would be doing that in the future. All the IAA members will be doing it by 2005 so they can get recertified. This would give them a chance to look at their syllabus on a worldwide basis and decide upon the changes that need to be made.
3. Recognition—We would like to have guidelines and a syllabus in place so that a group could recognize each other's training. If we are in mutually recognized treaty organizations, as we've seen with the Scots, the British, and the Australians, one of the things we need to know is what their educational system is, and how it can be measured against the common standard.
4. Accreditation—The IAA accreditation committee is going to evaluate these educational systems with the current prospective IAA members to see whether or not they should be recertified for membership to continue in the IAA.

Syllabus Considerations

Aims. The new and improved syllabus we are putting together is not intended to prescribe an educational process. This decision is left to the individual actuarial association. We are not mandating a uniform standard across the world. The aim is to recognize the geographic variation by allowing people to give various weights to various topics, based on the needs of the markets in the particular area. There are some interesting ramifications when the educational system is exam-based or university-based. The rest of the world thinks the universities are a much better place for an educational system. As a university professor, it is hard to argue with

that model. It would be desirable to have enhanced opportunities for the universities in the U.S. and Canada in particular, so we need to give some opportunities for people to develop educational systems on different models.

In the area of recognition, we want to use the system for mutual recognition treaties. One between the U.S. and the European Union (EU) countries to see whether we can agree on how to mutually recognize each other's credentials. We are doing this at the academy level. When you are looking at it from the U.S. and the academy, versus the 18 countries of the EU, which include both exam-based and university-based education systems, the ability to have a common core curriculum is a very useful device in terms of that mutual cross-recognition. However, the educational committee guidelines and the syllabi do not address the extent of additional education that might be required, or the change in practice from one country to another or from one practice area to another within a country.

Topics. In terms of accreditation, we don't want to accredit an organization because they have not weighted the ten topics below equally. We want to give them the chance to have reasonable variations based upon the need for actuaries in the markets and that is a very critical function.

Indicative Reading. Many of the indicative readings are out of the U.K. syllabus. The SOA is the largest organization in the world, but in terms of influence outside the U.S., the Institute of Actuaries and the Faculty of Actuaries have a long history of long-distance learning systems that have been in place for a number of years. Many of these readings are recognized worldwide outside of the US.

Syllabus Topics

1. Financial Mathematics: Introduction to asset types and securities markets; Interest, yield, and other financial calculations; Investment risk, introduction to stochastic interest and discount market models, (e.g., term structure of interest rates and cash-flow models.)

    Indicative Reading: Core Reading (Subject A1 – Subject 102)
    Faculty and Institute of Actuaries

    Mathematics of Finance
    J. J. McCutcheon and W. F. Scott

2. Probability and Mathematical Statistics
    Concepts of probability
    Random variables and their characteristics
    Methods and properties of estimation
    Correlation and regression analysis
    Hypothesis testing and confidence intervals
    Data analysis

Indicative Reading: *Mathematical Statistics*
John E. Freund, Prentice Hall, International Editions

Subject C1 Core Reading/Subject 101 Core Reading
Faculty and Institute of Actuaries

3. Economics
   Microeconomics
   Macroeconomics

   Indicative Reading: Core Reading for Subject 107
   Faculty and Institute of Actuaries

   There are many suitable textbooks at an introductory undergraduate level, although most will have a fairly strong national bias.

   Economics
   Begg, Fischer and Dombusch, published by McGraw-Hill, (would be suitable for the U.K.)

4. Accounting
   Basic principles of accounting, including the role of accounting standards
   Different types of business entity
   Basic structure of company accounts
   Interpretation and limitation of company accounts

   Indicative Reading: Accounting texts tend to be too detailed and country specific, although the very introductory parts of standard accounting courses might be suitable. Other suitable texts might be the training manual for the Investment Management Certificate of the Institute for Investment Management and Research and the Core Reading for Subject 108, Faculty and Institute of Actuaries.

5. Modeling
   Model structures
   Selection process
   Calibration
   Validation
   Scenario setting
   Sensitivity testing
   Limitations

   Indicative Reading: Core Reading (Subject 102)
   Faculty and Institute of Actuaries
   Introduction to Actuarial Modeling

James C. Hickman, *North American Actuarial Journal* (1:3)

Current Actuarial Modeling Practice and Related Issues and Questions
Angus S MacDonald, *North American Actuarial Journal* (1:3)

6. Statistical Methods

Statistical Methods, such as regression and time series
Survival and multistate models
Risk models (individual and collective)
Parametric and non-parametric analysis of data
Graduation principles and techniques
Estimation of frequency, severity and survival distributions
Credibility theory
Ruin theory

Indicative Reading: *Actuarial Mathematics*
Bowers, et al.

Casualty Actuarial Society textbooks for CAS examinations 3 & 4

Subject C2 Core Reading/Subject 104 and 106 Core Reading
Faculty and Institute of Actuaries

7. Actuarial Mathematics

Actuarial mathematics as applied to life insurance, pensions, health care and general insurance
Types of products and plans—individual, group and social insurance arrangements
Pricing or financing methods of products and plans
Reserving
Reinsurance

Indicative Reading: *Life Insurance Mathematics*
Gerber

Actuarial Mathematics (Part A)
Bowers et al.

Core Reading for Subjects 104 and 105
Faculty and Institute of Actuaries

Casualty Actuarial Society textbooks for CAS examinations 5 & 6

Actuarial Practice of General Insurance
Hart, Buchanan and Howe, Institute of Actuaries of Australia

Subject G Core Reading—Subject 303, 403 Core Reading
Faculty and Institute of Actuaries

8. Investment and Asset Management
   The objectives and institutional and individual investors
   Types of investment (bonds, shares, property and derivatives)
   Regulation and taxation of investments
   Valuation of investments
   Portfolio selection—incorporating assessment of relative value
   Performance measurement
   Portfolio management

   Indicative Reading: Most investment textbooks are either too theoretical or too practical and not mathematical or country specific enough. There are, however, several U.S. textbooks that contain some material that would be appropriate. These include:

   Investments
   Sharpe, W. F. (1978) published by Prentice Hall, New Jersey

   Modern Portfolio Theory and Investment Analysis (5^{th} edition)
   Elton, E J and Bruber, M J (1995) published by Wiley Radcliffe

   Parts of the textbook currently being prepared by the SOA

   Financial Economics: with Applications to Investments, Insurance and Pensions might also be suitable. Panjer, H H (ed.)(1998)

   Options, Futures and other Derivatives (3^{rd} edition)
   Hull, J C (1997) published by Prentice Hall International

   The relevant parts of Core Reading for Subjects 1-2, 109 and 301
   Faculty and Institute of Actuaries

9. Principles of Actuarial Management
   The general operating environment
   Assessment of risks
   Product design and development

Pricing and assumptions
Reserving and valuation of liabilities
Asset and liability relationships
Monitoring the experience
Solvency of the provider
Calculation and distribution of profit (surplus)

Indicative Reading: Core reading Subjects 302, 303, 304-F, G, H
Faculty and Institute of Actuaries
Actuarial Control Cycle
Institute of Actuaries of Australia

Pensions—see Annotated Reading List for Pensions
Faculty and Institute of Actuaries

General Insurance—Actuarial Practice of General Insurance
Hart, Buchanan and Howe, Institute of Actuaries

10. Professionalism
Characteristics and standards of a profession
Code of conduct and practice standards
The regulatory roles of actuaries
The professional role of the actuary

Indicative Reading: Professionalism Course Participants Course Notes
Faculty and Institute of Actuaries

Professional Ethics Course Handouts—SOA

Code of Conduct—relevant actuarial body

As we talk more about actuarial education around the word, I think you are going to see that there are more similarities than differences.

Mr. Hubert B. Mueller: I will give an overview of continental Europe and Latin America. Prior to the beginning of 2000, I spent seven years working in Cologne, and I also had some regional responsibilities for continental Europe. In referring to continental Europe, I exclude the U.K. The countries in power are essentially Germany, France, Italy, the Netherlands, and Switzerland. They represent a good part of the population and about 75% of the qualified actuaries in continental Europe. Spain has about 1,000 members. Then there are a couple of small countries, like Sweden, Norway, and Finland and what is now Central Europe (previously called Eastern Europe), which includes Poland, the Czech Republic, and Hungary, that have smaller actuarial bodies. Beyond that, the membership really drops down to a very low level. Markets like Russia do not have a lot of membership in the association.

Continental Europe

Overview

Continental Europe's actuarial profession was not really a significant influence in the markets up until deregulation (1994). The big event in continental Europe within the last 20 or 30 years was the advent of deregulation. Before that, in most markets, the supervisory authorities dictated the terms of the market. In Germany, until 1994, there was only one real actuary in the market—the supervisory actuary. He had the control and the authority to dictate product terms. For example, we worked with companies in the market on some innovative products. If they followed the guidelines, the supervisors would have said no to the product. The only variation is putting in different expenses or rounding the premium to one rather than two decimals. Commissions were the same, products were the same, and from an actuarial perspective, it was a boring market. Thanks to deregulation, things have changed. Supervisory authorities typically dictated product terms and conditions prior to deregulation.

Generally, there is no longer a product approval needed. It is more of a filing process with a veto right of the supervisor. Freedom of services allows cross-border activities. The appointed actuary concept was introduced with increased reliance by supervisory authorities on actuarial reports. The education system is still predominately "university plus" with actuarial degrees often part of the master of science curriculum. Additional exams are starting in some countries, such as Germany. There have been dramatic increases in the membership of actuarial associations since the mid-1990s. Currently, there are close to 10,000 qualified actuaries in various associations.

GERMANY

Overview

The German society of actuaries Deutsche Aktuarvereinigung (DAV) was founded in 1993. There are about 1,400 qualified members, and students are currently taking exams. It is the second largest actuarial society in Europe. The DAV works closely with the German Society for Insurance Mathematics Deutsche Gesellschaft für Versicherungsmathematik (DGVM). It was founded in 1948. It is equivalent to the AAA in North America. It has offered training seminars for actuaries since 1980. There are currently 30 working parties in the DAV dealing with actuarial/financial topics including: product issues, IAS/U.S. GAAP, embedded values, asset/liability management (ALM) and other financial/investment issues. U.S. GAAP integration is a big issue in Europe because many companies want to be listed in the New York Stock Exchange.

Requirements for Qualification are:

1. University education—master's degree in mathematics, physics, statistics or computer science
2. Three years relevant professional experience (e.g. insurance companies, building societies, actuarial consultancies
3. Passing six actuarial essay exams:

Four compulsory exams, one exam from a list of optional exams, and one final exam in student's subject of choice (life insurance, general insurance, or pensions)

A DAV academy is currently being set up to streamline the above exam process. There is no large organization to really administer the exam process. It takes four to six months to get results. Most of the graders are busy university professors. It is not quite organized but in 2000 they will set up an academy to do that.

Below are the details of the requirements:
Compulsory Actuarial Exams
- Life insurance
  - ☐ General calculation principles in life assurance
  - ☐ Premium, reserve, and dividend calculation (for participating policies)
  - ☐ Stochastic principles
- General insurance
  - ☐ Insurance risks target surplus
  - ☐ Premium calculation
  - ☐ Reserving
  - ☐ Risk classification
- Pensions
  - ☐ Basic statistics and probability theory
  - ☐ Markov Chains☐ Decrement models
  - ☐ Premium and Reserve calculations
  - ☐ Financing methods
- Computer Science
  - ☐ Software Development
  - ☐ SQL (Computer language for databases)
  - ☐ Business processes

Optional Actuarial Exams
Students need to take one out of the following three exams:
- Mortgage savings plans ("Bausparmathematik")
- Investments
  - ☐ Portfolio theory (Markowitz Capital Asset Pricing Model (CAPM))
  - ☐ Analyzing fixed-income products
  - ☐ Futures, options, swaps (including pricing issues)
  - ☐ Investment theory
- Health insurance
  - ☐ Actuarial principles
  - ☐ Premium and reserve calculation
  - ☐ Product range

Final Exam
Need to select one of the following two exams after three years of practical experience:
- Life insurance
  - ☐ Premiums and reserves for special tariffs (e.g. dread disease)
  - ☐ Group business

- ☐ Profitability of life insurance policies
- ☐ Basics of reinsurance of life insurance companies
- ☐ Assets (analyzing/hedging portfolios, etc.)
- ☐ Knowledge of the most important insurance laws (VVG, VAG, HGB, etc.)

Nonlife insurance

- ☐ Multivariate statistics
- ☐ Solvency: simulation models
- ☐ Credibility models
- ☐ Calculation of ruin probabilities
- ☐ Rating systems
- ☐ Basics of reinsurance of nonlife insurance companies

FRANCE

Overview

France has the second largest actuarial population in continental Europe. It is a university-only system. Specific actuarial education after completing high school is two years of university education (background must be either scientific or economic) and another three years of specific actuarial education with the university exam but no actuarial exam. After passing all the exams, you must apply to the actuarial association linked to the graduate institution at which study takes place. All the actuarial associations are federated under the French Federation of Actuaries. There is also an alternative route based on part-time study (it is less rigorous, but not as prestigious). There are now four separate actuarial associations that are grouped together under the French Federation of Actuaries (Chart 1).

A new simplified and united structure is currently planned (Chart 2).

French Actuarial Education Requirements

Five years of university education

- ☐ Finish with M.S. degree

Main topics

- ☐ General mathematics
- ☐ Statistics and econometrics
- ☐ Financial mathematics
- ☐ Microeconomy and macroeconomy
- ☐ French commercial and insurance laws
- ☐ General and insurance accounting
- ☐ Life and nonlife insurance

Internships

ITALY

Overview

The actuarial society is the Ordine Nazionale degli Attuari. It was founded in 1994 and has about 750 members. In this market, a separate entity exists (the "Istituto Italiano degli Attuari") and it has a pure scientific and educational mission. The two entities work together with the commissioner and the Italian Association of

Insurance Companies to establish professional standards and actuarial guidelines as well as offer actuarial training seminars.

Qualification Requirements
To become a member of the "Ordine," students must take an examination (written and oral) on actuarial techniques, mathematics/statistics, and insurance law and regulation. People eligible to take such an exam are those with a degree in actuarial and statistics sciences (no other degree is allowed). There are currently six universities offering such a degree.

Actuarial Practice
A member of "Ordine" can sign off any actuarial valuation that is required by law in certain circumstances (i.e. pension funds). Recent law introduced the role of the appointed actuary—a qualified actuary with a given experience and seniority in the life assurance. For nonlife insurers, no appointed actuary is needed. Valuation of the reserve is made by a qualified actuary employed by auditors. The Ordine Nazionale degli Attuari has not undersigned the mutual recognition of other professional bodies within the EU. For example, if you are a French qualified actuary, you can work as a qualified actuary in Germany or Italy.

The NETHERLANDS
Overview
The Dutch Actuarial Society ""Actuarial Genootschap (AG) has 700 qualified members and 375 affiliate members from other EU organizations practicing in the Netherlands. The Netherlands is a very insurance friendly and open market, and there are many foreign companies in that market. The roots of the actuarial society date back to 1888.

There are two ways to qualify as an actuary. The first is through the "university plus" model, and the other is the nonuniversity program. It takes 7–8 years time for qualification.

University-Plus model
- Offered by the University of Amsterdam
- University program (4–5 years) ends with "Drs." title
- Additional courses from the nonuniversity program (2–3 years)
  - Writing skills, pensions, insurance, regulation, taxation, speaking skills, reporting, financial risks, strategy/organization, and so on.

University-Plus program ends with "AAG" title

Nonuniversity program
- Takes place at the Actuarial Institute (part of AG)
  - Includes courses from the university program
- Three separate program stages
  - Actuarial Rekenaar—basic actuarial education
  - Actuarial Analyst—student chooses a specialization (life, nonlife, pensions, financial risks)
  - Actuaries (Fellowship) program—ends with "AAG" title

SWITZERLAND

Overview

We've heard of Switzerland because someone like Hans Gerber is a prominent member of that country's organizations, and he has contributed to actuarial literature around the world. The Swiss organization, "Schweizerische Aktuarsvereinigung, "Schweizerische Vereinigung der Versicherungsmathematiker (SAV"), has around 900 registered members, 300 of which are qualified Swiss actuaries. As a full member of the IAA, in 1995 the SAV has set up the "Sektion Aktuare SAV" (qualified Swiss actuary). As of January 2000, future members have to pass exams (or demonstrate equivalents) consistent with the IAA core syllabus. Those requirements harmonize the Swiss actuarial qualification with the "full member" requirements of other European Union societies. The Swiss actuarial designation does not differentiate between life and nonlife actuaries. Following the recent implementation of the Third Insurance Directives of the European Union, which introduced solvency supervision and freedom of services, the Swiss insurance industry is likely to introduce the position of "appointed actuary" in the near future.

Swiss Actuarial Association—Qualification Requirements

There are three ways to become an "Aktuar SAV" (Swiss Actuary):

1. "Standard" university education in actuarial science
2. "Supplementary" actuarial education with mathematics degree (MS), with or without pensions expert diploma
3. "Supplementary" actuarial education without mathematics degree, with or without pensions expert diploma; pensions experts Pensionsversicherungsexperte (PVE) must have a minimum of three years practical experience in pensions environment, have passed (two theoretical and one job-related) exams and written a dissertation.

In addition to the more theoretical education, a minimum of three years' experience in the actuarial profession and an oral examination by a board of examiners are required to become a qualified Swiss Actuary.

Below are the detailed requirements:

"Standard" actuarial education (possible at four Swiss universities):

Basic education: mathematics, stochastics, computer science, economics

Actuarial education: basic know-how

Insurance theory, insurance mathematics, finance, microeconomics

Actuarial education: special know-how

☐Risk management, management information, insurance, mathematics

☐ University education is completed by passing the exams

"Supplementary" actuarial education

Basic Education: Degree in mathematics with pensions expert diploma

Actuarial education: basic know how

Basic Education: Degree in mathematics without pensions expert diploma.

Actuarial education: basic know how and special know how

☐ Without mathematics degree and with pensions expert diploma

- Individual Application to the "Sektion Aktuare SAV"
- Basic Education and basic know-how of the actuarial education
- Without mathematics degree and without pensions expert diploma

☐ Individual application to the "Sektion Aktuare SAV"

- Basic education, basic and special know-how of the actuarial education

Latin America

Overview

Latin America's actuarial profession has a mixed history. Generally, it was not viewed as critical or necessary until recently. The exception is pension actuaries because of high and/or hyper inflationary environments. It either destroyed traditional life insurance, or negated the need for accurate reserving and/or pricing. Now, with inflation largely under control, more refined actuarial skills are needed.

In many markets, data have not been available often. To really do a detailed actuarial analysis, the problem of distance, data gathering, and data analysis is very much a problem of lack of availability. But there has been an influx of multinational companies such as AIG. They are changing the standards in their market and asking core companies to be more diligent in gathering data. Also, the supervisory authorities have recognized the need for adequate capital raising risk-based capital requirements. They are looking at the capital requirement in the established markets in North America.

The oldest actuarial organization in South America is in Brazil. It started in 1944. The actuarial education system remains University Plus.

MEXICO

Overview

Mexico's actuarial organization, Colegio Nacional de Actuario ("CONAC") was founded in 1960 and has about 500 members. Actuarial education consists of attending a recognized *colegio* at one of many universities. The curriculum is largely borrowed from the SOA, the CAS, and the Institute of Actuaries in the U.K. The qualification requirements and post-university education include submission of a written thesis. There is also an oral examination given by a panel of 3–5 qualified actuaries. In order to be admitted to this exam, you must be sponsored by a qualified actuary who will vouch for your personal integrity and qualifications. Proficiency in two other foreign languages must be demonstrated. Additional requirements are examinations administered by CONAC that deal with reserve opinions and pension plan funding.

There are nine universities recognized by the Ministry of Education. There is a work requirement for recognition. Six months worth of unpaid activity is needed to obtain the honorary professional status given to the actuary. Many of the actuaries in Mexico are qualified demographers. Much of the work tends to be in demography when they are doing this for the public. For example, they just had a

census in Mexico around February. Many of the demographers doing the home interviews are actuarial students. They were able to pool results in about three months, and they did a very good job.

There are two additional actuarial associations, The Asociacion Mexicana de Actuarios is primarily for insurance company employees. It was founded in 1966 and has about 500 members. The other, Asociacion Mexicana de Actuarios Consultores is primarily for pension consultants. It was founded 1981 and has about 50 members.

BRAZIL

Overview

The actuarial organization is Instituto Brasileiro de Actuaria (IBA) founded in 1944 with approximately 300 members. It is strictly university-based. There are seven recognized universities, two in Rio de Janeiro, two in Sao Paulo and one each in Rio Grande Do Sul, Parana, and Fortaleza. There is a required curriculum that includes complete mathematics, statistics, actuarial theory, insurance law, economics, and accounting. The scope of responsibilities, as prescribed by IBA for companies and businesses (insurance, providencia privada (annuity) and capitalization), are such functions as pricing, reserving, and self-policing.

ARGENTINA

Overview

The actuary in Argentina is technically a member of "Consejas Profesionales en Ciencias Economica." With minor exception, actuarial education is solely through obtaining a university degree. There are two qualified or sponsoring universities. The University of Buenos Aires is a public (state) school and historically was the only option. The University of Salvador, which is private, recently started the program and has not had any graduates yet. The curriculum is quite extensive and includes general and professional topics: theory of interest, statistics, numerical analysis, general insurance, personal insurance and economics. Once the curriculum is complete, only an application is necessary to receive qualification.

Recently, the Superintendent of Insurance established a "Valuation Actuary" certification requirement. This was an important event in the actuarial community in Argentina. In order to sign a statement, the actuary must be registered as an actuary with the superintendent and must demonstrate at least one year of relevant experience with the appropriate education institute. They are trying to implement something more rigorous. The SOA is active by providing library materials and administering exams.

Mr. Gordon E Willmot: Can you please comment on the actuarial education in the Scandinavian countries?

Mr. Mueller: Scandinavian countries more closely mirror the U.K. requirements. They are trying to have a similar program because their market is heavily influenced by the U.K. Membership is not that high in Finland, Norway, and Denmark. Sweden has the highest. Finland tends to be very good in casualty

insurance, but their education model has, until recently, been exclusively university driven. They still do not have exams in place and are looking at the U.K. system. With these small countries, they generally have one very prestigious university and they go for that one university program.

Mr. Willmot: Regarding the Dutch and the Swiss, do you know of any difference in the perceptions of those actuaries, either by employees or the public in the way they are qualified?

Mr. Mueller: The perception is higher in the Dutch market, which is seen as more business-oriented. I would say the country with the highest influence in the continent is the Netherlands. They are also the second highest in Europe, following the U.K. You don't find too many insurance companies that don't have at least two actuaries on their board. Sometimes the majority of board members are actuaries. You will find all the large U.K. companies active in the Netherlands. Also, the Netherlands has been the first market to deregulate, even before the freedom of services. Once the market is deregulated, the supervisors have less control and authority, and they pass on more reliance on the actuaries.

Mr. Willmot: I'm sorry I didn't make my question very clear. I wanted to know if the perception of actuaries differs with respect to the way they qualify as actuaries. I noticed in both Holland and Switzerland, there were different ways to qualify. Are some considered lesser actuaries?

Mr. Mueller: In general, the nonuniversity program is less prestigious. If you have not qualified for the Amsterdam program, you don't have the same status in the actuarial community. However, the actuarial program in Amsterdam doesn't produce enough people. You don't get enough good people coming out in any given year with degrees to really satisfy a market of 25–30 large companies. With only 20–30 people qualifying each year, that is one person per company on the average. The Swiss are coming more from the scientific and not the business angle. In general, Swiss companies are not run by the actuaries, but by former top agents, marketers or financial people. In the Netherlands, actuaries hold CEO positions.

Mr. John A. Hubbard: I just returned from Egypt where I've been teaching at the University of Cairo for the last year and a half. I'd like to emphatically second what Curtis said. We really have to move in the direction of giving more university recognition. The U.K. is doing that very aggressively, and they have many programs in Eastern Europe that are done in cooperation with the U.K. government.

Mr. Mueller: I think you also have to consider that in the U.K., the U.S. and Canada, most people start working in the field with a bachelor's degree at 21 years old. They can qualify at 25 or 26 if they go through the exams very rigorously. In many countries, the education system is such that people who work as actuaries have actually completed a master's degree, and are 24 or 25 years old. If you don't give recognition to that, it is going to lead to people not being able to qualify through the exams until they are in their early 30s. We need to recognize

university education and realize that many topics, which we include in our exams, are part of the education syllabus in the universities.

Mr. Robert L. Brown: We now have the SOA task force for education and qualification by 2005 in place chaired by Steve Radcliffe. Completely parallel to that, the British Institute has an education task force, chaired by Jeremy Goford. We are actually now meeting jointly. I think the acceptance level is extremely high at the very earliest stages, but we are rapidly working toward a common syllabus for all English-speaking actuaries.

With what we've heard at this meeting, it is a small step from there to a universal or worldwide syllabus. Because North America is out of step with the rest of the world in not recognizing university education, and given the position I am in, if somebody could come up with a magic formula that would recognize university education in North America, please send it to me.

CHART 1

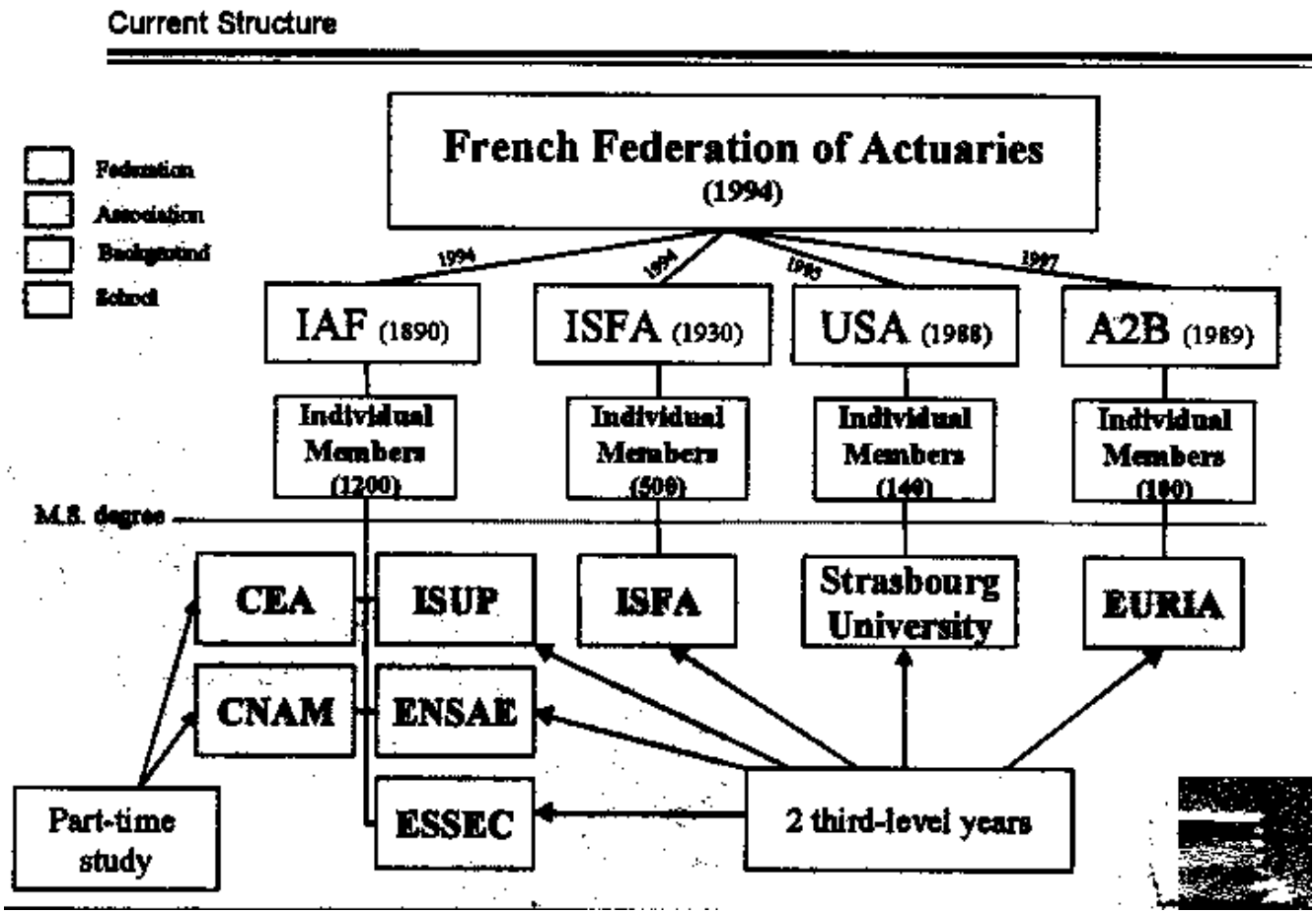
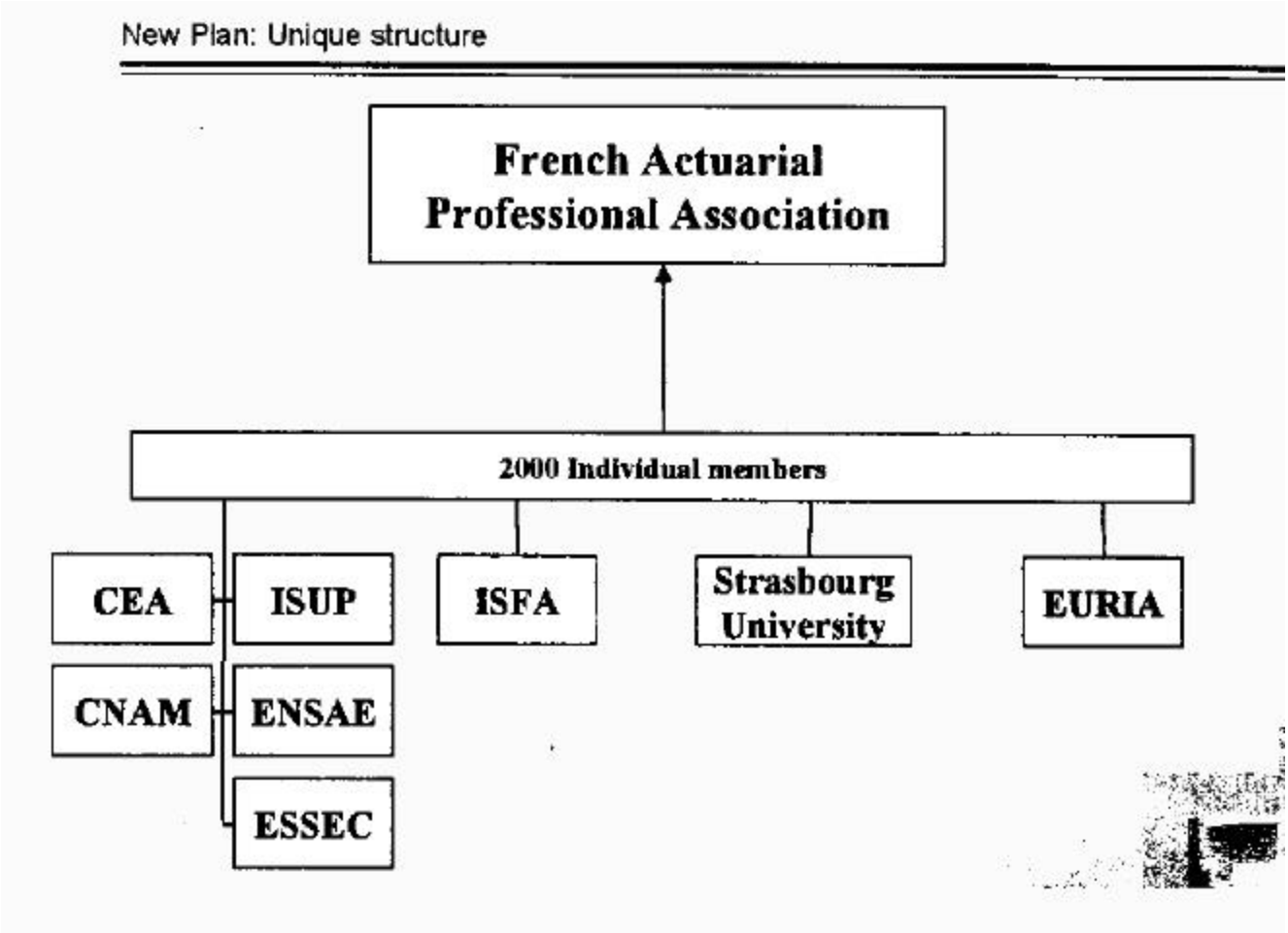

Current Structure
Federation
Association
Background
School
French Federation of Actuaries
(1994)
1994
1997
IAF (1890)
ISFA (1930)
USA (1988)
A2B (1989)
Individual Members (1200)
Individual Members (500)
Individual Members (140)
Individual Members (180)
M.S. degree
CEA
ISUP
ISFA
Strasbourg University
EURIA
CNAM
ENSAE
ESSEC
Part-time study
2 third-level years

CHART 2


New Plan: Unique structure
French Actuarial Professional Association
2000 Individual members
CEA
ISUP
ISFA
Strasbourg University
EURIA
CNAM
ENSAE
ESSEC